ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DETERMINANTS OF ACUTE MALNUTRITION AMONG UNDER-FIVE CHILDREN IN GOVERNMENTAL HEALTH FACILITIES IN SODDO TOWN, SOUTHERN ETHIOPIA: UNMATCHED CASE-CONTROL STUDY

BY FIKRE MOGA(BSC)

A THESIS SUBMITTED TO SCHOOL OF NURSING AND MIDWIFERY, COLLEGE OF HEALTH SCIENCES, ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTERS OF SCIENCE DEGREE IN CHILD HEALTH NURSING

MAY, 2021

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STATEMENT OF DECLARATION

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LIST OF ACRONYMS AND ABBREVIATIONS

ANC=Antenatal Care

AOR=Adjusted Odds Ratio

CI=Confidence Interval

EBF=Exclusive Beast Feeding

EDHS=Ethiopian Demographic and Health Surveillance

GHC=Ganame Health Center

GM=Growth Monitoring

HIV/AIDS=Human Immunodeficiency Virus, Acquired Immunodeficiency Syndrome

MAM=Moderate Acute Malnutrition

MCH=Maternal and Child Health

MUAC=Middle Upper Arm Circumference

PNC=Postnatal Follow up

SAM=Severe Acute Malnutrition

SNNPR=Southern Nations Nationalities and Peoples Region

STHC=Soddo Town Health Center

TT= Tetanoid Toxoid

UNICEF=United Nations Children's Fund

WHC=Wadu Health Center

WHO=World Health Organization

WSTRH=Wolaita Soddo Teaching and Referral Hospital

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ABSTRACT

Background: Acute malnutrition is a major public health challenge among children globally and particularly the burden is high in low-income countries like Ethiopia. Different reports and literatures revealed different risk factors of acute malnutrition in different geographical area. Moreover, to the extent of the investigator's knowledge, there is no similar study to identify factors associated with acute malnutrition in the study area. **Objective:** The main aim of this study was to identify determinants of acute malnutrition among under-five children in governmental health facilities of Soddo town, Southern Ethiopia. **Methods:** Institutional based unmatched case-control study was conducted among 399 participants (133 cases and 266 controls). Data were collected from February 14 to March 14, 2021 Interviewer administered a structured questionnaire was used to collect data and standardized anthropocentric measurement equipment's were used to identify cases and controls. Data were analyzed using SPSS version 26. A logistic regression model was fitted and used to identify the determinants of acute malnutrition and statistical significance was declared at P<0.05. **Result:** A total of 133 cases and 266 controls were included in the study. Mothers with no formal education [AOR 2.96(1.02, 8.56)], Birth interval less than 24 months [AOR2.71(1.54,4.76)], Marital status of mothers[AOR4.45(1.72,11.51)], diarrhea in the past two weeks [AOR 9.15(2.83,29.53)], using non-protected water for drinking [AOR3.45(2.00,5.93)], duration of exclusive breastfeeding less than 6 months [AOR4.65(2.21,9.78)], not taking sick children to health facility within 24 hours of the onset of any sickness[AOR 5.10(2.94,8.86)], low birth weight [AOR 3.56(1.15,10.99)], breast feeding for less than 24 months[AOR 10.26(4.57,22.99)],using non-improved toilet[AOR 5.09(2.40,10.79)], low dietary diversity [AOR 2.05(1.05,4.00)] and food insecurity [AOR 3.83(1.80,8.14)] were significantly associated with acute malnutrition. **Conclusion and Recommendation:** This study identified various determinants and provided clues on the major determinants of acute malnutrition among under-five children in the study area. non-optimum birth spacing, exposure to diarrhea, lack of safe water supply, duration of exclusive breastfeeding, dietary diversity and food insecurity were among the commonest contributing factors oof acute malnutrition Thus, ensuring safe water supply, empowering women and increasing knowledge and practices of mothers regarding exclusive breast feeding and family planning is recommended.

Keywords: Acute malnutrition, Determinants, Case-control, Children, Wolita Soddo

1. INTRODUCTION

1.1. Background

Malnutrition in all forms is defined as deficiencies, excess and imbalance of a person's intake of energy and important nutrients with body demand. It encompasses three major conditions: the first is under-nutrition which includes, wasting (low weight for height), stunting (low height for age), and underweight (low weight for age). The second one is malnutrition which is related to micro-nutrients such as vitamins and minerals deficiency or excess. The third one is overweight and obesity which occurs when there is an excess accumulation of fat in the person's body. Under-nutrition can also be classified as acute and chronic based on its causes and duration of nutritional deprivation. If the children weight for height is below normal it indicates that the child has recent or acute malnutrition. On the other hand if the individual's height is below the median height in the same age group, it is an indicator of chronic or recurrent malnutrition(1,2).

Acute malnutrition is a devastating global human disaster which is considered as both medical and social problem, that affects all age group in general and children in particular. It is characterized by low weight for height (wasting), or low Middle Upper Arm Circumference (MUAC) and presence of bilateral oedema. If timely and adequate treatment is not given it may halt the normal growth and development of children. Acute malnutrition is caused by poor dietary intake, recurrent infections, poverty, climate change, natural disaster, lack of policy measures, political instability and many other factors(3,4).

Acute malnutrition can further be classified into severe acute malnutrition(SAM) and moderate acute malnutrition or(MAM) based on the degree of wasting, mid-upper arm circumference and presence of bilateral edema(5). Moderate acute malnutrition in children is defined by moderate wasting(weight for height $\geq$-3 and <-2 z-score of the median World Health Organization(WHO)growth standard, and MUAC is greater or equal to 11.5cm but less than 12.5cm without bilateral nutritional edema(6). Severe acute malnutrition, on the other hand, is defined by very low weight for height <-3 z-score of the median WHO growth standards, MUAC less than 11.5cm and with or without bilateral edema(7).

Globally one among three children is not growing well due to malnutrition and in South Asia even one child among two is malnourished. In South and East Africa, two among five children are undernourished. Despite the alarming magnitude of acute malnutrition in the world particularly in developing countries like Ethiopia, only about one child in four receives treatment of acute malnutrition. In addition, around 28% of child death in Ethiopia, is directly associated with malnutrition which is devastating(8,9).

In Ethiopia, the burden of acute malnutrition among children has slightly declined from decades ago but still remains high. According to the reports mothers educational status, using non protected water for drinking, household wealth, mothers age, low birth weight, recurrent infection and illnesses and living in rural area are among the commonest predictors of acute malnutrition among under-five children(10).

1.2. Statement of the Problem

Each year millions of children die because of acute malnutrition. Also, the majority of deaths among under-five children is directly linked to acute malnutrition. Acute malnutrition puts children at greater risk of death and has many other adverse consequences such as impairing the health of the children, weakening the immune system of the children, decreasing the cognitive development, increasing the risk of death, increasing the health care costs, reducing the productivity and economic growth of an individual, families and nation overall (1,10,11).

According to the 2016 global nutrition report, 50 million under-five children were suffering from acute malnutrition. But in 2020, nearly 47 million children under five were acutely malnourished which showed a slight decline when compared to the 2016 global nutrition report. Also, around 14.3 million children were severely malnourished and 45% of deaths among under-five children is directly related to malnutrition especially in developing countries. Acute malnutrition is the biggest risk factor for the global burden of the disease and the majority of the burdens fall heavily on the developing countries of the world. Its impact is multi-dimensional and long-lasting which affects individuals, families, communities and countries as a whole(1,12).

According UNICEF's report, the majority of malnourished children are from sub- Saharan Africa and South Asia. If no immediate action is made, the number of under-five children suffering from Acute malnutrition could reach 54 million over the year. Which would end up with the global acute malnutrition rate not seen in the millennium. It will also put the children at greater risk of dying(13).

The negative impact of acute malnutrition among children is high in many countries in the world and its outcomes and determinants vary substantially from country to country and region to region and there is a clear relationship between infant and young child feeding practice, exclusive breastfeeding, antenatal and post-natal care with acute malnutrition (14).

The burden of acute malnutrition is high in 2018 in Sahel strip countries in Africa. It was significantly higher than the finding in 2017. The situation is progressing at an alarming rate with a global acute malnutrition rate above 10% and it is also above the emergency threshold in various regions of the Sahel strip countries. Also, more than 2.8 million children were

suffering from SAM in Sahel countries and its consequence is worrying and devastating in the region(15).

According to 2016 Ethiopian demographic and Health Surveillance (EDHS) data, ten per cent of children were wasted (too thin for their height) which was at the same level as in 2011 and three per cent of them were severely wasted. In 2019, seven per cent of children are wasted and 1% is severely wasted but regional variation exists by which higher numbers of children were wasted in rural areas and pastoralist community and smaller proportions of children were malnourished in urban areas like Addis Ababa. The average annual prevalence and trends of acute malnutrition among children is high in Ethiopia particularly among under-five children and the majority of deaths occur among them. Still, child malnutrition remains a serious public health problem in Ethiopia that needs strong and immediate remedial interventions and studies(8,16–18)

It is understood that acute malnutrition is the major public health problem in Ethiopia in general and the study area in particular. Different reports and literatures revealed different predictors of acute malnutrition including maternal education, household poverty, gender difference, lack of policy measures, poor socioeconomic status, living in rural areas. In addition, inadequate dietary intake, diseases like diarrhea, inappropriate feeding practice, and inadequate health services, age of the children, sex of the children and birth interval are some of the factors which increases the risk and burden of acute malnutrition. However, the determinant factors of acute malnutrition are not similar across different areas. Furthermore, the burden and risk factors which are associated with acute malnutrition has regional variation. Most of all, even though the burden of acute malnutrition is high in the study area, the factors behind it are not clearly known. Therefore, the main aim of this study was to identify determinants of acute malnutrition among under five children in Governmental health facilities in Soddo town, Southern Ethiopia(19–22).

1.3. Significance of the Study

Acute malnutrition is a major public health problem among children around the world including Ethiopia. Thus, this study aimed to determine child care practice, feeding practice, health service, household, environmental and dietary related determinants of acute malnutrition. Assessing determinants of acute malnutrition has paramount significance in delivering additional knowledge for health care providers especially for nurses to identify specific risk population. It will also help in increasing coverage of interventions by health care workers, health bureaus and the regional and federal government on halting the risk factors of acute malnutrition. In addition, it will strengthen community-based screening and management of acute malnutrition through identification of specific at-risk group. It will also contribute in optimizing the acute malnutrition management protocols. Moreover, the study will give clues on the major contributing factors of acute malnutrition to the institutions which works on child health. Furthermore, the information obtained from this study will also be used as a source of information for further studies on similar issues. Besides, the study will help policy and decision-makers in developing strategy to tackle the problem from the root.

2. LITERATURE REVIEW

2.1. Overview

Acute malnutrition is a devastating multi-dimensional problem that commonly affects infants, young children and adolescents. It is not just caused by the inadequacy of nutritious foods but poor feeding and caring practice, lack of health access and other social services. Despite the national and international communities intervention to tackle the negative impact of acute malnutrition, still, it remains major causes of mortality and morbidity among under-five children(2).

2.2. Prevalence of Acute Malnutrition

Globally more than 17 million children are suffering from severe acute malnutrition. Despite the significant interventions and progress in recent years, only about 2.9 million children have accessed treatment. Children with severe acute malnutrition are nine times more likely to die than well-nourished children(23). In Asia, the prevalence of wasting(acute malnutrition) was nine percent which is higher when compared to the global average prevalence rate of acute malnutrition(24).In Africa, the magnitude of acute malnutrition is high especially in East and West Africa compared to WHO Millennium development goals in 2015. It was 18%, 15.5% and 12.7% in Niger, Burkina Faso, and Mali respectively. In East Africa, it was 11.1%, 8.7% in Comoros and Ethiopia respectively(25).

In Ethiopia, the magnitude of acute malnutrition among under-five children is higher in most parts of the country(26–28). According to the study done in Debretabor, North-West Ethiopia, the prevalence of wasting is 7.6%(29).In Hawassa, its prevalence was 28.20% and the mortality rate of acute malnutrition was 7% in Hadiya Zone. Thus, due emphasis should be given to intervene on causes of malnutrition and further studies should be done(21,30,31). Also, the prevalence of malnutrition among under-five children is high in Wolaita Zone in general and Soddo town in particular and the survival rate was lower when compared to acceptable sphere standard(32–34).

2.3. Determinants of Acute Malnutrition

2.3.1. Socioeconomic and demographic characteristics

According to the studies, conducted in different parts of Nepal, occupation (AOR=4.69, 95% CI=1.17-13.76), severe food insecurity (AOR=3.55, 95%CI=1.85-9.77), and children from household with monthly income less than average level were 8 times more likely to suffer from acute malnutrition(35). Also, the likelihood of being malnourished is 3.96 times more likely for children from the family size of five or more, children of mothers whose age is <20 or>35 years at birth were 3.21 times more likely to develop acute malnutrition and low socioeconomic status(AOR=17.13,95%CI=5.85-50.13) were significantly associated with acute malnutrition(36). Other factors such as birth interval of less than two years and illiterate father were an independent predictor of acute malnutrition(37).

Similarly, another study done in a rural part of India on risk factors of SAM exhibited that; the chance of to be malnourished is higher among children household with low family income, maternal educational status, house size, drug addiction and alcohol consumption of parents, lower age at marriage for mothers, maternal height<145cm, and maternal weight <45cm were strongly associated with SAM(38).

In Africa, the two studies which are conducted in Mao district in Chad and Lubumbashi district in the Democratic Republic of Congo exhibited that, the likelihood of being malnourished is 2.6 and 24.89 times higher among children with undernourished caretaker respectively(39,40). Besides, caretaker marital status (AOR=7.7, 9 5%CI=2.0-30.1), and low food diversity (AOR=1.8, 95%CI=1.0-3.1) were significantly associated with acute malnutrition(39). Also the number of under-five children in the household, maternal age were significantly associated acute malnutrition (40).

In Ethiopia, a study conducted in North West Ethiopia on determinants of SAM among under-five children showed that the odds of acute malnutrition is 2.7 and 5.7 times higher among children from large family size and parents with monthly income less than 1500birr. Besides the probability to be malnourished is 2.9 times higher among children whose households have food insecurity problem(AOR=2.9 95%CI=1.17-7.28)(41).

Similarly, the study conducted in Dubti district in Afar region, on determinants of acute malnutrition showed that, children from parents whose monthly income less than one thousand birr were 4 times more likely to suffer from acute malnutrition (AOR=3.98, CI=2.05-7.69) and which supports the findings from North West Ethiopia. Likewise, children of father with no formal education were 2.47 times more likely to develop acute malnutrition, and children who served food with family were 2.18 times more likely to suffer from acute malnutrition(AOR=2.18, CI=1.10-4.30)(42).

According to the studies conducted in Gambela region and East Wolega, Oromia region on determinants of acute malnutrition among under-five children, children whose mother had no formal education were 2.55 and 2.16 times more likely to develop acute malnutrition with respectively. Also, Other factors such as birth order of the child (AOR=3.65, 95%CI=1.21-13.01), and the number of under-five children in the family (AOR=3.40, 95%CI=1.03-11.22) were significantly associated with acute malnutrition as the study in Gambela region showed. Likewise, children from parents whose family size is large were 2.59 times more likely to develop acute malnutrition as the study in East Wolega showed(43,44).

