



HARAMAYA UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCE

**SCHOOL OF POSTGRADUATE STUDY ASSESMENT OF UNDER
NUTIRITION AND ASSOCIATED FACTORS AMONG UNDERFIVE
CHILDREN IN BABILE WOREDA SOMALI REGION**

MPH THESIS

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**Assesment of under nutirition and Associated factors among underfive
children in Babile woreda Somali Region, Eastern Ethiopia**

**A Thesis Submitted to department of Public health nutrition School of Post
Graduate Studies**

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**In Partial Fulfillment of the Requirements for the Degree of
MASTER OF PUBLIC HEALTH IN NUTRITION**

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Harar, Ethiopia

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ABSTRACT

Background: Under nutrition contributes to the deaths of about 3 million children every year and continued to threaten the lives of hundreds of millions of children globally. Stunting, wasting, under-weight, and micronutrient deficiencies are the indicators of the under nutrition. The majority of the previous local studies focused on only age of 5-14 years or 6—23 month and investigating Acute malnutrition only and, this study carried out to fill the gap by generating evidence regarding under nutrition and associated factors among children less than five (<5) years using community based studies.

Objective: To assess under nutrition and its associated factors among under five children in Babile Woreda, Somali regional state, in **Dec 10, 2023 to Jan 10,2024**

Methods: A community-based cross-sectional study was conducted from Dec,10 2023 to Jan. 10,2024 in babile woreda. A total of 437 Mothers/caregivers with children aged underfive years old were selected by a systematic sampling method. Epi-data version 4.6.6 was used for data entry, stata version 17 were used for statistical analysis, and WHO Anthro version 3.2.1 software were used for calculating the z scores. Bivariate logistic regression and multivariate logistic regression were used to analyze the data. AOR with 95% CI and P -values less than 0.05 were considered to be the statistical significant.

Results: A total of 428 mothers or care givers paired with under five children was included in this study with response rate of 98%. The prevalence of undernutrition (Stunting, underweight and wasting) were 39.01%(34.49-43.73),25.93(21.99-30.33) and 18.69(15.26-22.68) respectively. Educational status of mother(**AOR= 7.32, 95%CI:4.04-13.27**), and duration of breast feeding (**AOR=2.44, 95%CI:1.25-4.75**) and (**AOR=2.42,95%CI:1.02- 5.73**) were significantly associated with stunting. Family size (**AOR=7.57, 95%CI:2.64-21.74**) and exposure to diarrhea **in the past to weeks (AOR=2.51, 95%CI:1.37- 4.58)** were significantly associated with wasting. Mother's monthly income(**AOR=3.08, 95%CI:1.62-5.85**), and Children's exposure to diarrhoea in the past two weeks (**AOR=3.73,95%CI: 2.10-6.64**) were significantly associated with underweight.

Conclusions. This study indicated that child undernutrition was high among under-five Children as compared to WHO classification of level of public health significance. We recommend to

promote use of family planning , preventing diarrhoeal diseases and provide nutritional counselling for mothers who had no formal education which are vital interventions to improve nutritional status of the children.

Keywords: *Under nutrition, stunting, wasting, underweight, Z score*

1. INTRODUCTION

1.1 Background

Malnutrition refers to a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients(Pavani Varma et al., 2008). The term malnutrition refers to both undernutrition and overnutrition. Undernutrition denotes the insufficient intake of energy and nutrients to meet an individual's needs to maintain good health(WHO, 2018b). Wasting, stunting, and underweight are among those anthropometric indicators commonly used to measure undernutrition in a population of under-five children (Verma et al., 2021).

According to the World Health Organization (WHO), wasting, stunting, and underweight are defined as Z-scores less than -2 standard deviations of weight for height, height for age, and weight for age, respectively(WHO, 2009). Wasting is low weight for height. It indicates current weight loss because a child consumes insufficient food or they are exposed to infectious diseases like diarrhoea, which causes them to lose weight (WHO et al., 2020). Stunting indicates children who are too short relative to their age and underweight, is defined as a child that weighs too little in relation to their age which frequently results from inadequate food supplies, poor childcare procedures, and restricted access to high-quality health and sanitation services(WHO and UNCF, 2020). Stunting and wasting are associated with chronic malnutrition and current nutritional status respectively. Underweight represents both chronic and acute malnutrition(WHO, 2006a).

Worldwide, an estimated 60 million and 13 million children experience moderate and severe acute malnutrition respectively, and 21.9%, 13.4%, and 7.3% of children under five are estimated to be stunted, underweight, and wasted(De Onis et al., 2012). Globally, about 149 million under-5 children are stunted, it results from chronic under-nutrition, typically related to poor socio-economic status, inappropriate maternal nourishment, recurrent illness, and/or improper child feeding and care in infancy(WHO and UNCF, 2020).