Similarly, the community-based case-control study done in Kera demographic surveillance and Health research center of Haromaya university on predictors of acute malnutrition among children under three years of age found that; children from parents who decided on the care or treatment of the ill child individually were 1.62 times more likely to develop acute malnutrition, Besides, children from mothers who have no access to the health facility were 1.56 times more likely to have acute malnutrition. Other factors such as narrow birth interval (AOR=1.65,95%CI=1.23-2.20) and socio-economic status were significantly associated with acute malnutrition(45).

Other studies which are conducted in Jimma Zone and Shashogo Woreda, South Ethiopia showed that the likelihood of acute malnutrition is 3.25 and 8.683 times higher among children from mothers who were illiterate respectively. Other factors such as; children from parents with low monthly income were 3.14 times highly likely to suffer from acute malnutrition, and birth interval less than one year (AOR=4.33,95%CI=2.09-8.94) were significantly associated according to the study in Jimma. Likewise, lack of maternal autonomy in decision making(AOR=3.46,95%CI=1.272-9.414) and visiting health institution after 24

hours of the onset of symptoms for sick children (AOR=3.95,95%CI=1.465-10.647) were independent predictors of the occurrence of acute malnutrition as the study conducted in Shashogo revealed(46,47).

2.3.2. Child Feeding and Caring Practice

According to the studies conducted in two different districts of Nepal and Southern India on predictors of SAM among under-five children, lack exclusive breastfeeding(EBP) not giving colostrum, bottle feeding, discontinuing breastfeeding before two years of age, and late initiation complementary feeding were significantly associated with acute malnutrition(35,37,48).

Similarly, the studies conducted in Mao district in Chad and Lubumbashi district in Congo, showed that type of complementary feeding, frequency of complementary feeding, caretakers nutritional status, ceasing breastfeeding before six months of age, and caretakers handwashing habit were an independent predictor of acute malnutrition(39,40).

According to the studies done in North West Ethiopia, and in Gambela region lack of exclusive breastfeeding, late initiation of breastfeeding, lack of counselling on Infant and young child, infrequent handwashing practice were significantly associated with acute malnutrition(41,43). A similar study done in Enebsie Sarmidr district, East Gojam, North Ethiopia on determinants of SAM showed that, the chance to be malnourished is 4.26 and 5.81 times higher among children who initiated breastfeeding lately after birth and who did not practice breastfeeding respectively. Other factors such as, decreased meal of mothers during pregnancy and lactation(AOR=8.15,95%CI=3.70-17.97) and birth interval less than two years(AOR=3.34,95%CI=1.55-7.20) were significantly associated with SAM after controlling the effects of other variables(49).

Likewise, studies in East Wolega and Kera demographic surveillance, Health research center of Haromaya university and Jimma Zone showed that the odds of acute malnutrition is 2.63, 1.43l and 3.22 times higher among children who did not practice exclusive breastfeeding respectively Other factors such as lack of caregivers hand washing, bottle feeding, discarding colostrum were found to be independent predictor of the occurrence of acute malnutrition(44–46).

Similarly, a case-control study conducted in Karat town public health facilities children showed that children who had a history of dietary diversity less than or equal to three food groups were 5.13 times more likely to suffer from acute malnutrition (AOR=5.13, 95%CI=1.56-16.84), children who receive breastfeeding for less than 12 months of age were 3.02 times highly likely to develop acute malnutrition(AOR=3.02,95%CI=1.57-23.04)(50).

2.3.3. Child characteristics and Illnesses

According to the study conducted in Pakistan, more males were malnourished as compared to females and children who were exposed to recurrent infections were more likely to develop acute malnutrition(22). Other similar studies conducted in India exhibited that, not taking an age-appropriate vaccine, low birth weight and recurrent illness, age of the children, and children with poor appetite were independently associated with acute malnutrition(38,48).

The studies done in Mao district in Chad and in Congo exhibited that, the probability of being malnourished is 10.7 and 10.34 times higher among children who were exposed to diarrheal diseases when compared to their counterparts respectively. Also, other factors such as history of fever (AOR=8.4, 95%CI=3.1-22.8); history of vomiting (AOR=7.6,95%CI=3.0-19.7) and stunting were (AOR=5.3, 95%CI=177-16.3) independent predictor of acute malnutrition in the study conducted in Chad and children with low birth weight were 2.72 times more likely to develop acute malnutrition than their counterparts as the study in Congo showed (39,40).

According to the studies done in North West Ethiopia and Gambela, the chance to be malnourished is 3.2 and 2.74 times more likely among children who had diarrhea two weeks preceding the survey respectively. (41,43).Other studies done in Enebsie Sarmidr district, East Gojam and in East Wolega found that Children who had diarrhea in two weeks preceding the survey were almost eight and four times more likely to develop acute malnutrition respectively. Also, children who had a history of febrile illness preceding two weeks before the survey were 2.87 and 1.86 times more likely to suffer from acute malnutrition respectively. Besides, the study in East Gojam showed that, Children whose age below 24 months were 2.64 times more likely to suffer from acute malnutrition with (AOR=2.64,95%CI=1.17-5.95(44,49).

Also, other studies conducted in, Shashogo Woreda, and in Karat town showed that the likelihood of being acutely malnourished is 4.13 and 8.41 times higher for children who had

diarrhea two weeks preceding the survey respectively(47,50). A similar study which is employed in Konso Zone, South Ethiopia exhibited that, increased age of the child(AOR=1.23, 95%CI=1.02-1.48), and short birth interval were statistically significant to acute malnutrition(51).

2.3.4. MCH Service Utilization related characteristics

The studies conducted in Pakistan and rural part of India found that, the likelihood of being malnourished is high among children who did not take age appropriate vaccination when compared to their counterparts(22)(38). Similarly another study conducted in Gamela region exhibited that, the chance to be malnourished is 4.6 times higher among children who did not take the age-appropriate vaccine when compared to their counterparts Gambela revealed(43).Similar study conducted in Haromaya University revealed that, the chance to be malnourished is 1.56 times higher among children of mother who have no access to health facility(45).

Even though, maternal antenatal care follow-up, post-natal care follow-up and deworming has significant impact on the health of child and mother scientifically, the studies conducted in Karat town and Shashogo Woreda and East Wollega revealed that there no significant association between mothers' antenatal care follow-up, postnatal follow-up and regular deworming(47,50)(44).

2.3.5. Environmental Characteristics

The study in Mao, Chad exhibited the absence of toilet as an independent predictor of malnutrition (AOR=1.9, 995%CI=1.1-3.6)(39). Other studies which are done in Mechakel woreda and Karat town revealed that the likelihood to be acutely malnourished is 3 and 5.6 times higher among children whose source of drinking water is unprotected (AOR=3.04, 95%CI=1.01-9.17) and (AOR=5.61,95%CI=2.04-27.03) respectively(50,52). In general, Various risk factors have been identified to predict the occurrence of acute malnutrition in children but there has been regional variation among the findings.

Moreover, majority of the studies which were conducted on determinants of acute malnutrition were done in nomadic and pastoralist community which cannot represent other communities than themselves. Also, most of the studies which were done in similar issues on population with similar characteristics employed cross-sectional study design, which is not adequate to

determine the independent predictors of acute malnutrition and also most of the studies didn't give due emphasis to determinants which are related to maternal and child health service utilization such as; lack antenatal follow up, post-natal follow-up, lack of counselling on maternal nutrition during pregnancy, lack of regular growth monitoring and lack of counselling by health care providers on infant and child feeding which have a significant impact on child malnutrition. Moreover, to the extent of investigators knowledge, there is no similar study conducted before and various associated factors are not clearly known in the study area. Therefore, this study aimed to fulfil the above gaps by assessing the determinants of acute malnutrition among under-five children in governmental health facilities in Soddo town, Wolaita Zone, South Ethiopia.

2.4. Conceptual Framework

This conceptual framework schematically presents the likely relationship between the independent and outcome variable of the study and also shows the relationship among independent variables each other. It was adapted from the United Nations Children's Fund (UNICEF) published document on the topic: UNICEF'S Approach to Scaling up Nutrition(2).

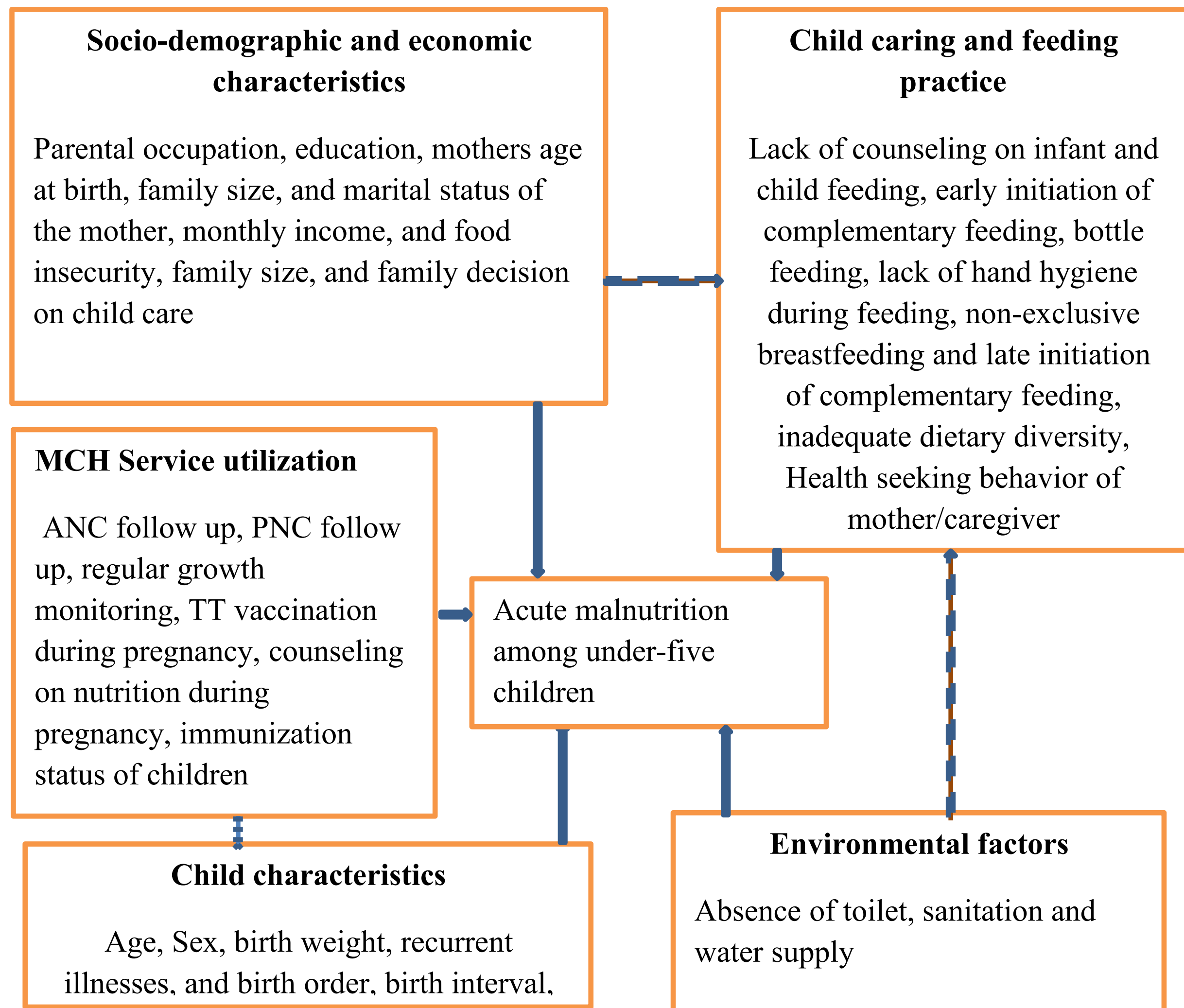

Figure 1.Schematic presentation of conceptual framework of the study which is adapted from UNICEF 2015.

3. OBJECTIVES

3.1. General Objectives

- ❖ To assess determinants of acute malnutrition among under-five children in governmental health facilities of Wolaita Soddo town, Southern Ethiopia in 2021.

3.2. Specific Objectives

To identify socio-demographic related determinants of acute malnutrition

To determine child feeding-related determinants of acute malnutrition

To determine environmental-related determinants of acute malnutrition

To identify maternal and child health service-related determinants of acute malnutrition

To identify child characteristics and illness related determinants of acute malnutrition

4. METHODS AND MATERIALS

4.1 Study Area and Period

The study was conducted in Wolaita Soddo town, in Southern Ethiopia which is an administrative town of Wolaita zone. It is located in 327 km South of Addis Ababa, the capital city of Ethiopia and 152km away from Hawassa, the regional city of Southern Nations Nationalities and Peoples Region (SNNPR). In the town, there is one teaching and referral hospital, one private hospital, 3 health centers and 13 private clinics. The study was conducted from February 14-March 14/2021 in governmental health facilities of Wolaita Soddo town, Southern Ethiopia.

4.2. Study Design

Institutional based unmatched case-control study design was employed.

4.3. Population

4.3.1. Source Population

The source population of this study were all children aged 6-59 months who receive health service in governmental health facilities in Wolaita Soddo town.

4.3.2. Study Population

For cases: the study population were all selected children aged 6 to 59 months whose weight/height was<-2 z-score of WHO standard, and or MUAC<12.5 with or without bilateral oedema who visited under five clinics of the selected health facilities.

For controls: all selected under-five children who visited the health facility (under-five clinic) for any medical reason and whose weight/height was ≥-2 z-score, and or MUAC ≥12.5 and no bilateral edema.

4.4. Inclusion and Exclusion Criteria

4.4.1. Inclusion Criteria

For cases: all children aged 6-59 months, who have acute malnutrition and who visited selected health facilities in Wolaita Soddo town during data collection period and those children whose mother/caregiver were present, able and willing to participate were recruited into the study.

For controls: all children aged 6-59 months who have no acute malnutrition, who visited health facilities in Wolaita Soddo town during data collection period and those children whose mother/caregiver were present and able and willing to participate were recruited into the study.

4.4.2. Exclusion Criteria

Children with physical deformities (which will interfere with or give an incorrect measurement), children who were critically ill, children with congenital anomalies, known chronic diseases like HIV/AIDS, tuberculosis and chronic heart diseases and mothers or caregivers who were ill and not willing to participate were excluded from the study.

4.5. Sample Size and Sampling Technique

4.5.1. Sample Size Determination

The sample size was calculated by using double population proportion formula using STAT CALC application of Epi-info version 7 statistical software by taking family size, diarrhea preceding two weeks of survey, lack of maternal autonomy in decision making, lack of exclusive breastfeeding and maternal illiteracy as an independent predictor of acute malnutrition(44,47). Then, maternal illiteracy was used to determine the sample size since it gives a maximum sample size(44). The sample size was calculated by using the following assumptions: proportion of mothers of controls with no formal education 16.37% and proportions of mothers of cases with no formal education 29.7%, 2.16 OR from the study in East Wollega, Oromia region, 5% type I error, 80% power, case to control ratio of 1:2 and 10% for non-response rate. Thus, the total sample size was 408; 136 cases and 272 controls.