Undernutrition among young children is a pressing global health issue, with far-reaching implications for both individual well-being and public health. In developing regions, particularly in sub-Saharan Africa, the prevalence of undernutrition among children under the age of five remains alarmingly high. It is stimated that about 5.4 million under-five children die each year

with 2.7 million deaths occurred in Sub-Saharan African countries including Ethiopia(Unicef, 2020)

Stunting and other forms of under nutrition reduce a child's chance of survival, hindering optimal health and growth. It is also associated with suboptimal brain development, which is likely to have long-lasting harmful consequences for cognitive ability, school performance and future Learning. This in turn affects the development potential of nations (De Sanctis et al., 2021, CSA, 2016). Wasting sequentially impairs the functioning of the immune system and can lead to increased severity, duration and susceptibility to infectious diseases and increases the risk of death.

Children and adolescents' cognitive development and brain physiology depend on early access to a suitable and nutrient-rich diet. under nutrition causes developmental problems in children, including reduced learning capacity (WHO, 2009). Children's and teenagers' social skills, academic performance, and attendance at school are all negatively impacted by malnutrition(WHO, 2024). This study focuses on assessing under nutrition and its associated factors among under-five children in Babile Woreda Somali Region Ethiopia since under nutrition is a public health issue that affects a huge population of children in developing countries.

1.2 Statement of the Problem

In 2021, globally, 149.2 million children under the age of 5 years were stunted, 45.4 million wasted, and 38.9 million over weight(Khan et al., 2023). Malnutrition among children is one of the most important causes of morbidity and mortality in the world, particularly in developing countries(Walton et al., 2011). According to WHO estimates, 2.7 million deaths of children under five occur in Sub-Saharan African nations, including Ethiopia(Unicef, 2020). The two continents, Asia and Africa, are home to the majority of children who are stunted, and each of them contributed 87 million and 59 million to the burden of stunting among children worldwide in 2016(WHO, 2018a).

The prevalence of undernutrition among under 5 years of age children varies across different countries and studies around the globe. According to the reports of previous studies, the prevalence of stunting ranges from (24.9% to 48.9%) (Isaac et al., 2014, Demissie et al., 2013, Sewnet et al., 2021, EMDHS, 2019, Menalu et al., 2021, Fufa et al., 2021) with the minimum prevalence of 24.9% was reported in Sudan(Musa et al., 2014) and the largest prevalence of 49.4% was reported from a study conducted in Ethiopia(Geberselassie et al., 2018). Similarly, the previous studies reveal that the prevalence of underweight ranged from (11.8% to 52%) (Olack et al., 2011, Gebre et al., 2019, EMDHS, 2019, Menalu et al., 2021, Sewnet et al., 2021, Teshome et al., 2009) (Teshome et al., 2009) with a minimum prevalence of 11.8 % reported from a study conducted in Kenya(Olack et al., 2011) and the largest prevalence of 52% was reported from the study conducted in Sudan, (Abdelrahman et al., 2017). Moreover the prevalence of wasting was ranges from (7% to 42.3%) (Mengistu et al., 2013, Yisak et al., 2015, Emmanuel et al., 2016, Wuneh et al., 2017, Gebre et al., 2019, Menalu et al., 2021)with the lowest report of 7% was from study conducted in Ethiopia((EMDHS, 2019) and the largest report of 42.3% was from the study conducted in Dollo ado district eastern Ethiopia(Demissie and Worku, 2013).

Children who are undernourished will experience frequent episodes of infection, be less competent in their studies, and be less productive than children who are well-nourished. The short term consequence of under nutrition are recurring illness, weakness, delay physical growth and brain development, irritability, poor appetite, and low weight for age, etc. and Long term

consequence under nutrition are stunting or short height for age, poor learning ability, poor performance at school and poor general health. All of which reflect in poor working capacity, resulting in low income. stunting in girls can have effects on child bearing, resulting in low birth weight babies(Kar et al., 2008). Previous study showed that lack of attention, memory loss, impaired intelligence, psychomotor development problem, lack of fine motor skills, and poor neuro-sensory integration are all a result of childhood stunting(Pienaar, 2019). The lives of children around the world continue to be in danger in which the estimated three million child deaths caused by under nutrition each year. According 2016 estimate found that 159 million children under the age of five had stunted growth and 50 million were wasted. Stunting affected an estimated 154.8 million, which is 22.9% of under-five children globally(Pienaar, 2019).

Despite significant progress in reducing child malnutrition in Ethiopia, the country still faces a high burden of under-nutrition among under-five children, with particularly severe rates in the Somali region. The 2016 Ethiopian Demographic Health Survey highlights alarming rates of stunting (27.4%), wasting (23%), and underweight (29%) in the Somali region, which surpass national averages. Existing local studies have primarily focused on older children (5-14 years) or specific age groups (6-23 months), often concentrating only on acute malnutrition. There is a notable lack of comprehensive, community-based research addressing under-nutrition among children under five years old in this region. This study aims to fill this gap by assessing the prevalence of under-nutrition and identifying associated factors in Babile Woreda, Somali Region.

1.3 Significance of the Study

The study will primarily benefit Babile Woreda community by linking undernourished children in Babile Woreda, besides the nutritional status of their children will measured and counseling will be provided accordingly. It will also benefit Babile Woreda health office, by assessing the key associated factors affecting under nutrition, the finding of this study will help nutrition program planners and mangers to develop action plans and FAFAN zone health office as it will provide the nutritional status of the children in specified age. It will also provide them the

important factors associated with infant and young child nutrition that should be considered during planning and Implementation of nutritional interventions in present and future.