4.5.2. Sampling Technique and Procedures

All health centers in the town such as; Soddo town health center, Ganame health center and Wadu health center and the only governmental hospital in the town named Wolaita Soddo University and teaching Hospital were selected purposively to get an adequate sample size. Then, the calculated sample size was proportionally allocated to the health facilities based on the average monthly flow of the cases from previous month reports. Consecutive sampling was used to select cases and controls were selected by using a systematic random sampling technique. The figure below shows the sampling procedure of the study.

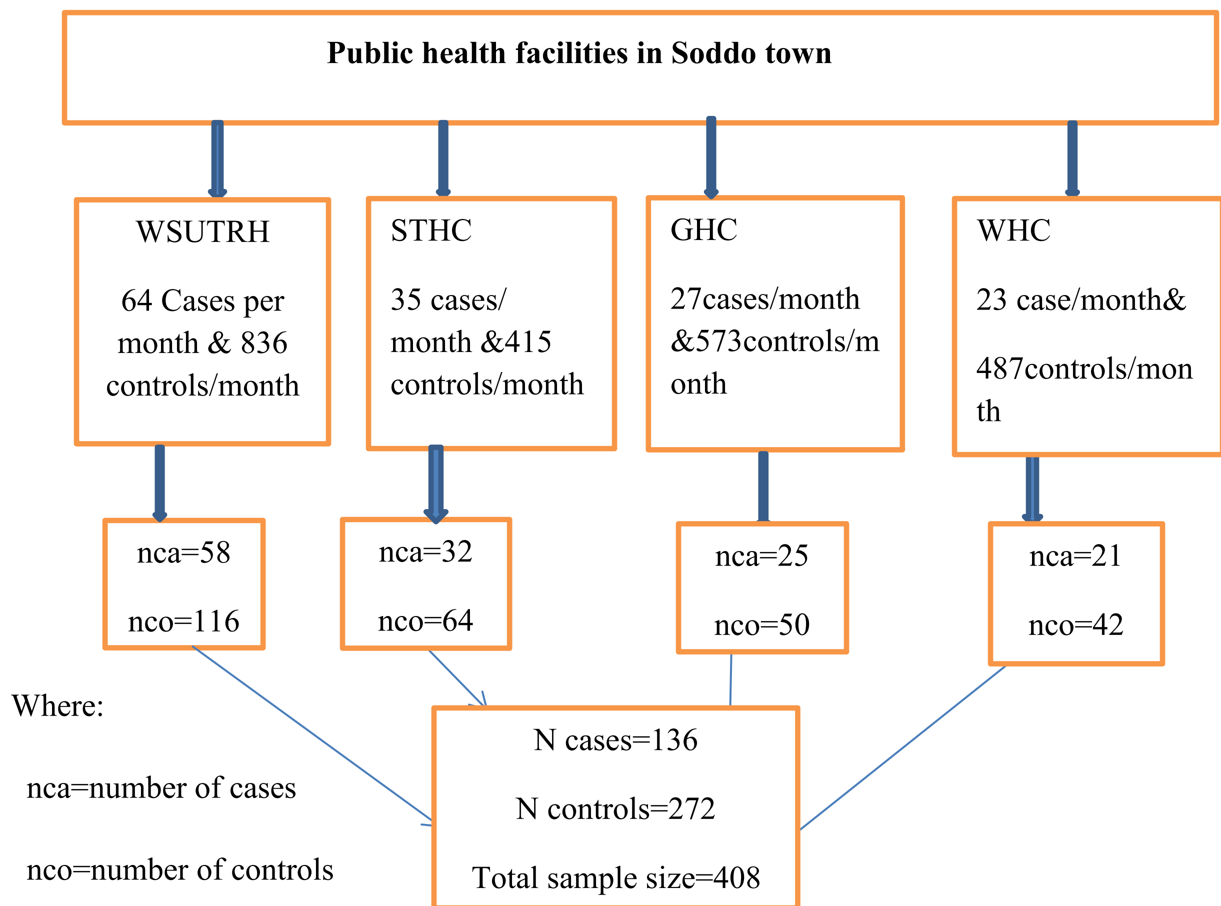

Figure 2.Schematic presentation of the sampling procedure of the study, 2021

After sample size of the case was proportionally allocated for all health facilities in the town, controls were selected by using a systematic random sampling technique. It was computed as follows:

Table 1. Selection of controls by using systematic random sampling technique Soddo town,2021.

Health facilities	N	N	K= N/n	Remark
OTRH	836	116	7	Thus, every 7th person was selected and the first person was chosen randomly.
STHC:	415	64	6	Thus, every 6th person was interviewed and the first person was chosen randomly.
GHC	573	50	11	Thus, every 11th person was selected and the first participant was selected randomly.
WHC	487	42	12	Every 12th person was included and the first person was selected randomly.

Where: OTRH: Otona teaching and referral hospital, STHC: Soddo town health center

GHC: Ganame health center, WHC: Wadu health center

4.6. Data Collection Instruments and Procedures

Ten diploma nurses were recruited for data collection based on their prior experience in data collection and four supervisors were recruited to monitor the day-to-day activities of the data collectors. The data was collected from mother's/care givers of children by using standardized interviewer-administered questionnaires and child nutritional status was determined by using anthropometric measurements. Data collection tools were prepared after reviewing different related literatures to address the study objectives. The questionnaire was translated into Amharic and local language (Wolaittato language) for fieldwork purpose and again it was translated back into the English language by language experts to check its consistency. The questionnaire had the following sections: Sociodemographic characteristics, child caring

feeding practice, dietary factors, child characteristics and illnesses, MCH service utilization and environmental factors.

Anthropometric measurement was taken by using WHO standard instruments and procedures. Thus, seca 874 U electronic scale and measuring board were used to measure the weight and height of children respectively. The length of children aged below 2 years was measured in the recumbent position and a sliding board was used to measure their length according to the standard, while the standing height was measured for children aged above 2 years and the height/length of the children was measured to the nearest 0.1cm. Children were undressed or worn light clothes and the weight of the child was measured to the nearest 0.1kg. For very small or frightened or upset children, the mother/caregiver weighed alone first and then weighed while holding the child in her arms, and the child's weight was computed by subtraction. MUAC of the child was also measured on the left arm by using tape meter at the level of upper arm mid-point mark to the nearest 0.1cm. Also, normal thumb pressure was applied for both feet for three seconds to assess the presence of pitting bilateral oedema. Thus, for children who have bilateral oedema, no other anthropometric measurement was taken and they were directly categorized as acute malnutrition.

4.7. Study Variables

4.7.1. Dependent Variable

Acute malnutrition

4.7.2. Independent Variable

Socio-demographic characteristics: Parental occupation, education, age of mother, family size, household income, food insecurity, and family decision on child care.

MCH Service utilization: Lack of ANC follow up, Lack of PNC follow up, lack of regular growth monitoring, lack TT vaccination during pregnancy, lack of counseling on nutrition during pregnancy, immunization status

Child caring and feeding practice: Early initiation of complementary feeding, bottle feeding, lack of hand hygiene during feeding, non-exclusive breastfeeding and late initiation of complementary feeding.

Child characteristics: Age, Sex, Vaccination status, birth weight, recurrent illnesses, morbidity status, birth interval, and birth order.

Environmental factors: Lack of access for health facility, Absence of toilet, sanitation and water supply.

4.8. Operational definitions and/or Standard definitions

Moderate acute malnutrition in children is defined by moderate wasting(weight for height ≥-3 and <-2 z-score of the median WHO growth standard, and MUAC is greater or equal to 11.5cm but less than 12.5cm without bilateral nutritional (6).

Severe acute malnutrition: it is defined by very low weight for height <-3 z-score of the median WHO growth standards, MUAC less than 11.5cm and with or without bilateral oedema(7).

Controls: are those under-five children whose weight for height is ≥-2, MUAC ≥12.5cm and who have no nutritional oedema.

Dietary Diversity: The number of different food groups consumed within 24 hours preceding the study(53).

Adequate dietary diversity: Proportions of children who were feed foods from four or more food groups out of eight major food groups within 24 hours preceding the interview(53).

Inadequate dietary diversity: Proportions of children who were feed foods from three or fewer food groups out of eight major food groups within 24 hours preceding the interview(53).

Food secure: Those individuals who experience none of the food insecurity access questions or just experiences worry but rarely(54).

Food insecure: Those respondents who experience some or all of food insecurity access questions(54).

Improved toilet type: Include any non-shared toilet of the following types: flush/pour flush toilets to piped sewer systems, septic tanks, and pit latrines; ventilated improved pit (VIP) latrines; pit latrines with slabs; and composting toilets.

4.9. Data Quality Management

Training was given for supervisors and data collectors on the purpose of the study, techniques of data collection, anthropometric measurement techniques and data recording. Pretest was conducted on 5% of the total sample size outside of the study area (Boditi Primary Hospital). Based on the result of the pretest, the necessary modifications and correction were made. The supervisors and investigator followed the day-to-day data collection process and ensured the completeness and consistency of collected data on daily basis. The anthropometric assessments were done using a standardized technique and equipment. To ensure the quality of data, the questionnaire was checked for consistency and completeness. Then, questions that contain errors were corrected and those missed important variables like age of the children, sex, residence and other important variables were omitted accordingly.

4.10. Data Processing and Analysis

Data were checked for completeness and consistency before data entry, then it was entered into Epi data 4.6 and exported to SPSS version 26 for analysis. Anthropocentric findings of the children were analyzed manually to identify cases and controls. The data was coded, recoded and stored to ease up analysis. Descriptive analysis was carried out to describe character of the respondents based on the study variables. Logistic regression analysis was done to identify the independent predictors of acute malnutrition. Thus, model fitness was checked. Multicollinearity among independent variables was checked by a variance inflation factor (VIF) and tolerance test. The independently associated variables in bi-variate logistic analysis with P-value <0.25 were entered into a multi-variable logistic regression analysis to control for confounding variables and to identify independent predictors of acute malnutrition. The adjusted odds ratio (AOR) with their respective 95% confidence interval (CI) were used and P-values <0.05 were considered as statistically significant. Finally, the results of the study were presented using tables, graphs and texts depending on the type of data obtained.

4.11. ETHICAL CONSIDERATION

Ethical clearance was obtained from the Institutional review board, Addis Ababa University, College of Health Sciences, School of Nursing and Midwifery and an official letter of cooperation was taken from the Soddo town health office bureau. Also, permission was asked from selected health facilities. Before the data collection, written informed consent was obtained from the study participants and the right to the refusal was respected. The purpose of the study was communicated with the study participants and the confidentiality of the information which was obtained from the study participants was maintained.

4.12. DISSEMINATION OF FINDING

The finding of the study will be disseminated to school of nursing and midwifery, Addis Ababa University at first and then to higher administrative bodies of the selected health facilities, Zonal health bureau. Finally, attempt will be made to publish the finding in reputable and peer-review journal.

5. Results

5.1. Socio-demographic Characteristics

A total of 399 participants (133(33.3%) cases and 266(66.7%)) controls) were included in the study with an overall response rate of 97.8%. The mean age of mothers of cases and controls were 33.17 and 31.81 respectively. Regarding family size, 54(40.6%) of cases and 51(19.2%) of controls had a family size of five and above. Concerning residence of the study participants, 41.4% of cases and 27.4% of controls were from rural area. Regarding maternal education, high proportion of mothers of case 37(27.8 %) had no formal education when compared to mothers of controls 14(5.3%). Besides, individual-based decision making on money (decision made by either father or mother alone were relatively higher among cases 80(60.9%) and the majority of controls 210(78.9%) make decision jointly. The table below shows the summary of the socio-demographic presentation of the study participants.

Table 2.Socio-demographic characteristics of study participants in public health facilities in Soddo town, 2021.

Variable	Categories	Cases (%)	Controls (%)	Total
Marital status	Married	100(75%)	256(96%)	356(89.2%)
	Others	33(24.8%)	10(3.8%)	43(10.8%)
Residence	Rural	55(41.4%)	73(27.4%)	128(32%)
	Urban	78(58.6%)	193(72.6%)	271(68%)
Religion	Protestant	76(57.1%)	147(55.3%)	213(53.3%)
	Orthodox	49(36.8%)	95(35.7%)	144(36%)
	Muslim	6(4.5%)	24(9%)	30(8%)
	Other	2(1.5%)	“-”	2
Mothers Education	No formal education	37(27.8%)	14(5.3%)	51(12.8%)
	Primary	55(41.4)	117(44%)	172(43.1%)
	Secondary and above	41(30.8%)	135(50.8%)	176(44.1%)
Fathers	No formal	15(11.3%)	12(4.5%)	27(6.8%)

Education	education			
	Primary	55(41.4%)	101(38%)	156(39%)
	Secondary and above	63(47.4%)	153(57.5%)	216(54.1%)
Mothers' occupation	Trader	18(13.5%)	39(14.7%)	57(14.3%)
	Employee	12(9%)	85(32%)	97(24.3%)
	Daily laborer	29(21.8%)	30(11.3%)	59(14.8%)
	Housewife	74(55.6%)	112(42.1%)	186(46.6%)
Fathers' occupation	Trader	35(26.3%)	72(27.1%)	107(26.8%)
	Employee	24(18%)	115(43.2%)	139(34.8%)
	Daily laborer	56(42.1%)	40(15%)	96(24%)
	Farmer	18(13.5%)	39(14.7%)	57(14.3%)
Average monthly income	≤ 1000	31(23.3%)	9(3.4%)	40(10.1%)
	1001-1500	15(11.3%)	14(5.8%)	29(7.3%)
	1501-2000	24(18%)	21(7.9%)	45(11.3)
	2001-2500	5(3.8%)	19(7.1%)	24(6.1%)
	2501-3000	14(10.5%)	33(12.4%)	47(11.8%)
	>3000	44(33.1%)	170(63.9%)	214(53.4%)

5.2. Child characteristics and illnesses

Around two-thirds of both cases76(57.1%) and controls166(62.4%) were males and the mean age of children was 24.33 months for cases while it was 24.35 months for controls. Concerning the birth order, more than half of cases 75(56.4%) and around two-thirds 97(36.5%) of controls had birth order of four and above. Regarding birth interval, relatively high proportion of 59(44.4%) cases and 56(21.1%) of controls had birth interval of less than 24 months. Concerning the birth weight of the children,18(43.9%) and 15(15.5%) of cases and controls had a birth weight less than 2.5kg.

Table 3. Child-related factors in Soddo town health facilities,2021.

Variable	Categories	Case (%)	Control (%)	Total (%)
Sex	Male	76(57.1%)	166(62.4%)	242(60.6%)
	Female	57(42.9%)	100(37.6%)	157(39.4%)
Birth order	1-3	58(43.6%)	169(63.5%)	227(56.9%)
	4 and above	75(56.4%)	97(36.5%)	172(43.1%)
Child age	6-11	28(21.1%)	52(19.5%)	80(20%)
	12-23	36(27.1%)	74(27.8%)	110(27.6%)
	24-35	35(26.3%)	70(26.3%)	105(26.3%)
	36-47	16(12%)	44(16.5%)	60(15.1%)
	48-59	18(13.5%)	26(9.8%)	44(11%)
Birth weight	<2.5Kg	18(43.9%)	15(15.5%)	33(24%)
	≥2.5kg	23(56.1)	82(84.5%)	105(76%)

Regarding morbidity status, the majority of cases 131(98.5%) and 207(77.8%) of controls were sick in the past two weeks prior to data collection. Relatively highest proportion of cases had diarrhea in the last two weeks 73(55.7%) preceding the survey. The figure below shows the graphical presentation of the common illnesses among under five children in the study area.

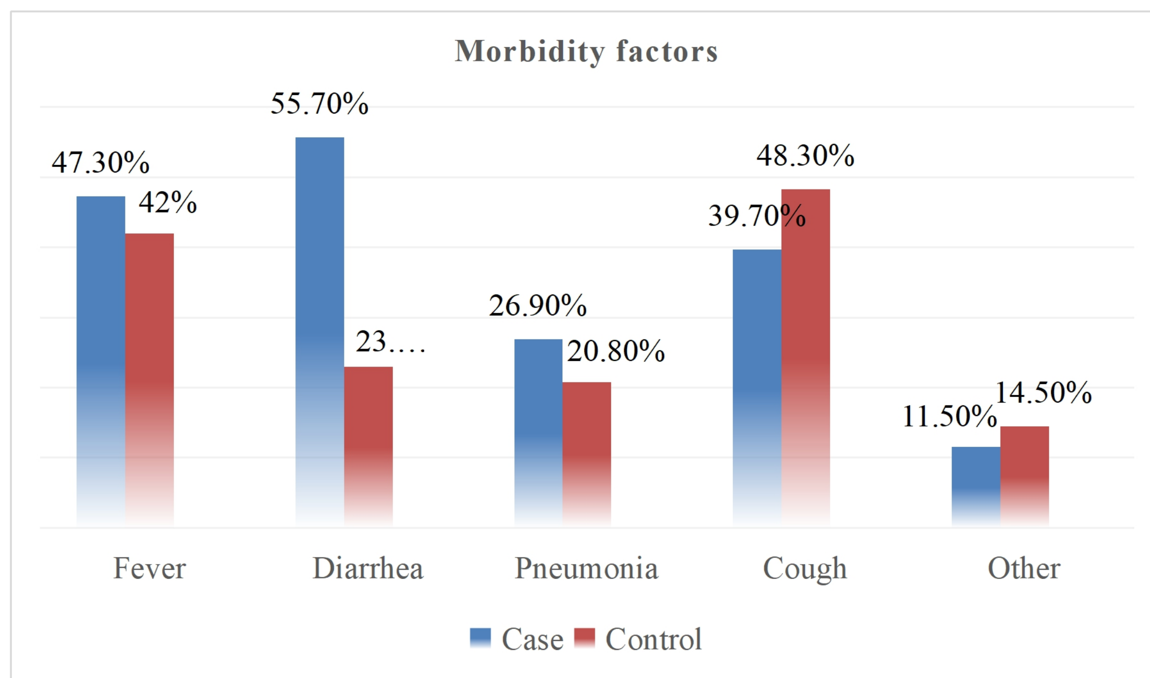

Figure 3. Morbidity status among cases and controls of under five children in Sodo town public health facilities ,2021.

5.3. MCH Service utilization

Out of the total study participants, 73(54.9%) and 191(71.8%) of mothers of cases and controls had regular ANC visit during pregnancy and among those who had ANC visit, 52(71.2%) of cases and 167(87%) of controls got counselling on diet and nutrition during pregnancy. Regarding place of delivery,30(22.6%) of cases and 42(15.8%) of controls gave birth (delivered) at home. Significant majority of cases 131(98.5%) and 246(92.5%) of controls had no growth monitoring follow up in the health facility. Around two-thirds of cases 86(64.7%) and almost three-fourth of controls 204(76.7 %) have reported to have health facility within 10km radius of their home. The majority of parents of cases 103(81.1%) and 105(40.2%) of controls do not take their children to health facilities within 24 hours of onset of sickness.

In addition, Individual-based decision making on the care and treatment of the child was 72(54.1%) among cases while it was 54(20.4%) among controls.

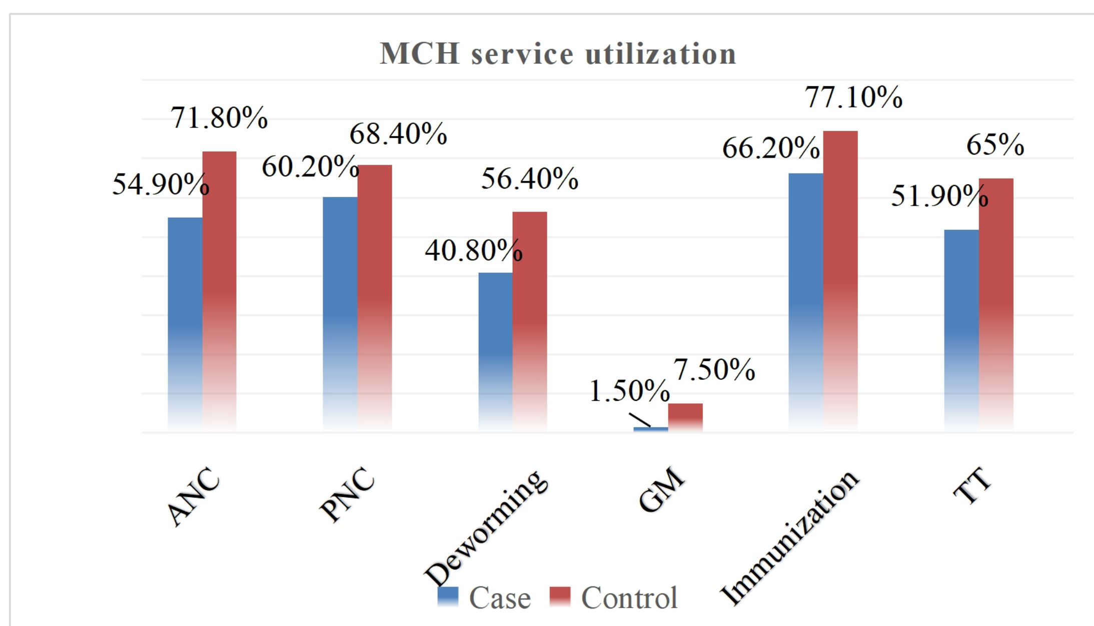

Figure 4. Maternal and child health service utilization among cases and controls under-five children in Sodo town public health facilities,2021.

Note: GM=Growth monitoring, TT-Tetanoid toxoid vaccine,

5.4. Environmental factors

Almost all households (99.2%) of both cases and controls have toilet in their compound but only 9(6.8%) and 104(39.4%) of cases and controls have improved type of toiled respectively. Concerning drinking water supply, relatively high proportion of households of cases (57 (42.9%) and 30(11.3%) of controls use drinking water from a non-protected water source.

Table 4.Environmental factors in Soddo town health facilities,2021.

Variable	Categories	Cases (%)	Controls (%)	Total
Toilet available	No	1	2	3
	Yes	132(99.2%)	264(99.2%)	396(99.2%)
Type of toilet	Improved	9(6.8%)	104(39.4%)	113(28.5%)
	Non-improved	123(93.2%)	160(60.6%)	283(71.5%)

Drinking water	Protected	76(57.1%)	236(88.7%)	312(78.2%)
	Nonprotected	57(42.9%)	30(11.3%)	87(21.8%)

5.5. Child caring and feeding practice

Concerning breastfeeding, the majority of cases 111(83.5%) and more than one-third 98(36.8%) of controls had exclusive breastfeeding for less than six months of birth. Around two-thirds of both cases 89(66.9%) and controls168(63.2%) experienced bottle feeding. Besides, the majority 124(93.2%) of cases and around one-third 97(36.5%) of controls discontinued breastfeeding before 24 months of their age. Regarding colostrum feeding, 72.9% of mother's cases and 42.1% of controls did not give colostrum for their children. Concerning food insecurity, relatively high proportion of cases 117(88%) were suffering from food insecurity when compared to controls where 124(46.6%) were suffering from food insecurity. Likewise, around half 62(46.6%) of cases and one-third 78(29.3%) of controls did not get counseling on infant feeding practice. In case of handwashing,14.3% of mothers/caregivers of both cases and controls do not wash their hands after the toilet. Besides, 38(28.6%) of mothers/caregivers of cases and 59(22.2%) of controls do not wash their hands before preparing meals. The table below shows the summary of child-caring and feeding practice of parents of cases and controls in the study area.

Table 5.Child caring and feeding practice of parents in Public health facilities in Soddo town, 2021.

Variable	Categories	Case (%)	Control (%)	Total
How long on EBP	<6 month	111(83.5%)	98(36.8%)	209(52.4%)
	>6 month	6(4.5%)	14(5.3%)	20(5%)
	At six months	16(12%)	154(57.9%)	170(42.6%)
Bottle feeding	No	44(33.1%)	98(36.8%	142(35.6%)
	Yes	89(66.9%)	168(63.2%)	257(64.4%)
Give colostrum for child	No	97(72.9%)	112(42.1%)	209(52.4%)
	Yes	36(27.1%)	154(57.9%)	190(47.6%)

Separate feeding plate	No	50(37.6%)	113(42.5%)	163(40.9%)
	Yes	83(62.4%)	153(57.5%)	236(59.1%)
Hand wash Before feeding child	No	42(31.6%)	54(20.3%)	96(24.1%)
	Yes	91(68.4%)	212(79.7%)	303(75.9%)
Dietary diversity	Poor	103(77.4%)	88(33.1%)	191(47.9%)
	Good	30(22.6%)	178(66.9%)	208(52.1%)
Household food insecurity	Food Secure	16(12%)	142(53.4%)	158(39.6%)
	Food Insecure	117(88%)	124(46.6%)	241(60.4%)

In case of dietary diversity of the children, most of cases 103(77.4%) and one-third of controls 88(33.1%) had inadequate dietary diversity (consumed from less than four groups of foods in the past 24 hours proceeding the interview). Grains were the most commonly consumed category of food by both groups 96(72.2%) and 220(82.7%) while flesh foods were rarely consumed by both groups 7(5.3%) and 56(21.1%) respectively.

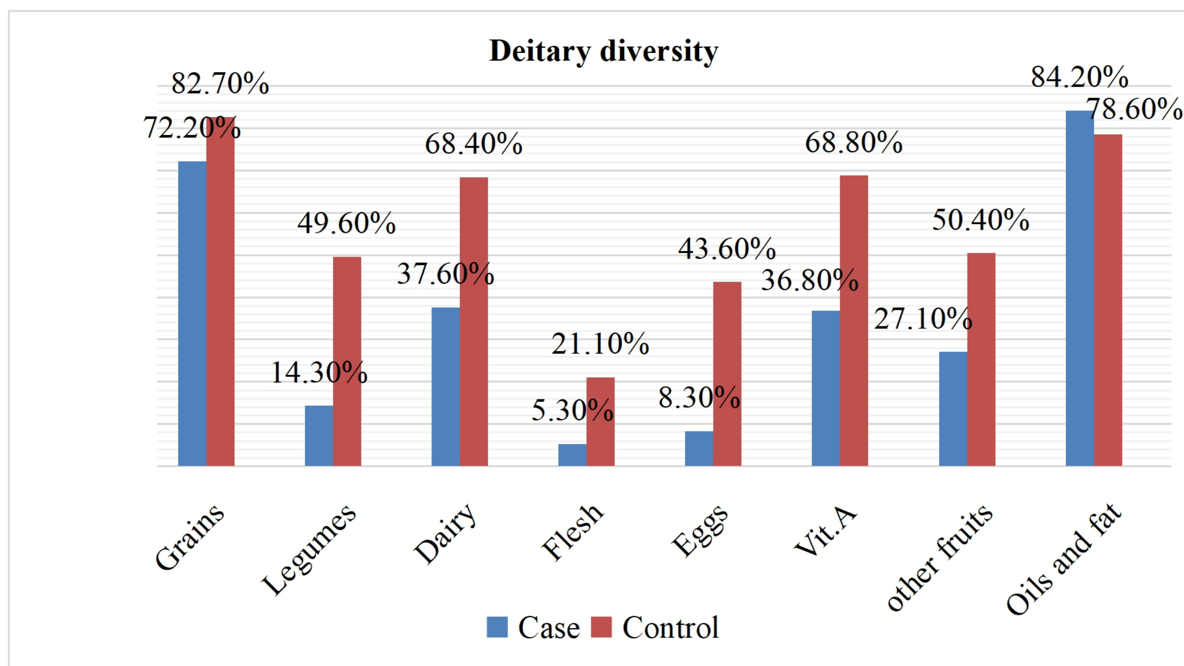

Figure 5.Deitary diversity feeding practice among cases and controls under-five children in Sodo town public health facilities,2021.

5.6. Determinants of acute malnutrition

All independent variables were checked for the presence of association with acute malnutrition in bi-variate logistic regression analysis. The variables found to be associated with acute malnutrition in bi-variate analysis(P-value <0.25) were: Marital status, residence, family size, birth interval, mother's education, occupation of mother, father's occupation, birth order, birth weight, diarrhea two weeks preceding survey, pneumonia, place of delivery, ANC follow up, PNC follow up, immunization stats, source of drinking water, type of toilet, dietary diversity, food insecurity, Individual based decision making on the health care of children, not taking TT- vaccine, not visiting health facility within 24 hours of the onset of any sickness, duration of EPF, duration of breast feeding, lack of colostrum feeding and lack of counseling on child feeding practice.

Multi-variable logistic regression analysis showed that, the likelihood of being malnourished was higher among children from parents who were not living together/other than married [AOR4.45(1.72,11.51)], family size of five and above[AOR2.54(1.37,4.73)], birth interval less than 24 months[AOR2.71(1.54,4.76)], children of mothers with formal education were almost three times more likely to develop acute malnutrition [AOR 2.96(1.02, 8.56)], low birth weight [AOR 3.56(1.15,10.99)], children who had diarrhea in the past two weeks prior to data collection were around nine times more likely to suffer from acute malnutrition [AOR 9.15(2.83,29.53)] , not taking sick children to health facility within 24 hours of the onset of any sickness[AOR 5.10(2.94,8.86)], using non-improved toilet[AOR 5.09(2.40,10.79)], using non-protected water for drinking[AOR 3.45(2.00,5.93)],duration of exclusive breast feeding less than 6 months[AOR4.65(2.21,9.78)], breast feeding for less than 24 months[AOR 10.26(4.57,22.99)],dietary diversity[AOR 2.05(1.05,4.00)] and food insecurity [AOR 3.83(1.80,8.14)] were significantly associated with acute malnutrition in the study area.

Table 6.Determinants of acute malnutrition among under-five children in Sodo town public health facilities,2021.