The results of this study will give important information on the prevalence of under nutrition in young children under the age of five in Babile Woreda,for Fafan zone and Somali Regional Health Bureau and. It also provides information for other governmental and non-governmental organizations found in the region for the implementation of under-five malnutrition intervention strategies. Additionally, researchers may utilize the results as a starting point for future study and as input for comparable studies that need to be investigated further.

1.4 Objectives of the Study

1.4.1 General Objective

To assess under nutrition and associated factors among under five children in Babile Woreda, Somali region, **Dec 10, 2023 to Jan 10,2024.**

1.4.2 Specific Objectives

To determine the prevalence of under nutrition among under five children Babile Woreda Somali region, eastern Ethiopia.

To identify factor associated with under nutrition among under five children in Babile Woreda Somali region, eastern Ethiopia.

2. LITERATURE REVIEW

2.1 Under Nutrition

The global progress on reducing stunting has been extremely slow. Worldwide, the prevalence of childhood stunting decreased from 39.7% in 1990 to 26.7% (171 million) in 2010, only 13 percentage points a relative decrease in 20 years(De Onis et al., 2013). This trend is expected to continue and reach a prevalence of 21.8% in 2020(De Onis et al., 2013). The developing countries have experienced a decrease from 44.4% in 1990 to 29.2% in 2010(Norris et al., 2014). The forecast is that this decreasing trend will continue and reach a prevalence of 23.7% in 2020.

Institution based crosssectional study conducted in India among under five children reveals that 74.2%, 30% and 41.9% were stunted, Underweight and wasted respectively(Amritanshu et al., 2013). A cross-sectional community-based descriptive study conducted in among children under five years old in Khartoum State, Sudan found that the prevalence of wasting 21.1% (12.3% moderate and 8.8% severe) and stunting was 24.9% (15.1% moderate and 9.7% severe)(Musa et al., 2014).

The prevalence of undernutrition was varies across different parts of Ethiopia. According to the report of Ethiopian mini-demographic survey of 2019, the prevalence of stunting, underweight and wasting was 37%, 21% and 7% respectively(EMDHS, 2019). A Community-Based Cross-Sectional Study conducted among Under-Five Children in Pastoral Communities of Afar Regional State, Northeast Ethiopia reveals that prevalence of wasting, stunting, and underweight was 16.2% (95% CI: 13.8–18.8%), 43.1% (95% CI: 39.8–46.5%), and 24.8% (95% CI: 21.9–27.8%), respectively(Gebre et al., 2019). Another institution-based cross-sectional study conducted in Addis Ababa among Under-Five Orphan Children found the prevalence of wasting, stunting, and underweight were 11.1%, 45.8%, and 25.5%, respectively(Sewnet et al., 2021).Furthermore A community-based cross-sectional study conducted in Debre Berhan Town

reveals that prevalence of undernutrition in below age-5 children was 61 (15.8%), with the corresponding figures for underweight, stunting, and wasting were 26%, 41%, and 33%, respectively (Menalu et al., 2021).

2.2 Factors Associated with under nutrition

The causes of malnutrition are directly related to inadequate dietary intake as well as disease, but indirectly to many factors, among others household food security, maternal and child care, health services and the environment (WHO, 2013). Nutritional status is also influenced by three broad factors: food, health and care. Optimal nutritional status results when children have access to affordable, diverse, nutrient-rich food; appropriate maternal and child-care practices; adequate health services; and a healthy environment including safe water, sanitation and good hygiene practices (UNICEF, 2006)

2.2.1 Immediate factors (morbidity status of the child)

Different studies revealed child nutrition are affected by different factors. An analysis study done to Bangladesh National Nutrition Program baseline survey revealed that undernourished children were more likely to be received no measles vaccination, and have suffered from diarrhea in the previous two weeks (Ahmed et al., 2012a). Previous history of diarrheal disease were significantly associated with wasting. A community based cross-sectional study conducted in Dabat District, northwest Ethiopia indicated that wasting were 2.66 times higher among children with history of diarrheal disease compared to those who had no history of diarrheal morbidity in the past 2 weeks (Kebede et al., 2015a). Another cross-sectional community-based study done among infants and young children in Filtu town, Somali region revealed that child with diarrheal disease in the past 15 days were 4 times more likely to be underweight than those without diarrheal diseases in the last 15 days, equally child with diarrheal disease in the past 15 days were 2 times more likely to be wasted (Kebede et al., 2015a)

Presence of illness was significantly associated with stunting. According to institution-based cross-sectional study conducted in Addis Ababa among Under-Five Orphan Children, Orphan children who had a history of illness were two times more likely to be stunted (AOR : 2.23; 95% CI: 1.41, 12.73) than those who had no history of illness(Sewnet et al., 2021)

2.2.2 Underlying Cause (child care & feeding practice and unhealthy environment and in adequate health service)

A study conducted in shroud, Iran showed that no relationship was observed between height for age, weight for height, and weight for age, for breastfeeding, the first supplementary food, and the type of staple food up to the age of 1year(Delvarianzadeh et al., 2017) . Another study conducted in central region of Mozambique revealed that; overall duration of breastfeeding, duration of exclusive breastfeeding, and time of initiation of complementary feeding were significantly associated with stunting(Garcia Cruz et al., 2017) .