Variable	Cases (%)	Controls(%	COR (95% CI	AOR (95% CI	P-value
Marital status					
Married	100(75%)	256(96%)	1	1	
Others	33(24.8%)	10(3.8%)	8.45(4.01,17.8)	**4.45(1.72,11.5)**	0.002**
Residence					
Rural	55(41.4%)	73(27.4%)	1.86(1.20,2.88)	1.55(0.70,3.45)	0.273
Urban	78(58.6%)	193(72.6%)	1	1	
Family size					
1-4	79(59.4%)	215(80.8%)	1	1	
5 and above	54(40.6%)	51(19.2%)	2.88(1.81,4.57)	**2.54(1.37,4.73)**	0.003**
Birth interval					
<24 months	59(44.4%)	56(21.1%)	2.99(1.90,4.69)	**2.71(1.54,4.76)**	0.001**
≥24 months	74(55.6%)	210(78.9%)	1	1	
Mothers' education					
No formal education	37(27.8%)	14(5.2%)	8.70(4.29,17.65)	**2.96(1.02,8.56)**	0.044*
Primary	55(41.4)	117(44%)	1.54(0.96,2.48)	0.73(0.38,1.39)	0.344
Secondary and above	41(30.8%)	135(50.8%)	1	1	
Mothers' occupation					
Trader	18(13.5%)	39(14.7%)	0.69(0.37,1.31)	1.29(0.57,2.94)	0.536
Employee	12(9%)	85(32%)	0.214(0.10,0.4)	0.47(0.19,1.17)	0.105
Daily laborer	29(21.8%)	30(11.3%)	1.46(0.81,2.63)	0.68(0.28,1.65)	0.399
Housewife	74(55.6%)	112(42.1%)	1	1	
Fathers' occupation					
Trader	35(26.3%)	72(27.1%)	1	1	
Employee	24(18%)	115(43.2%)	0.43(0.236,0.78)	0.66(0.306,1.45)	0.309

Daily laborer	56(42.1%)	40(15%)	2.88(1.62,5.1)	1.18(0.50,2.80)	0.699
Farmer	18(13.5%)	39(14.7%)	0.94(0.47,1.89)	0.16(0.05,0.50)	0.206
Birth order					
1-3	58(43.6%)	169(63.5%)	1	1	
4-and above	75(56.4%)	97(36.5%)	2.25(1.47,3.44)	2.61(0.96,7.09)	0.06
Birth weight					
<2.5Kg	18(43.9%)	15(15.5%)	4.27(1.87,9.77)	**3.56(1.15,10.99)**	0.027*
≥2.5kg	23(56.1)	82(84.5%)	1	1	
Diarrhea in the last two weeks					
No	58(44.3%)	159(76.8%)	1	1	
Yes	73(55.7%)	48(23.2%)	4.16(2.60,6.68)	**9.15(2.83,29.53)**	.000***
Pneumonia					
No	95(73.1)	164(79.2%)	1	1	
Yes	35(26.9%)	43(20.8%)	1.40(0.84,2.34)	3.05(0.78,11.85)	0.106
ANC follow up					
No	60(45.1%)	75(28.2%)	2.09(1.35,3.22)	1.06(0.59,1.90)	0.837
Yes	73(54.9%)	191(71.8%)	1	1	
Place of delivery					
Home	30(22.6%)	42(15.8%)	1.55(0.92,2.62)	0.54(0.26,1.12)	0.099
Health facility	103(77.4%)	224(84.2%)	1	1	
PNC follow up					
No	53(39.8%)	84(31.6%)	1.43(0.93,2.21)	0.94(0.54,1.65)	0.853
Yes	80(60.2%)	182(68.4	1	1	
Immunization status					
Immunized	88(66.2%)	205(77.1%)	1	1	
Not immunized	45(33.8%)	61(22.9%)	1.71(1.08,2.72)	1.02(0.54,1.92)	0.952
Visit health facility within 24 hours of the onset of any sickness					

No	103(81.1%)	105(40.2%)	6.37(3.83,10.6)	**5.10(2.94,8.86)**	.000***
Yes	24(18.9%)	156(59.8%)	1	1	
Vaccinated for TT					
No	64(48.1%)	93(35%)	1.72(1.13,2.63)	0.88(0.49,1.58)	0.678
Yes	69(51.9%)	173(65%)	1	1	
Decision on health care of child					
Father only	54(40.6%)	27(10.2%)	6.95(4.04,11.96)	**4.78(2.52,9.07)**	.000***
Mother only	18(13.5%)	27(10.2%)	2.31(1.19,4.48)	**2.39(1.11,5.16)**	0.026*
Jointly	61(45.9%)	212(79.6%)	1	1	
Type of toilet					
Improved	9(6.8%)	104(39.4%)	1	1	
Non-improved	123(93.2%)	160(60.6%)	8.88(4.32,18.25)	**5.09(2.40,10.79)**	.000***
Drinking water					
Protected	76(57.1%)	236(88.7%)	1	1	
Non-protected	57(42.9%)	30(11.3%)	5.9(3.53,9.84)	**3.45(2.00,5.93)**	.000***
Duration of EBF					
<6 month	111(83.5%)	98(36.8%)	10.90(6.09,19.51)	**4.65(2.21,9.78)**	.000***
>6 month	6(4.5%)	14(5.3%)	1.39(12.22)	**4.46(1.02,19.45**	0.046*
At six months	16(12%)	154(57.9%)	1	1	
Give colostrum for child					
No	97(72.9%)	112(42.1%)	3.7(2.35,5.83	1.40(0.73,2.68)	0.297
Yes	36(27.1%)	154(57.9%)	1	1	
Counseling on child feeding					
No	62(46.6%)	78(29.3%)	2.1(1.36,3.23)	0.60(0.32,1.13)	0.116
Yes	71(53.4%)	188(70.7%)	1	1	
Duration of breast feeding					
<24 Months	124(93.2%)	97(36.5%)	24.(11.67,49.37)	**10.26(4.57,22.99)**	.000***
≥24months	9(6.8%)	169(63.5%)	1	1	

Dietary diversity					
Inadequate	103(77.4%)	88(33.1%)	6.94(4.29,11.22)	**2.05(1.05,4.00)**	0.034*
Adequate	30(22.6%)	178(66.9%)	1	1	
Food insecurity					
Food Secure	16(12%)	142(53.4%)	1	1	
Food Insecure	117(88%)	124(46.6%)	8.37(4.71,14.88)	**3.83(1.80,8.14)**	.000***

*=Statistically significant at P-value<0.05, **=P-value<0.01, ***=P-value<0.001 1=Reference Category, COR= Crude odds ratio, AOR= Adjusted odds ratio, CI=Confidence interval

6.Discussion

To tackle the negative effect of acute malnutrition among under-five children from the root, its contributing factors need to be identified in-depth. Thus, this study tried to look into different determinants of acute malnutrition by encompassing various factors.

Among the sociodemographic characteristics, children of parents who were divorced/widowed/separated and singles were 4.45 times more likely to develop acute malnutrition when compared to children whose parents are live together. This finding is consistent with the study conducted in Chad and Karat town which revealed children of caretakers living alone or not married were 7.7 and 3.3 times more likely to suffer from acute malnutrition respectively(39)(50).This might be because of the high influence of family structure or characteristics on nutritional status and survival of children. In addition, a parent who takes care of children alone might not involve in various economic activities, invest in child welfare adequately and cannot provide a balanced diet for their children.

In this study, children from parents with a family size of five and above were 2.54 times more likely to suffer from acute malnutrition. This study was consistent with the study conducted in East Wollega, Oromia region Ethiopia, Northeast Ethiopia, and Nepal which revealed children who live with parents whose family size is large were more likely to develop acute malnutrition(36) (44)(42,50). This is might be due to the fact that, the allocation of food per child is more likely to decrease with the increase in the number of family members in the household, which in turn, may adversely affect the nutritional status of children(55).

The present study exhibited that; non-optimum birth interval is significantly associated with acute malnutrition. Children with a birth interval of less than 2 years were almost three times more likely to develop acute malnutrition. The study in Haromaya university is in agreement with this finding which exhibited children of mother with birth interval of less than 2 years were 1.65 times more likely to experience malnutrition(45). This finding is also supported by a study conducted in Jimma Zone, which also exhibited the presence of association between birth interval and acute malnutrition(46). This may be due to as the birth interval gets short, there may be sharing of breastfeeding among the older and younger children which may end up with the inadequate intake of breast milk by both the old and younger child increasing the risk of being malnourished. Also, short birth spacing makes a mother nutritionally more

vulnerable which may affect both the quality and quantity of breast milk, which in turn increases the likelihood of child malnutrition(55–57).

Children from mothers who never attend formal education were three times more likely to develop acute malnutrition when compared to their counterparts. This finding is in agreement with different studies in India, Gambela, East Wollega, Jimma Zone and Shashogo Woreda which revealed the likelihood of being malnourished is high for children from mothers who are illiterate(38,43,44,46,47). This could be due to the fact that the more educated mothers have great awareness and knowledge on child caring and feeding practice and also, they can involve in various economic activity. Therefore, they can provide the most diversified food to their children which decreases the risk of being malnourished(55,58,59).

The present study exhibited that, the odds of acute malnutrition among children whose birth weight is less than 2.5kg is 3.56 times higher when compared to their counterparts. This finding agrees with the study done in India which revealed there were higher odds of malnutrition among children whose birth weight is low(38). Also, this finding is supported by the study done in Chad which showed the odds of malnutrition is 2.72 times higher among children whose birth weight is low(39). This is maybe due to the fact that, children whose birth weight is low are prone for infection, and other illnesses this may predispose them to malnutrition.

The current study observed that, diarrheal disease two weeks prior to data collection was an independent contributing factor of acute malnutrition. Children who have had diarrhea two weeks prior to data collection were around nine times more likely to suffer from acute malnutrition when compared to their counterparts. Similar studies conducted in different parts of Ethiopia(41,43,44,47,49,50), Chad and Kongo(39,40) support the finding from this study. A high prevalence of malnutrition was seen among children with diarrhea and this due to the fact that, malnutrition and diarrhea have a bidirectional relationship by which malnutrition causes immune deficiency and increased susceptibility to infection such as diarrhea. Diarrhea in turn causes loss of excessive fluids and important nutrients from the body, reduced appetite, reduced energy intake, malabsorption and also increases the bowel motility of the children which may result in child malnutrition.

Lack of safe drinking water supply and using unprotected water is directly related with the incidence of diarrhea and other water borne disease which results in child malnutrition. Another important sanitation issue that is mainly linked with acute malnutrition is use of un-improved toilets and use of drinking water from unprotected source. This study also showed that, acute malnutrition was higher among children from household which uses non-improved type of toilet and those household drinking water from unprotected source when compared to their counterparts. This result is in agreement with the studies conducted in different part of Ethiopia(50,52).

In the current study, it was found that children who were not taken to health facilities within 24 hours of the onset of any sickness were 5 times more likely to have acute malnutrition when compared to their counterparts. This finding is in line with the study conducted in Shashogo woreda which revealed the children who were not taken to a health facility within 24 hours of the onset of symptom were 4 times more likely severely malnourished. This might be due to the fact that taking the sick child earlier is advisable because of that it prevents further disease progress; complication and it also helps to detect the problem earlier(47).

This study showed, children from father who made decision alone on the child care and treatment were 4.78 times more likely to suffer from undernutrition and children from mother who made decision alone on the child care and treatment were 2.39 times more likely to suffer from acute malnutrition when compared to children from parents who made decision jointly. The study conducted in Haromaya supports this finding which revealed the odds of acute malnutrition is higher among children from parents who made decision individually(45). This could be explained by the fact that, decision making autonomy is important determinant in the uptake of reproductive and child health service. Though, women in low-income countries and those who have no education are often excluded from household decision making and this exclusion and power imbalance with in relationship interferes with women access to reproductive and child health service which in turn have adverse effect on child nutritional status.

This study observed that, duration of exclusive breastfeeding significantly affected the nutritional status of the children. The odds of acute malnutrition is 4.65 times higher among children who stopped exclusive breastfeeding before the first six months of age. This finding

is supported by the studies done in different parts of Ethiopia(41,44–46,49), Kongo,and India(40,48) which revealed not practicing exclusive breastfeeding have significantly affected the nutritional status of children. This could be explained by the fact that, breast milk provides many of the nutritional requirements of a child and contains anti-infective properties that protect children from early infections and enhance normal child growth. So, lack of these important nutrients from the breast during the first six months may have many adverse effects including child malnutrition(60,61).

This study also found that, the chance to be acutely malnourished is 4.46 times more likely among children who were on exclusive breast after six months of their age. This finding is consistent with the findings of the studies conducted in Nepal(35,37) which revealed late initiation of complementary feeding and improper exclusive feeding are significantly associated with the nutritional status of the children. This could be explained by the fact that, after the age of 6 months, breast milk alone is no longer sufficient to meet the nutritional requirement of the infants, so that other foods and liquids are needed besides breast milk. Thus, children who were on breast milk alone after six months of their age cannot get the important nutrients from other foods and liquids which in turn adversely affects the nutritional status of the children.

The current study observed that, children of parents who discontinue breastfeeding before 24 months were 10 times more likely to have malnutrition. This finding is supported by the studies conducted in Karat town and India which reveals the duration of exclusive breastfeeding is significantly associated with child nutritional status(48,50). This is due to the fact that, the longer the duration of breastfeeding, the higher the amount and quality nutrients can be provided to the children. Besides, the longer duration of breast feeding has a positive impact on linear growth of child and prevention of chronic illnesses since it contains protective factors. Therefore, mothers who stop breastfeeding earlier might expose the children to malnutrition due to lack of important nutrients and increases the risk of infection.

The present study observed that, the likelihood to be malnourished is 2.05 times higher among children who consume from less than four food groups in a day when compared to children who consume from four and above food groups per day. The study done in Chad and Karat town agreed with this finding which revealed low dietary diversity significantly associated with nutritional status of the children (39)(50). This due to the fact that, diversified diets are an

important aspect of healthy living and diseases prevention and it is directly related to nutritional adequacy and quality of the diet. Therefore, parents who have poor dietary diversity/feeding practices may expose children to infection due to poor immunity which in turn cause malnutrition.

The odds of acute malnutrition is almost four times higher among children from households which have food insecurity problem. This finding is supported by the study which is done in Nepal and Northwest Ethiopia with this finding which reveals children of parents who are in food insecurity were more likely to be malnourished(35)(41).This might be due to limited availability of food or low economic access to purchase food which leads to reduced quantity and quality of diet. Thus, food-insecure households might not satisfy their dietary needs and which increases the risk of malnutrition.

7. Strength and Limitation of the Study

Strengths

An attempt was made to obtain large and representative sample size by using a variable which gives maximum sample size.

An effort was made to recruit nurses who knows local language and who had prior experience of data collection which minimized the bias of information obtained.