A study done in Dabat district, northwest Ethiopia revealed that children with Poor dietary diversity are more likely to be wasted when compared to their counterparts. Equally children whose started breastfeeding one hour later after delivery were more likely to be wasted then those children whose initiated breastfeeding early before one hour (Kebede et al., 2015a)

A community based cross-sectional study conduct in BuleHora district, South Ethiopia showed that Children who received pre-lacteal feeding were 3.8 times more likely to be stunted than children who did not receive pre-lacteal feeding at the time of birth. The study also revealed that children who started complementary feeding before the age of 6 months were 3.3 times more likely to be stunted then children who started complementary feeding at 6 months(Asfaw et al., 2015a)

Another case control study done in Machakel Woreda, Northwest Ethiopia showed that Children who were not properly vaccinated were 35 times more likely to have malnutrition when compared to that of vaccinated with appropriate dose. Similarly, Squeeze out of first breast milk showed significant association with malnutrition as those children whose s Squeezed out of first breast milk following delivery were 2 times more likely to have malnutrition when compared to children whose s do not Squeezed out of first breast milk (Bantamen et al., 2014)

A study done in Filtu, Eastern Ethiopia showed that; Low dietary diversity scores, inappropriate age of complementary feeding initiation and bottle feeding were identified to be significant predictors of stunting. The study also revealed that Breastfed children were less likely to be wasting and/or underweight(Fekadu et al., 2015).

A study on Predictors of poor anthropometric status among children under 2 years of age done rural Uganda showed that Stunting was positively associated with lack of a latrine in the household as children from households who do not own latrine were two times more likely to be stunted than their counterpart(Wamani et al., 2006)

An analysis study done to Bangladesh National Nutrition Program baseline survey revealed that Children with moderate stunting and underweight were more likely to reside in households with un-hygienic toilet (Ahmed et al., 2012b)

2.2.3 Basic cause (socio-economic of mother/care taker, husband and child)

2.2.3.1 Mother/caretaker and husband socio-economic

A study conducted in shroud, Iran revealed that there were no association obtained between all nutritional status indices (stunting, wasting and underweight) with parents' education and occupation, and family size. However, a significant relationship was observed between s' body mass index (BMI) and malnutrition at the present time and those of the past time (Delvarianzadeh et al., 2017).

A cross-sectional survey done in rural Uganda revealed that infant and young children born to a non-formally educated were 2 times more likely to be wasted than children born to s educated above primary (Wamani et al., 2006).

A cross-sectional survey conducted in Botswana showed that maternal occupation, income, and education were found to be important determinant underweight among children. Underweight was less prevalent among children whose parents worked in the agricultural sector than among children whose parents were involved in informal business, similarly as family income increases, the prevalence of underweight were decreasing and The higher the level of the 's education, the lower the level of child underweight observed (Ahmed et al., 2012b).

The prevalence of stunting was lower in the highest Socio Economic Status quintile. In Amhara, stunting was almost double (44 percent) in the lowest quintile compared to the highest quintile

(26 percent), but the difference was not significant(Disha et al., 2015). Another cross sectional study conducted in Jima zone, southern Ethiopia revealed that increasing age and large family size were important predictors of the nutritional status of children (Beyene, 2012).

A study on Predictors of Nutritional Status and Mortality of Children in Seraro district, Southern Ethiopia showed that better maternal nutritional status, parents education, low number of child births per, higher number of foods given for children per day, ownership of livestock and household food sufficiency throughout the year were some of the factors having significant association with better nutritional status of children (Alemayehu, 2015).

According to Ethiopian 2016, EDHS stunting were greater among children in rural areas (40 percent) than urban areas (25 percent). In addition to that the percentage of stunting and underweight children decreases with increasing education and household wealth. More than 4 in 10 children born to mother with no education (42 percent) are stunted compared with 18 percent of children whose mother have more than a secondary education. Similarly, stunting decreases from 42 percent among children in the lowest wealth quintile to 27 percent of those in the highest wealth quintile(EDHS, 2017)

2.2.3.2 Child Demographics

Different studies revealed child nutrition are affected by different factors. Studies conducted Shahroud, Iran showed that an association exist between child's age and under nutrition (underweight, stunting and wasting) as under nutrition increases with age from six months to two years of age. With regard to sex the study revealed that the prevalence of under nutrition were slightly higher in female compared to male child (Delvarianzadeh et al., 2017). In contrast a studies done in Bangladesh and Zambia showed that under nourished children was likely to be male. In addition, the former acknowledges that under nutrition increases with age from six months to two years of age, and the later revealed that underweight children were more likely to receive no measles vaccination, and have suffered from diarrhea in the previous two weeks (Ahmed et al., 2012b).

A study conducted in Kenya showed that there was no association between age of the child with stunting, at some time the study yielded a borderline association exist between having experienced fever or malaria in the past two weeks and stunting (adjusted odds ratio=0.26, 95%

confidence interval=0.07-1.00, $p=0.05$), Despite showing no association statistically, wasting was found to increase with age (Kar et al., 2008).

A community based cross-sectional study conducted in Dabat District, northwest Ethiopia showed the burden of stunting and wasting among children aged 12 –24 months was 44.6 and 11.6%,respectively, while it was 13.5 and 5.4% in infant's aged 6 –11 months and was increasing as the age of the child increases, similarly the study also indicated that wasting were 2.66 times higher among children with history of diarrheal disease compared to those who had no history of diarrheal morbidity in the past 2 weeks (Kebede et al., 2015b).

A cross-sectional community-based study conducted among infants and young children in Filtu town, Somali region revealed that child with diarrheal disease in the past 15 days were four times more likely to be underweight than those without diarrheal diseases in the last 15 days, equally child with diarrheal disease in the past 15 days were two times more likely to be wasted (Fekadu et al., 2015).

According to Ethiopian EDHS 2016, after being fairly stable in the first 6-8 months of life, the prevalence of stunting increases steadily from age of 9 months through the first 4 years of life, before declining slightly, as it is slightly higher among male than female children (41 percent versus 35 percent) (EDHS, 2017)

2.3 Conceptual Frame Work

This conceptual frame work has three main factors which may have association with under nutrition among children less than 5 years. This factors as shown in the below diagram includes Inherent factors, Proximal factor, Intermediate factor, and Distal factor. The conceptual framework illustrated below was adapted from UNICEF conceptual framework on cause of children malnutrition

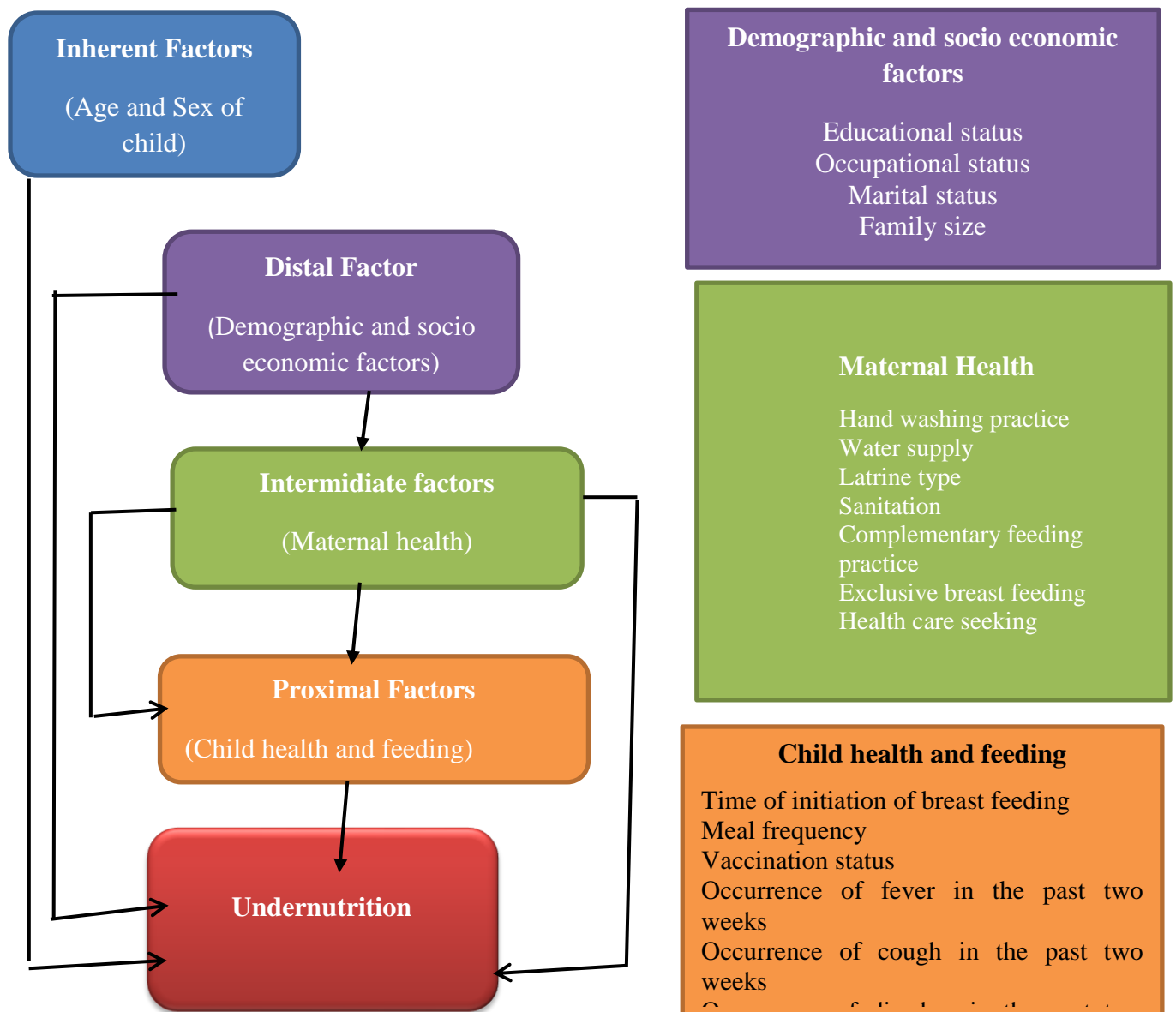


Figure 1: Conceptual Frame Work of undernutrition among under 5 years children

Source: Adapted from UNICEF conceptual framework of malnutrition and different Literature(UNICEF,2013)