Limitations

Apart from the mentioned strengths, this study has the following limitations: It was based on respondents self-reported data and tracking of exposure status retrospectively, which was prone to recall bias but efforts were made to minimize it by giving detailed instructions for participants and providing adequate time for study participants to recall as much as possible. Another limitation of this study was maintaining inter-observer reliability of anthropometric measurement, which could result in misclassification of cases and controls. However, due emphasis was given to minimize it by standardizing anthropometric instruments, giving training for the research team and close supervision throughout the fieldwork to minimize such expected biases

8. Conclusion

This study identified various determinants of acute malnutrition and provided clues on the commonest contributing factors of acute malnutrition among under-five children in the study area. The majority of the determinants which were found to be associated with acute malnutrition among under-five children in the study area were in line with the studies conducted in many developing countries including Ethiopia. The major determinants which are an independent predictor of acute malnutrition among under-five children in this study are: marital status, family size of five and above, birth interval of less than 2 years, mothers who had no formal education, birth weight less than 2.5kg, children exposed to diarrhea in the past two weeks before data collection, not taking sick children to health institutions within 24 hours, children from the household who use non-improved toilet, children of parents who use water from un protected sources, duration of exclusive breast feeding, duration of breast feeding for less than 24 months, inadequate dietary diversity and children of household which have food insecurity issue were found to be significantly associated with acute malnutrition among under-five children in the study area.

9. Recommendation

Multifaceted and organized effort should be made at all levels to tackle this grave issue of acute malnutrition among under-five children. Based on the study finding, the investigator forwards the following recommendations:

To the community

Parents are encouraged to implement the advises given by health providers on infant and child feeding practices.

Parents are advised and encouraged give exclusive breastfeeding (6months) for their children and to continue breastfeeding until 24 months.

Parents should practice jointly decision on child care and treatment.

Parents should take sick children to health facility as earlier as possible.

To health extension workers and other health professionals

Should give education for the community on treating water, hygiene and sanitation and improving toilet and on prevention of diarrheal diseases.

Should give health education for mothers on exclusive breastfeeding, when to stop breastfeeding and family planning.

Due attention should be given to growth monitoring and screening of the children at the clinical and community level to detect and tackle the problem at early stage.

Health care workers should encourage parents to provide the most diversified to their children

Health workers should monitor nutritional status of mother and give health education towards diet during ANC follow-up, since it has negative consequence on the birth weight of the children

To Government and NGO's

Government should encourage women's education and empowerment through awareness creating and capacity building.

The government should create awareness of the community towards the negative impact of divorce or not living together on the child health status.

Should give due attention to safe drinking water supply to the community.

Should provide a safety net program for the poorest community to solve food insecurity problem.

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APPENDIX – I: English Version Questionnaire

Addis Ababa University School of Nursing and Medwifery

Information Sheet

Hello, my name is ______________________. I am working with Mr Fikre Moga. He is a second-year graduate student of Masters in child health nursing in College of Health Sciences, School of nursing and midwifery, Addis Ababa University. This study is part of the requirements for the fulfillment of the MSc in child health nursing program for which he is enrolled. The component of this study is to measure nutrition related indicators such as height & weight of children and to assess predictors of acute malnutrition among children aged 6-59 months. All of the measurements and interview will be done with complete professionalism, carefulness and accuracy. I hereby assure you that for the responses will be kept strictly confidential for all matters and it will only be used for the purpose of the study mentioned above. You and your child name will not be mentioned to protect your confidentiality. You have a right to answer or not for questions which might be inconvenient for you. The study may require______ minutes. So please give me only some minutes to complete my question and take my measurements. If you have any additional questions, please feel free to contact the investigator with cell phone,+251-985587030 and also use email address fikremoga@gmail.com I thank you in advance for being very cooperative with this research along with your child.

Consent form for study participants and confidentiality

Consent form for study participants

The purpose of this study is to assess predictors of acute malnutrition. The study will consists of child related information (like heights, weights and age measurements, information on feeding practices like breast feeding, complementary feeding, the meal frequency and dietary diversity); interview of information related on mothers occupation, socio-demographic and economic factors, environmental factors and child health care characteristics. The study has no any risks to the health of your child. You and or your child's participation in this research are entirely voluntary either to accept or refuse participation.

Confidentiality

The study records and forms including only numeric identifiers will be kept securely & not available to other participants. The study findings of your child's information will not be made available to persons or organization except the involving institutions/faculty. The finding of study will be communicated only in the summary forms like tables in number, percentage and frequency, figures and graphs. I assure that I have read and understood the contents, objective and purpose of the study in the community settings including the potential risks, benefits and the right to participant or refuse, and that all of my questions about the study have been answered to my satisfaction. I hereby give my informed consent for my child to participate in this study and have their picture taken or be videotaped as necessary. After all these I understood and:

1. I agree to participate in the research voluntarily___________________________

2. I didn't agree to I didn't agree to participate in this research __________________

Parent/Alternate caregiver Signature ______________________Date ___________________

Interviewer Name __________________Signature ___________________ Date___________

Results of interview questionnaire-encircle from the given options

1.Completed

2.Refused

3.Partiallycompleted

4. Other specify

Child Height------------Weight--------------Bilateral oedema----------------- MUAC----------

Case-------------------------------Control-----------------------

Date of visit ______/_________/________/ID_________ Name of health facilitiy----------

Table.7. Questionnaire adapted from different literatures (8,45,47,50,62).

Questions related to socio-economic and demographic factors			
Sr.No	**Characteristics**	**Alternatives:Choose/describe/category**	**Skip to**
101	What is your relationship with the child?	1.Biological Mother 2.Caregiver 3.Other (Specify)-----------------	
102	If you are biological mother of the child, what is your age at delivery?	Age: ---------- year-----------	
103	What is your current marital status?	1. Married 2.Single 3. Divorced/separated/ widowed 4.Other/specify	
104	What is your residence	1.Rural 2.Urban	
105	What is your religion	1.Protestant 2.Orthodox 3.Muslim 4.Other (Specify)-------------	
106	What is the total number of family member living in your house?	1. Number of family size_____	
107	What is the level of education you attended?	1. No formal Education 2. Primary school (1-8)	

		3. Secondary school (9-12) 4. Higher level (Diploma and above)	
108	What is the level of education of father of your child attended?	1. No Education 2. Primary school (1-8) 3. Secondary school (9-12) 4. Higher level (Diploma and above)	
109	what is your occupation?	1. Petty trader 2. Employee 3. Daily laborer 4. House wife 5. Other (specify)……………	
110	What is the father of your child's occupation?	1. Petty trader 2. Employee 3. Daily laborer 4. Farmer 5. Other (specify)……………	
111	Who is autonomous in controlling the? household expenditure?	1. Mother only 2. Father only 3. Mother and father 4. Alternative caregiver	
112	What is the average monthly income of this household? (Monthly in Ethiopian birr)	Total income _______ birr	
Child related factors			
Sr.No	**Characteristics**	**Alternatives:Choose/describe/category**	**Skip to**

201	What is the Sex of your child?	1. Male 2.Female	
202	What is the birth order of your child?	Birth order: ___________	
203	What is the age of your child? (Please show child's birth certificate)	Age: in months--------------	
204	What was his/her birth weight in kilogram?	Birth weight in Kg--------------	
205	What is the birth interval between this child and his/her immediate elder?	Interval in number__ (in year)	
206	Does your child fall sick in the past two weeks?	1. No 2. Yes	
207	If yes, what are the diseases he/she often suffers from?	(see sub-table below)	
	Maternal and child health service Utilization		
301	Do you have regular antenatal care follow up during pregnancy?	1.No 2.Yes	
302	If yes, did the health professionals give counseling on nutrition during pregnancy?	1.No 2.Yes	
303	Where you gave delivery for your child?	1.Home 2.Health facility	
304	Do you have regular postnatal	1.No 2. Yes	

.	Diseases	No	Yes
1	Fever		
2	Diarrhea		
3	Pneumonia		
4	Cough		
5	Others		

<table>
<tr><td></td><td>care follow up?</td><td></td><td></td></tr>
<tr><td>305</td><td>Do your child take de-worming regularly (for children aged_>2 years</td><td>1.No 2.Yes</td><td></td></tr>
<tr><td>306</td><td>Does your child have regular Growth monitoring follow-up?</td><td>1.No 2.yes</td><td></td></tr>
<tr><td>307</td><td>Is your child immunized?

Please check the immunization certificate of

child and if immunized for mark “√ “and if

not immunized mark “× “</td><td><table>
<tr><td>Immunized for</td><td>Yes “√ “</td><td>No “× “</td></tr>
<tr><td>1. BCG</td><td></td><td></td></tr>
<tr><td>2.Penta (1-3)</td><td></td><td></td></tr>
<tr><td>3.Polio (polio 0-3)</td><td></td><td></td></tr>
<tr><td>PCV</td><td></td><td></td></tr>
<tr><td>Rota</td><td></td><td></td></tr>
<tr><td>4.Measles</td><td></td><td></td></tr>
</table></td><td></td></tr>
<tr><td>308</td><td>Is health care facility available within 10Km radius of your home?</td><td>1.No 2.Yes</td><td></td></tr>
<tr><td>309</td><td>If your answer is health facility for Q307, how long you wait to take the sick children to health facilities after the onset of symptom? (Tell in hours)</td><td>Put in hours-------------------------</td><td></td></tr>
<tr><td>310</td><td>Who decides on the health care of children?</td><td>1.Father only
2.Mother only
3.Jointly (Both)</td><td></td></tr>
<tr><td>311</td><td>Have you vaccinated for TT During your pregnancy</td><td>1.No 2. Yes</td><td></td></tr>
<tr><td colspan="4">Environmental characteristics</td></tr>
<tr><td>401</td><td>Is toilet or latrine available around your home</td><td>1.No 2. Yes</td><td></td></tr>
</table>

402	If yes, what type of toilet/latrine facility do you use in this household?	**1.Improved, not shared is Flush or pour** 1.Flush toilet 2.Traditional pit latrine 3.Ventilated improved latrine **2. Non- improved toilet facility:** 1.None/Bush/Field 2.Digging a hole 3. other(specify)........................	
403	What type of drinking water do you use in this household?	**1. Improved water Source** 1.Tap 2.Borehole (protected) 3.Others **2. Non- improved water source** 1.Borehole (not protected) 2.River 3. spring 4. rain water 5.Others (specify) __________	
404	Do you have separate house for kitchen and for domestic animals from main house	1.No 2. Yes	
Child caring, feeding practices and Dietary diversity information's.			
Sr.No	**Characteristics**	**Alternatives: Choose/describe/category**	**Skip to**
501	Did any health care provider talk with you on how to feed your child??	1.No 2. Yes	

502	For how long have you been EBF your children after delivery?	1. Number of months		
503	Are you still breastfeeding your child?	1.No	2. Yes	
504	Have you gave bottle feeding for your child	1.No	2. Yes	
505	If, yes for Q304, at what age did you first introduce complementary food to the baby?	1. Before six months 2. At six months 3. After six months		
506	Do you give your child colostrum breast milk?	1.No	2.Yes	
507	For how long you want to continue breast feeding?	Put in months-----------------		
508	Food diversity/Food group in the past 24 hours taken	1.No	2. Yes	
	1.Grains, roots and tubers (Potatatos,Casava,barley,rice,ray and teff)	No	Yes	
	2.Pulses/legumes and nuts (beans, peas, lentils, nut)	1.No	Yes	
	3. Dairy products (milk, yogurt and milk products)	1.No	Yes	
	4.Flesh food (meat, fish, poultry and liver/organ meats)	1.No	Yes	
	5. Eggs	1.No	Yes	
	6. Vitamin A- rich fruits and	1.No	Yes	

	Vegetables (Mangos, papaya)			
	7. Other fruits and vegetables (Including wild fruits and vegitables)	1.No	Yes	
	8.Foods cooked in oil/ fats (E.g. oil, fat or butter added to foods used for cooking)	1.No	Yes	
509	Does the child have a separate feeding plate from adults?	1.No 2.Yes		
510	When do you usually wash your hands? More than one answer is possible	(see nested table below)		

no	Activity	1.no	2.yes
1	After going to the toilet		
2	Before preparing meal		
3	Before feeding a child		

Table 8. Household food Insecurity Access Scale (HFIAS) Measurment Tool Adapted From FANTA, 2007(54)

No	Questions	Response Options	Code
1.	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes	….|___|
1a	How often did this happen?	1, Rarely (once or twice in the past four 2, Sometimes (three to ten times in the past four weeks) 3,Often (more than ten times in the past four weeks)	
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q3) 1=Yes	
2a	How often	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	
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes	
3.a	3. 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)	
4	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 Q5) 1 = Yes	
4.a	4.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)	
5	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 Q6) 1 = Yes	
5.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)	
6.	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 Q7) 1 = Yes	

6.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)	
7.	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 Q8) 1 = Yes	
7.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)	
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not	0 = No (skip to Q9) 1 = Yes	

	enough food?		
8.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)	
9.	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	

Thanks for spending your time and giving us information!

APPENDIX – II: የአማርኛ ስሪት መጠይቅ(AMHARIC VERSION QUESTIONARIE)
የአዲስ አበባ ዩኒቨርሲቲ የነርሲንግ እና ሚድዋይፈሪ ትምህርት ቤት

የመረጃ ሉህ

ሄሎ ስሜ _______________________. ከአቶ ፍቅሬ ሞጋ ጋር ነው የምሰራው ። በአዲስ አበባ ዩኒቨርስቲ በጤና ሳይንስ ኮሌጅ ፣ በነርሶች እና ሚድዋይፈሪ ትምህርት ቤት ውስጥ በሕፃናት ጤና ነርሲንግ የሁለተኛ ዓመት ተመራቂ ተማሪ ነው ። ይህ ጥናት በተመዘገበበት የህፃናት ጤና ነርሲንግ ፕሮግራም ኤም.ኤስ.ሲ እንዲፈፀም ከሚያስፈልጉት መስፈርቶች አካል ነው ። የዚህ ጥናት አካል የልጆችን ቁመት እና ክብደት ያሉ የተመጣጠነ ምግብ ነክ አመልካቾችን ለመለካት እና ከ6-59 ወር ዕድሜ ላላቸው ሕፃናት ድንገተኛ የተመጣጠነ ምግብ እጥረትን መገመት ነው ። ሁሉም ልኬቶች እና ቃለመጠይቆች በተሟላ ሙያዊነት ፣ በጥንቃቄ እና በትክክለኝነት ይከናወናሉ ። ለሚሰጡት ምላሾች ለሁሉም ጉዳዮች በጥብቅ በሚስጥር እንደሚጠበቁ እና ከዚህ በላይ ለተጠቀሰው ጥናት ብቻ እንደሚውል አረጋግጣለሁ ። ለእርስዎ የማይመቹ ሊሆኑ ለሚችሉ ጥያቄዎች የመመለስ ወይም ያለመመለስ መብት አለዎት ። ጥናቱ ______ ደቂቃዎችን ሊፈጅ ይችላል ። ስለዚህ ጥያቄዬን ለማጠናቀቅ እና ልኬቶቼን እንድወስድ እባክህ ጥቂት ደቂቃዎችን ብቻ ስጠኝ ። ተጨማሪ ጥያቄዎች ካሉዎት እባክዎን መርማሪውን በሞባይል ፣ + 251-985587030 ለማነጋገር ነፃነት ይሰማዎ እንዲሁም በኢሜል አድራሻ ይጠቀሙ fikremoga@gmail.com ከልጅዎ ጋር በመሆን በዚህ ምርምር ለመሳተፍ ፍቃደኛ ስለሆኑ አስቀድሜ አመሰግናለሁ ።