3. METHOD AND MATERIALS

3.1 Study Area and Period

The study was conducted at Babile Woreda from **Dec 10, 2023 to Jan 10,2024**. **Babile** is one of the Woreda of Somali regional state, part of Fafan zone. It is bordered on the East by Gursum Woreda Somali, on the west by Fadis Woreda Oromia region, on the north by Babile Woreda Oromia region, on the south by the Fik Woreda Somali, and this Woreda is located 114km from the Jig-jiga, Somali Region state capital city and 670km from Addis Ababa the capital city of the country.

According to 2015 E.C. population projection, the Woreda had a total population of 117,102 of whom 64406 are female and 52696 are male. The projections also revealed that 29,682 were reproductive age group, 11,472 are under-five children. (Source: Babile Woreda health office). The Woreda has 18 kebales, three (3) health centers and 38 health posts.

3.2 Study Design

Communities based cross sectional study was employed.

3.3 Source Population

All children under five years who live in Babile Woreda Somali region.

3.4 Study Population

All children under five years who live in selected kebales of Babile Woreda.

3.5 Study Units

All children under five years who living in selected household and including in the study.

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

All children under five years (<5yrs) living in Babile Woreda.

3.6.2 Exclusion Criteria

Since the study involves /caretaker child pair, Mothers/caretaker who are critically ill and mentally incapable for interview during data collection were excluded.

3.7 Sample Size Determination and Sampling Procedure

3.7.1 Sample size Determination

The sample size was calculated based on the prevalence and associated factor with under nutrition. First the required sample size was calculated using single proportion formula with child assumption of 95 % confidence level, marginal error of 5%, Proportion (P) of the three indices i.e. wasting (19.5 %), stunting (24.8 %) and underweight (21.5 %) of infant and children aged <59 month.

$n = (z\alpha/2)^2 * p(1-p) / d^2$ where n = desired minimum sample size

Z=z value corresponding to in a 95% level of significance = 1.96

P= proportion of under five years who are wasting

D=absolute precision (margin error) = 5%

Substituting in to the equation and taking indices that gives us the largest sample size $n = (1.96)^2 * 0.195 (1-0.195) / (0.05)^2 = 241$. Adding 10% non-response rate makes our sample size 265 mother/caretaker pair. Considering multi stage sampling that was employed during sample selection, and a design effect of 1.5 were multiplied making our final sample size for prevalence of under nutrition 397 mother/caretaker child pair. Secondly, factors associated with under nutrition sample size are calculated using Epi info version 7 statistical software for two population proportions.

To determine the sample size, the following assumption were made: diarrhea in the last 15 days was found to be a major determinant factor for under nutrition in study done in Bulehora, southern Ethiopia

Where, n1 = sample size of children who had no diarrhea in the last two weeks, but who are undernourished

n2 = sample size of children who had diarrhea in the last two weeks and undernourished $r = n1/n2 = 2$, that is taking two to one ratio. $Z\alpha/2 = 1.96$ for the standard scale of 95% level of confidence, and considering 80% of power. Open Epi Version 7 is used to calculate sample size with the above assumption considering all nutritional indices and wasting was taken as it gives the maximum sample size i.e. 265 (by two to one ratio.).

Adding 10% non-response and multiplying 1.5 design effect, then the total sample size for factors associated with under nutrition is 437mother /caretaker child pair.

The detail is as follows.

Table 1:Sample size Determination

No	Variable	Assumption	Sample size	Final Sample Size	Reference
1.	Diarrhea last two wks.	CI=95% Power=80% Exposed(yes)=84.7% Unexposed(no)=56.5% Ratio=2:1 AOR=2.199	291 +10% non-response multiply [1.5 design effect]	437	(Akombi et al., 2017)
2.	Household income	CI=95% Power=80% Exposed(yes)=73.8% Unexposed(no)=53% Ratio=2:1 AOR=2.5	214	353	(Pienaar, 2019)
3.	Access to health facility	CI=95% Power=80% Exposed(yes)=63% Unexposed(no)=32% Ratio=1.1 AOR=2.3	210	346	(Kebede et al., 2015b)

Our last sample size will be **437**since it is the largest.

3.7.2 Sampling Procedure

Multi stage sampling was employed to select the study population. Among the 18 kebales of the Woreda, five kebele namely Dhandhama (1,161 HHs), Biqa (749 HHs), Elbahay (980 HHs), obosha (1,233 HHs) and kora (878HHs) was selected using simple random sampling. This data on number of households living the above mentioned kebales was obtained from health extension workers operating in the area, then proportional sample allocation was made per kebales household number (as shown on below figure). Study units was selected by systematic random sampling accordingly.