ከሚመለከታቸው ተቋማት / ፋኩልቲዎች በስተቀር የልጅዎ መረጃ የጥናት ግኝት ለሰዎች ወይም ለድርጅት አይሰጥም ። የጥናቱ ግኝት የሚገለጸው በቁጥር ፣ መቶኛ እና ድግግሞሽ ፣ ቁጥሮች እና ግራፎች ባሉ ሰንጠረች ባሉ ማጠቃለያ ቅጾች ብቻ ነው ። የጥናቱን ይዘቶች ፣ ዓላማ፣ ጥቅሞች እና የተሳታፎ ወይም እምቢተኝነት መብቶችን ጨምሮ እንዳነበብኩና እንደተረዳሁ አረጋግጣለሁ ፣ እናም ስለ ጥናቱ ያነሳኋቸው ጥያቄዎች ሁሉ ለእኔ እርካታ እንደተሰጡኝ አረጋግጣለሁ ። . ልጄ በዚህ ጥናት ውስጥ እንዲሳተፍ እና እንደአስፈላጊነቱ ፎቶግራፍ እንዲነሳ ወይም በቪዲዮ እንዲቀርፅ በመረጃ የተደገፈ ፈቃዴን እሰጣለሁ ።

ከነዚህ ሁሉ በኋላ ተረድቻለሁ እና፡

1. በምርምር ላይ በፈቃደኝነት ለመሳተፍ እስማማለሁ______________________________

2. አልተስማማሁም በዚህ ምርምር ለመሳተፍ አልስማም ___________________

የወላጅ / ተለዋጭ ተንከባካቢ ፊርማ ________________________ ቀን ____________________

የጠያቂዉ ስም ___________________ ፊርማ ____________________ ቀን____________

ከተሰጡት አማራጮች የቃለ መጠይቅ መጠይቅ-ክበብ ውጤቶች

1. ተጠናቅቋል

2. ተቀባይነት አላገኘም

3. በከፊል ተጠናቅቋል

4. ሌላ ይግለጹ

የህጻኑ/ኗ ቁመት ------------ ክብደት ---------- ክብደት / ቁመት ---------የእግር እብጠት(Bilateral edema) ----------- - ሙአክ(MUAC) ----------

Case ---------------------------------- Control---------------- -------

የጉብኝት ቀን ______ / __________ / _________ / Code__________ የጤና ተቋሙ ስም ----------

ከማህበራዊ-ኢኮኖሚያዊ እና ስነ-ህዝብ ምክንያቶች ጋር የተዛመዱ ጥያቄዎች			
Sr.No	ጥያቄዎች	ምርጫዎች	ዝለል
101	ከልጁ ጋር ያለዎት ግንኙነት ምንድነው?	1.እናት 2. አባት 3. አሳዳጊ 4. ሌላ (ይግለጹ) ----------------	
102	የልጁ እናት ነዎት ከሆነ በወሊድዎ ዕድሜዎ ስንት ነበረ?	ዕድሜ-------------------	
103	አሁን ያለዎት የትዳር ሁኔታ ምንድነው?	1. ያገባ 2. ነጠላ 3. የተፋታ / የተለየ / መበለት 4. ሌላ / ይግለጹ	
104	መኖሪያዎ የት ነው	1.ገጠር 2.ከተማ	
105	ሃይማኖቶዎ ምንድን ነው	1. ፕሮቴስታንት 2. ኦርቶዶክስ 3. ሙስሊም 4. ሌላ (ይግለጹ) -------------	

106	_በ ቤት ዉስጥ ስንት የቤተሰብ አባላት ይኖራሉ	1. የቤተሰብ አባላት ብዛት------------------	
107	የህጻኑ እናት(አሳዳጊ) የትምህርት ደረጃምን ያህል ነው?	1. መደበኛ ትምህርት አልተማርኩም 2. የመጀመሪያ ደረጃ ትምህርት ቤት (1-8) 3. ሁለተኛ ደረጃ ትምህርት ቤት (9-12) 4. ከፍተኛ ደረጃ (ዲፕሎማ እና ከዚያ በላይ)	
108	የህጻኑ አባት(አሳዳጊ) የትምህርት ደረጃ ምን ያህል ነው?	1. መደበኛ ትምህርት አልተማረም 2. የመጀመሪያ ደረጃ ትምህርት ቤት (1-8) 3. ሁለተኛ ደረጃ ትምህርት ቤት (9-12) 4. ከፍተኛ ደረጃ (ዲፕሎማ እና ከዚያ በላይ)	
109	የህጻኑ እናት(አሳዳጊ) የስራዘርፍ	1.ነጋዴ 2. ሰራተኛ 3. ዕለታዊ ሠራተኛ 4. የቤት ሚስት 5. ሌላ (ይግለጹ) ……………	
110	የህጻኑ አባት(አሳዳጊ) የስራ ዘርፍ ምንድነው?	1.ነጋዴ 2. ሰራተኛ 3. ዕለታዊ ሠራተኛ 4. ገበሬ 5. ሌላ (spe cify) ……………	
111	የቤት ወጪን ማን ነዉ ምቆጣጠረዉ	1. እናት ብቻ 2. አባት ብቻ 3. እናት እና አባት	
112	የዚህ ቤተሰብ ወራዊ ገቢ ምን ያኽል ነው? (በወር በኢትዮጵያ ብር)	ጠቅላላ ገቢ _______ ብር	

ከልጅዎ ጋር የተያያዙ

ተ.ቁ		ይምረጡ / ይግለጹ	ዝለል ወደ
201	የልጅዎ ጾታ ምንድነው?	1. ወንድ 2. ሴት	
202	ስንተኛ ልጅዎ ነዉ	__________	
203	የልጅዎ ዕድሜ ስንት ነው? (እባክዎን የልጁን የልደት የምስክር ወረቀት ያሳዩ)	ዕድሜ-በወራት --------------	
204	የልደት ክብደቱ በኪሎግራም ምን ያህል ነበር?	የልደት ክብደት በ Kg --------------	
205	ይህ ህፃን ከቅርብ ታላቁ ጋር ምን ያክል የእድሜ ልዩነት አላቸዉ	በዓመት----------------	
206	ባለፉተ 2 ሳምነታት ልጅዎ ታሞ ያወቃል?	1. አይደለም 2. አዎ	
207	207 አዎ ከሆነ ብዙውን ጊዜ እሱ / እሷ የታመመባቸዉ ምንድን ናቸው?	(see table below)	

.	በሽታዎች	አይ	አዎ
1	ትኩሳት		
2	ተቅማጥ		
3	የሳንባ ምች		
4	4 ሳል		
5	ሌሎች		

የእናቶች እና የህፃናት ጤና አገልግሎት አጠቃቀም

301	በእርግዝና ወቅት መደበኛ	1. የለም 2. አዎ	

<table>
<tr><td></td><td>የወሊድ ክትትል ነበሮዎት?</td><td></td><td></td></tr>
<tr><td>302</td><td>አዎ ከሆነ የጤና ባለሙያዎች በእርግዝና ወቅት አመጋገብ ላይ የምክር አገልግሎት ሰጥተዋልን?</td><td>1. የለም 2. አዎ</td><td></td></tr>
<tr><td>303</td><td>ይህ ልጅ የት ነዉ የተዎለደዉ</td><td>1. ቤት 2. የጤና ተቋም</td><td></td></tr>
<tr><td>304</td><td>መደበኛ የድህረ ወሊድ እንክብካቤ ክትትል አለዎት?</td><td>1. የለም 2. አዎ</td><td></td></tr>
<tr><td>305</td><td>ልጅዎ አዘውትሮ የትል-መድኃንት ዎስዶ ያዉቃል (ዕድሜያቸው ከሁለት አመት በላይ ለሆኑ ልጆች</td><td>1. የለም 2. አዎ</td><td></td></tr>
<tr><td>306</td><td>ልጅዎ መደበኛ የእድገት ክትትል አለው?</td><td>1. የለም 2.አይ</td><td></td></tr>
<tr><td>307</td><td>ልጅዎ ክትባት ዎስዱዋል?</td><td><table>
<tr><td>የክትባት አይነቶች</td><td>2. አዎ</td><td>የለም</td></tr>
<tr><td>1. BCG</td><td></td><td></td></tr>
<tr><td>2.Penta (1-3)</td><td></td><td></td></tr>
<tr><td>3.Polio (polio 0-3)</td><td></td><td></td></tr>
<tr><td>PCV</td><td></td><td></td></tr>
<tr><td>Rota</td><td></td><td></td></tr>
<tr><td>4.Measles</td><td></td><td></td></tr>
</table></td><td></td></tr>
<tr><td>308</td><td>የጤና እንክብካቤ ተቋም ከቤትዎ በ 10 ኪ.ሜ ውስጥ ይገኛል?</td><td>1. የለም
2. አዎ</td><td></td></tr>
<tr><td>309</td><td>መልስዎ ለ Q307 የጤና ተቋም ከሆነ ለታመሙ ልጆችዎ የጤና ተቋማትን ለመጎብኘት ለምን</td><td>ሰዓት-------------------------</td><td></td></tr>
</table>

	ያህል ጊዜ ይጠብቃሉ?		
310	በልጆች ጤና አጠባበቅ ላይ የሚወስነው ማነው?	1. አባት ብቻ 2. እናት ብቻ 3. በጋራ	
311	በእርግዝናዎ ወቅት T.T ክትባት ወስደዋል	1. አይ 2. አዎ	
የአካባቢ ሁነታዎች			
401	መጸዳጃ ቤት በቤትዎ ዙሪያ ይገኛል	1. አይ 2. አዎ	
402	አዎ ከሆነ ፣ ምን ዓይነት መጸዳጃ ቤት ይጠቀማሉ?	1.Improved, not shared is Flush or pour : 1. ሽንት ቤት ማጠቢያ ያለዉ 2.ባህላዊ የጉድጓድ መፀዳጃ ቤት 3.የተሻሻለ የመፀዳጃ ቤት አየር እንዲወጣ የሚያደርግ 2. Non- improved toilet facility: 1.የለም / ቡሽ / ሜዳ 2.ጉድጓድ መቆፈር 3.ሌላ (ይግለጹ)	
403	ምን ዓይነት የመጠጥ ውሃ ይጠቀማሉ?	Protected water Source 1የቧንቧ ውሀ 2. የጉድጓድ ዉሀ (የተጠበቀ) 3. ሌሎች (ይግለጹ) 2. Non-protected water source 1.የጉድጓድ ዉሀ (ጥበቃ የሌለዉ) 2.የ ወንዝ ዉሀ 3.የምንጭ ውሃ 4.የዝናብ ውሃ 5. ሌሎች (ይግለጹ)	
404	ለኩሽና ከዋናው ቤት የተለየ	1. የለም 2. አዎ	

	ቤት አለዎት		
የልጆች እንክብካቤ ፣ የአመጋገብ ልምዶች እና የአመጋገብ ብዝሃነት መረጃ			
Sr.No	ጥያቀዎች	አማራጭች	ዝለል ወደ
501	ልጅዎን እንዴት መመገብ እንዳለቦዎ ጤና ባለሙያ ከእርስዎ ጋር ተነጋግሮ ያዉቃል ?	1.የለም 2. አዎ	
502	ህጻኑ ምን ያህል ጊዜ ነው የእናት ጡት ወተ ት ብቻ የጠባው	ወራት----------------	
503	ልጅዎ በጡጠ ተመግቦ ያዉቃል	1. አይደለም 2. አዎ	
504	ለልጅዎ ተጨማሪ ምግብ የጀመረውትክከለኛ ጊዜ ያዉቃሉ	. አይደለም 2. አዎ	
505	፣ አዎ ከሆነ ለ304 ፣ በስንት ወሩተጨማሪ ምግብ የጀመ	ከስድስት ወሩ በፊት 2. በስድስት ወሩ 3. ስድስት ወር ከሞላዉ በኂላ	
506	ጡት ማጥባቱን ለምን ያህል ጊዜ መቀጠል ይፈልጋሉ?		
507	በ24 ሰዓታት የተበሉ የምግብ ስብጥር ጥያቄዎች	1. የለም 2. አዎ	
	እህል ዘሮች ፣ ሥሮች እና ሀረጎች(ገብስ ፣ ሩዝ ፣ጤፍ፣ ወዘተ)	1. የለም 2. አዎ	
	ጥራጥሬ(ለውዝ (ባቄላ ፣ አተር ፣ ምስር)	1. የለም 2. አዎ	
	የወተት ተዋጽኦዎች (ወተት ፣ እርጎ)	1. የለም 2. አዎ	

	የሥጋ ምግቦች (ሥጋ ፣ ዓሳ ፣ ዶሮ እና የጉበት)	1. የለም	2. አዎ	
	እንቁላል	1. የለም	2. አዎ	
	ቫይታሚን ኤ- የበለፀጉ ፍራፍሬዎች እና አትክልቶች (ማንጎ ፣ ፓፓያ)	1. የለም	2. አዎ	
	ሌሎች ፍራፍሬዎችና አትክልቶች(የዱር ፍራፍሬዎችን እና አትክልቶችን ጨምሮ)	1. የለም	2. አዎ	
	በዘይት /በ ስብ የበሰሉ ምግቦች (ለምሳሌ ዘይት ፣ ስብ ወይም ቅቤ ምግቦች ላይ ተጨምረዋል)	1. የለም	2. አዎ	
508	ልጁ ከአዋቂዎች የተለየ ማእድ አለዉ	1. የለም 2. አዎ		
509	እጅዎን የሚታጠቡት መቼ መቼ ነው?	(see nested table below)		

No		1. የለም	1. የለም
1	መጸዳጃ ቤት ከሄዱ በኂላ		
2	ምግብ ከማዘጋጀትዎ በፊት		
3	ልጅ ከመመገብዎ በፊት		

No	ጥያቄዎች	የምላሽ አማራጮች ኮድ	ኮድ
1.	ባለፉት አራት ሳምንታት ቤተሰቦችዎ በቂ ምግብ አያገኙም ብለው ተጨነቁ?	0 = አይ (ወደ 2 ዝለል) 1 = አዎ.... ǀ ___ ǀ	....ǀ___ǀ

1a	1 ሀ ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
2	ባለፉት አራት ሳምንታት እርስዎ ወይም ማንኛውም የቤተሰብ አባል በሀብት እጥረት ምክንያት የመረጡትን አይነት አልበሉም?	0 = አይ (ወደ 3 ዝለል) 1 = አዎ	
2a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
3.	ባለፉት አራት ሳምንታት እርስዎ ወይም ማንኛውም የቤተሰብ አባል በሃብት እጥረት ምክንያት ውስን የሆኑ ምግቦችን ብቻ መመገብ ነበረብዎት?	0 = አይ (ወደ Q4 ዝለል) 1 = አዎ	
3.a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
4	ባለፉት አራት ሳምንታት እርስዎ ወይም ማንኛውም የቤተሰብ አባል በእውነት መብላት ያልፈለጉትን አንዳንድ ምግቦች መመገብ ነበረብዎት? ሌሎች የምግብ ዓይነቶችን ለማግኘት የሚያስችል ሀብት ባለመኖሩ?	0 = አይ (ወደ Q5 ዝለል) 1 = አዎ	
4.a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-	

		10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
5	ባለፉት አራት ሳምንታት እርስዎ ወይም ማንኛውም የቤተሰብ አባል ከሚፈልጉ ያነሰ ምግብ መመገብ ነበረብዎት?	0 = አይ (ወደ ዝለል) 1 = አዎ	
5.a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
6.	ባለፉት አራት ሳምንታት እርስዎ ወይም ሌላ ማንኛውም የቤተሰብ አባል በቂ ምግብ ስላልነበረ በቀን ውስጥ ጥቂት ምግቦችን መመገብ ነበረበት?	0= አይ (ወደ Q7 ዝለል) 1 = አዎ	
6.a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
7.	ባለፉት አራት ሳምንታት ውስጥ አንድም የሚበላ ምግብ በቤትዎ ውስጥ ያልነበረበት ወቅት ነበር?	0 = አይ (ወደ Q8 ዝለል) 1 = አዎ	
7.a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ)	

		3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
8.	በአለፉት አራት ሳምንቶች እርስዎ ወይም ማንኛውም የቤተሰብ አባል በሌሊት በረሃብ ተኝተዋል? በቂ ምግብ ስላልነበረ?	0 = አይ (ወደ Q9 ዝለል) 1 = አዎ	
8.a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	
9.	ባለፉት አራት ሳምንታት እርስዎ ወይም ማንኛውም የቤተሰብ አባል በቂ ምግብ ባለመኖሩ ምንም ሳይበሉ አንድ ቀንና ሌሊት ሙሉ አሳልፈዋል?	0=አይ(መጠይቁ ተጠናቅቋል) 1 = አዎ	
9.a	ይህ ስንት ጊዜ ተከሰተ?	1, አልፎ አልፎ(ከ1-2 ጊዜ) 2 ፣ አንዳንድ ጊዜ(ከ3-10ጊዜ) 3 ፣ ብዙ ጊዜ(ከ 10 ጊዜ በላይ)	

ጊዜዎን በማሳለፍዎ እና መረጃ ስለሰጡን እናመሰግናለን!