In families having more than one child aged <59 month, child was included. If the member of the selected household was absent during data collection, then three re-visit was made and those remained absent for these re-visits, then next household was included. In case that the selected household had no infant and young children <59 month, then the next house hold was selected.

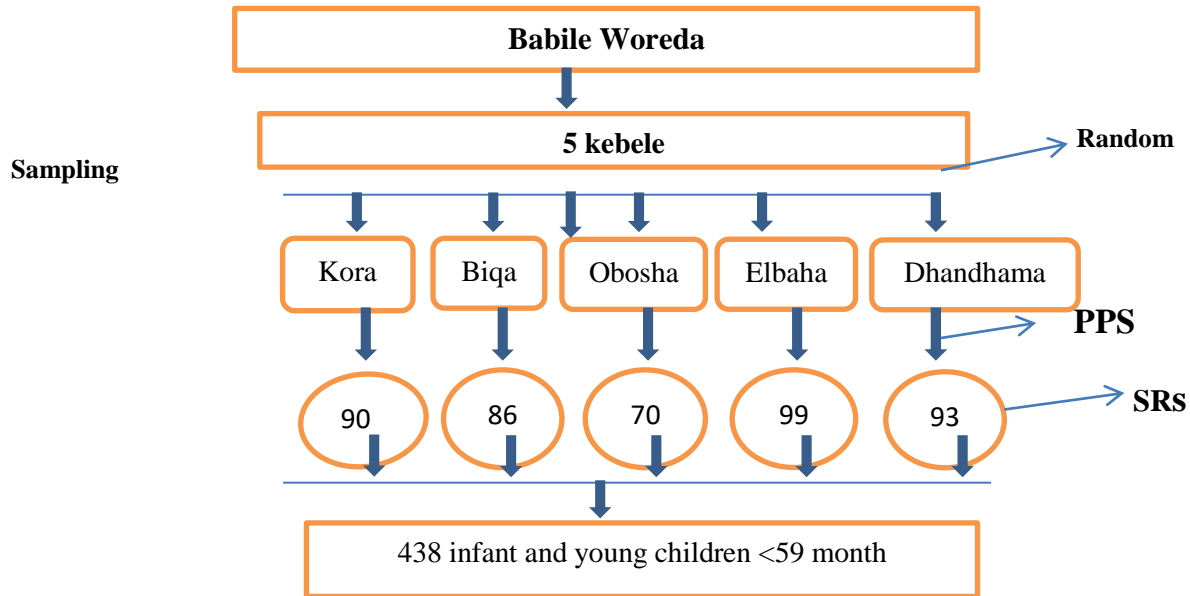


Figure 2: Sampling Procedure Scheme

3.8 Data Collection tools

The data was collected using structured questionnaire and anthropometric tools such as weight, height and MUAC. The questionnaire was originally prepared in English, translated into Somali and translated back to English to maintain its consistence. The questions were adopted from other studies, EDHS, and WHO infant and young child feeding guide and modified to local **context**. With regard to Child anthropometry: the length and weight measured in line with WHO recommendation on anthropometric measurement using Anthropometric Indicators Measurement Guide by Food and Nutritional Technical Assistance.

Face to face interview was conducted with mother /caretaker using structured questionnaires, covering immediate, underlying and basic factors. Age of the child was obtained by asking mother/caretaker. If the mother/caretaker cannot mention child’s age exactly, then locally known occasions such eidalfidr and eidalodha was used as source of retrieval, immunization status of

the child was also asked and child's immunization card were requested if available for cross checking.

The length of the infant and young children was measured using length/height board placed horizontally while the child is on light cloth, no shoes or hat on and on supine position (lying position), and the measurement will be taken twice. If the two measurement vary ≤ 1 cm, then it was averaged and recorded immediately to the nearest 0.1 cm vary more than 1cm, then it was disregarded and the measurement was taken again. The weights of the infant and young children were also measured by Salter scale with basin while the child is on light cloth, no shoes, or hat and the measurement will be taken twice. If the two measurements differ ≤ 0.5 kg, then it was averaged and recorded immediately to the nearest 100gm, but if the measurements vary more than 0.5 kg, then it was disregarded and the measurement was taken again.

The reference standards of US National Center for Health Statistics (NCHS) recommended by the World Health Organization were used as reference. A cut-off below or equal to Z-scores of minus two standard deviations was used, irrespective of the indicator used. Children with a Z-score below or equal to -2 SD were considered as stunted, wasted or underweight

The data was collected by 12 health extension workers and 4 supervisors who held university degree in health. Two days Training was given to data collectors' and supervisors on their responsibilities such as describing the purpose of the study to the respondents, informing respondents on the importance of honest and sincere response, measuring length and weight accurately and to the standard. In addition to that the data were checked daily by the principal investigator for completeness and accuracy

3.8.1 Data Collection Procedure

Face to face interview was conducted with mother /caretaker using structured questionnaires, covering immediate, underlying and basic factors. Age of the child was obtained by asking mother/caretaker. If the mother/caretaker cannot mention child's age exactly, then locally known occasions such eidalfidr and eidalodha was used as source of retrieval, immunization status of the child was also asked and child's immunization card were requested if available for cross checking.