APPENDIX -II: Wolaitatto Oyishaa (Wolaitic Version Questionnaire)

Harganchaa------------------------------- Paya------------------------

Galasa ______/_________/________/Codyaa_________ payateta keettaa suntaa----------

Heeranne miishaara ohettida oyishatta			
Payiduwa	Oyishaa	Zaaruwa/dooruwaa	Kantt a
101	Na'aara diya gayittitettayi ayibee?	1.Ayiyo 2.Naagiyaro 3. Harano (qoncissa)-----------------	
102	Na'aa ayiyo gidikko neeni n'aa yeliyodde layittayi aapunee?	Ne layittaa: ---------- Maarotta layittaa-----------	
103	Ha'i de'iya geluwaa hanottayi ayimalee	1.Gelassi 2.Gelabryikke 3. Birshettaasi / dumma dayissi/hayiqiisi 5. Haraa/ Qoncisaa	
104	Ha'i neeni diyoosayi aweee	1.Gaxariyaana 2.Ambaana	
105	Ayibaa amanuwa kaalayi	1.Protestantiya 2.Orthodokissiyaa 3.Muslimiyaa 4.Haraa (qoncisaa)-------------	
106	Aapuni naati de'i niyoo?	1. Naatu qoodaa _____	
107	Ayi keena tamaaraddi/ loohaddi?	1. Ayibakka tamarabeyikke 2. Koyiro xekaa (1-8) 3. Na''antto xekaa (9-12) 4. Xoqaa loohuwa (Diplomanne hegaape bolaa)	

108	Haggaa na’aa awayi ayikeenaa tamaaridee woyikko loohidee?	1. Ayibakka tamarabeyikke 2. Koyiro xekaa (1-8) 3. Na’’antto xekaa (9-12) 4. Xoqaa loohuwa (Diplomanne hegaape bolaa)	
109	Ne oosoyi ayibee?	1.Qeeri zal’ancha 2. Qaxarettada ootayissi 3. Wolqa oosancha 4. So oosancha 5. Haraa (Qoncisa)……………	
110	Na’aa awaa oosoyi ayibee?	1. Qeeri zal’ancha 2. Qaxarettidi ooteesi 3. Wolqa oosancha 4. Goshancha 5. Haraa (Qoncisa)……………	
111	Sooni kessiyo miishaani ooni awatti?	1.Ayiyo 2. Awaa 3. Ayoyoonne Awaa 4. Hara sooni ootiya asa	
112	Aginnani geliya miishaa qoodayi aapunnee (aginnani geliaya Etiophiyaa birraani)	Kumetta qoodaaa ______ biraa	

Na’aara ohettida Oyishatta

Payiduwa a	Oyishaa	Zaaruwaa/dooruwaa	Kanta
201	Na’ayi attumeeye Maccee?	1. Atuma 2.Macca	

<table>
<tr><td>202</td><td>Aapuntta na’e?</td><td>Aapuntee: ___________</td><td></td></tr>
<tr><td>203</td><td>Na’aa layittayi aapunee?</td><td>Layitaa: ______________ Aginani</td><td></td></tr>
<tr><td>204</td><td>Na’a kiluwa yeletiyode erayi?</td><td>1.Akayi 2.Hay’ika</td><td></td></tr>
<tr><td>205</td><td>Bola Oyishhasi zaaroyi ee gidikko 204, yeletiyode kiloyi aapunee kilogramiyan?</td><td>Yeletiyyoode kiluwaa--------------</td><td></td></tr>
<tr><td>206</td><td>Haggaa na’anne a bayirraa woyikko a kaaluwa gidon de’iya layitta dumatetayi aapunee?</td><td>Layittaa payiduwan__ (Layittaa)</td><td></td></tr>
<tr><td>207</td><td>Aadhida na’u saaminttaa gidon ne na’ayi sayetiidee?</td><td>1.Akayi 2.Hay’ikka</td><td></td></tr>
<tr><td>208</td><td>Hayi’ikka giiko ayibee sakidayi?</td><td><table>
<tr><td>Hargiyaa</td><td>Akayi</td><td>Hayikka</td></tr>
<tr><td>1. Mishu waa</td><td></td><td></td></tr>
<tr><td>2. Karaa</td><td></td><td></td></tr>
<tr><td>3. Sheenuwa</td><td></td><td></td></tr>
<tr><td>4. Qufiyaa</td><td></td><td></td></tr>
<tr><td>5.Haraa(qoncisa</td><td></td><td></td></tr>
</table></td><td></td></tr>
<tr><td colspan="4">Ayiyonne na’a payatteta go’’a xeeliyaagaa</td></tr>
<tr><td>301</td><td>Yeluwaa kaaloyi dei’i??</td><td>1.Akayi
2.Hayi’ikka</td><td></td></tr>
<tr><td>302</td><td>Awaani yeladdi ?</td><td>1.Sooni
2.Payatetta keetan</td><td></td></tr>
<tr><td>303</td><td>Yela simmin payatteta kaaladdi</td><td>1. Akayi
2. Hayi’ikka</td><td></td></tr>
<tr><td>304</td><td>Ne na’’aasi dichaa kaaloyi de’i?</td><td>1. Akayi
2. Hayi’ikka</td><td></td></tr>
</table>

<table>
<tr><td rowspan="2">305</td><td>Na’’ayi katabettidee?

Ane bessa kitibatiya woraqattaachild katabettikko “√ “ katabettana xayikko qassi “ × “</td><td><table><tr><td>Kitibattiya</td><td>Hayti’’ikka “√ “</td><td>Akayi“× “</td></tr><tr><td>1. BCG</td><td></td><td></td></tr><tr><td>2.Penta (1-3)</td><td></td><td></td></tr><tr><td>3.Polio (polio 0-3)</td><td></td><td></td></tr><tr><td>PCV</td><td></td><td></td></tr><tr><td>Rota</td><td></td><td></td></tr><tr><td>4.Measles</td><td></td><td></td></tr></table></td><td></td></tr>
<tr><td>5.Nenna’ayi uluwaa xaliya ekkidee (na’’u layittappe bola naatu xalaala xeeles.</td><td>1. Akayi
2. Hayi’ikka</td><td></td></tr>
<tr><td>306</td><td>Payatteta keetayi nesoope tamu kilometeriya giddoni de’’i?</td><td>1. Akayi
2. Hayi’ikka</td><td></td></tr>
<tr><td>307</td><td>Efiyyosay payatteta keetaa giddiko na’ayi saheti simmin aapun saatiya giddon efay?</td><td>Saatiyaani yoota------------------------</td><td></td></tr>
<tr><td>308</td><td>Na’’a payatteeta xeeliyagani oone hayuwaa immiya?</td><td>1.Awaa xalaala
2.Ayee xalaala
3.Na’’ayikka</td><td></td></tr>
<tr><td>309</td><td>TT giyo kittibaatiya ixetan dayidda ekaddi/</td><td>1. Akayi
2. Hayi’ikka</td><td></td></tr>
<tr><td colspan="4">Heerane Moottaa xeeliyaga</td></tr>
<tr><td>401</td><td>Sheesha keetayi de’’i?</td><td>1. Akayi
2. Hayi’ikka</td><td></td></tr>
<tr><td>402</td><td>Ee giiko ayimala sheesha ketay?</td><td>1.Lo’’onne maara sheesha keta:
Hatan gujiyo sheesha keeta
Lo’’o Booketida sheesha keeta</td><td></td></tr>
</table>

		Carkoyi geliyoonne kiyo sheesha keeta, Haraa qoncisa 2. Lo''o gidenna sheesha keeta Dembaani coo utoosi Giigenna olaa coo bokoogani otoosi Haraa qoncisa	
403	Ushaasi ayimala haataa go'eteeti?	1. Lo''o haataa qomuwaa Bonbaa hataa Gurgadiyaa hataa naagetidagaa Haraa qoncisaa 2. Lo''o gidenna haattaa Pultuwaa hataa Iraa hataa Shaafaa,bu'iyanne,Abaa Haraa qoncisa	
404	Inteesi aqiyo,katta kattiyonne mehiya ayissiyo dumma dumma kiflee de'i?	1. Akayi 2. Hayi'ikka	
Na'aa naagiyogaane qumaa mizuwaa xeeliyagaa			
P.	Oyishaa	Zaaruwa	Xaala
501	Aapun aginna xantta xalala imaadi	1. Aginaa qoodaa _____	
502	Xuuxuwaa xanta erayi?	1. Akayi 2. Hayi'ikka	
503	Ayidde qumaa mizuwa doomidaaako erayi?	1. Akayi	

		2. Hayi'ikka		
504	Neesi na'a kattaa mizuwaa xeeliyagan xuurayi de''i?	1.Akayi 2.Hayi''ikka		
505	Ne na''assi koyiro maata immmadi?	1.Akayi 2.Hayi''ikka		
506	Aapuuni wodiya xanttaddi/xantanawu koyayi	Aginan yoota-------------		
	Hageetu gidoppe aapun kaataa qomuwa ne na'ayi miiidee 24 saatiya giddoni? (Isuwaappe daro zaaroyi dandayeteessi)	Akayi	Hayikka (qoodaa yoota)	
	1.Gaashiya,bangaa,ruziya,donuwaa qayisiriyya malatiyageeta	Akayi	Hayikka	
	2.Baqeelaa, Ataraa,nne ocholinniya malatiyageeta	Akayi	Hayikka	
	3. Maataa, pilaa, oyisaa	Akayi	Hayikka	
	4. Ashuwaa ,tiriya, kilahuwaa	Akayi	Hayikka	
	5. phuphuliyaa	Akayi	Hayikka	
	6. Vitaminiya A- giyogaa oyiqida santann	Akayi	Hayikka	
	7. Hara santtaanne mitaa ayifiyaa	Akayi	Hayikka	
	8.Oyisaani woyiikko zayttiyaanni ka'ida qumaa	Akayi	Hayikka	
514	Woga saara duma mii?	1.Akayi 2.Hayi''ikka		
517	Awude awude kushiya meecetayi?	1. Sheesha keetappe simiyoode 2. Kattaa giigisanappe koyirottada		

		4. Na’’aa mizanaappe kas	

Payiduwaa	Oyishaa	Zaaruwaa/Dooruwa	Codiyaa
1.	Ha aginnaa gidon katay sooni xayaneesha gaada hirgaddii?	0.Akayi (na’anto oyishakko kanta) 1.Hayi’’ika	….|___|
1a	Aaputto hirgaddi?	1, guuta wodiya(issito woyikko na’uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan (Tamaappeka daro)	
2	Aadhidda oyiddu giyaa giddoni maana koyiido qummaa miishayi xayidoo gishawu agaddi?	0.Akayi (hezaanto oyishakko kanta) 1.Hayi’’ika	
2a	Aaputoo hegee hanidee?	1, guuta wodiya(issito woyikko na’uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan (Tamaappeka daro)	
3.	Aadhidda oyiddu giyaa giddon guuta kattaa qomuwaa miideti miishayi bayinna gishawu?	0.Akayi (oyidanttoanto oyishakko kanta) 1.Hayi’’ika	
3.a	3. Aaaputoo hegee haniddee?	1, Guuta wodiya(issito woyikko na’uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan (Tamaappeka daro)	
4	Aadhiida aginaani maanaw dosenna qummaa qomuwaa miideti miishayi	0.Akayi (ichashanto oyishakko kanta) 1.Hayi’’ika	

	bayinna gishaw?		
4.a	4.a. Aaputtoo haniddee hegee?	1, guuta wodiya(issito woyikko na'uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3,Eesuwan eesuwan (Tamaappeka daro)	
5	Aadhidda oyiddu saamintani maana besiyoogappe guuta kata miidetti miishayi bayinna gishawu?	0.Akayi (usupunto oyishakko kanta) 1.Hayi''ika	
5.a	Aaputoo hanidee hegee?	1, guuta wodiya(issito woyikko na'uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan (Tamaappeka daro)	
6.	Aadhidaa oyidu saamintani maanawu besiyoogappe guuta wodiya miido sate de''i?	0.Akayi (laapunto oyishakko kanta) 1.Hayi''ika	
6.a	Aaputoo hegee haniddee?	1, guuta wodiya(issito woyikko na'uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan (Tamaappeka daro)	
7.	Aadhidda oyiddu saamintaani sooppe muleera miyoobi xayiddo wodee de''i?	0.Akayi (hospunto oyishakko kanta) 1.Hayi''ika	
7.a	Aaputoo hegee hanidee?	1, guuta wodiya(issito woyikko na'uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan	

		(Tamaappeka daro)	
8.	Aadhidda oyiidu saamintani namisishin xissikiddo wodee de’’i kattay xayiddo gishaw?	0.Akayi (udupunto oyishakko kanta) 1.Hayi’’ika	
8.a	Aaputoo hegee hanidee?	1, guuta wodiya(issito woyikko na’uto) 2, Issitto issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan (Tamaappeka daro)	
9.	Aadhidda oyiddu samintta intessoni katayi xayyinni galasaanne qama mela aato wodee de’’i?	0.Akay 1.Hai’’ika	
9.a.	Aaputoo hegee hanidee?	1, guuta wodiya(issito woyikko na’uto) 2, Issitto-issitto(heezappe biidi tamaa gakanaashin) 3, Eesuwan eesuwan (Tamaappeka daro)	

Oyishaa Zaarido gishawu kehipppe galatoosi!