3.8.2 Data Collectors

Data collectors was 12 health extension workers and four supervisors, Data collectors was recruited based on their work experience, dedication; hard-working and two BSc nurse and two health officer with better experience were recruited as supervisors. Training of two consecutive days was given on how to fill in the questionnaire and most importantly on how to measure anthropometric measurements of under five children. The training was included pre-testing of the instruments.

3.9 Study Variables

3.9.1 Dependent Variables

Under nutrition (stunting, wasting and underweight)

3.9.2 Independent Variables

❖ Socio Demographic Factor

- ✓ Age Mother/care taker
- ✓ Educational status mother/care taker
- ✓ Marital status mother/care taker
- ✓ Occupation mother/care taker
- ✓ Family size
- ✓ Husband Age
- ✓ Husband Occupation
- ✓ Husband Education
- ✓ Sex of the child
- ✓ Number of undertow children
- ✓ Age of the child

❖ Intermediate factors

- ✓ Exclusive breast feeding
- ✓ Complement feeding
- ✓ Meal frequency
- ✓ Health- care-seeking
- ✓ Hand washing

- ✓ Water supply
- ✓ Sanitation
- ✓ Latrine

❖ **Child health characteristics**

- ✓ Occurrence of fever in the past two weeks
- ✓ Occurrence of cough in the past two weeks
- ✓ Occurrence of diarrhea in the past two weeks

3.10 Operational Definitions

Stunting: - Is Deficits in length-for-age or height-for-age. In this study height for age < -2 SD of the WHO Child Growth Standards median is considered as stunted.

Wasting: - In this study wasted refers to weight for length below -2 SD of the WHO Child Growth Standards median.

Underweight: - In this study underweight weight for age below -2 standard deviations (SD) of the WHO Child Growth Standards median(WHO, 2009).

Under-nutrition children: Children with one of three types of malnutrition (stunting, underweight or wasting) (Member Y,et al, 2018).

Improved water supply: - in this study it refers to water suitable for drinking including; treated river water or bottled water

Unimproved water supply: - water which is not suitable for drinking and this may include; untreated river water or Surface water(UNICEF, 2006)

3.11. Data Quality Control

To assure quality of the data two days of training was given for the data collectors on. The training will be focusing on introducing the data collection tools, the initial and end of the data collection period, how we collect data, wisely using of time, data handling, and submit the collected data to be familiar with it. It was conducted before the actual data collection period. Pre-test 5% was done Obosha Kebele. Data completeness was checked, cleaned and compiled by the investigator on daily basis. The questionnaire was translated into the local language i.e. Somali for data collection and then retranslated back into English to ensure accuracy of translation.

3.12. Data Processing and Analysis

EPI data version 4.6.6 was used to enter the data, and STATA version 17 was used for analysis. The 2006 WHO Anthro 3.2.1 software was used to calculate anthropometric indices. The percentages and frequencies of socio demographic characteristics and other pertinent variables in the study were described using descriptive analysis. Using both bivariate and multivariable logistic regression analysis, the associations of under nutrition in children were found. Both crude and adjusted odds ratios together with their corresponding 95% confidence intervals were computed to see the strength of association between the outcome and independent variables. All independent variables that were associated with the outcome variables (wasting, stunting, and underweight) in bivariate analysis (with p value < 0.25) were included in the final multivariable logistic analysis. A p value of < 0.05 was considered to declare the result as statistically significant. The multi co linearity was checked with VIF and Hosmer–Lemeshow test was performed for model fitness in the final model, and p value > 0.05 was considered a good fit. The result was presented in text, tables, charts and graphs based on the types of data.

3.13. Ethical Clearance

Ethical clearance was obtained from the ethical review board of Haramaya University, College of Health and medical Science. In addition, letters of permission was written to all respected offices. Prior to data collection written informed, voluntary signed consent was obtained from each mothers/caregiver of the study participants after explaining the purpose of the study. Consent was taken from their parents and verbal assent was taken from study participant.

Confidentiality of the information was assured and privacy of the respondents was maintained. The study participants was exempted from paying any cost for the tests. their participation is voluntary and they have the full right to refuse to take part in or interrupt the study at any time. Positive results was communicated to the physician for further diagnosis and treatment.

4. RESULTS

4.1. Baseline Characteristics of Study Participants

A total of 428 children with their mothers or caregivers were included in the study, with a response rate of 98%. About, 168 (39.25%) of mothers/caregivers, were found in the age range of 25-29 years. The majority 368 (85.98%) of mother or care givers marital status was married. Nearly half, 218 of mothers or caregivers had no formal education and about 355 (82.94%) had no occupation (house wife). More than half 242 (56.54%) of children were male and about 118 (27.57%) were found between 6-11 months age. Majority of households which accounts, 268 (62.62%) had less than two under two years children and nearly three fourth, 318 (74.30%) of mother or care givers had no monthly income. More than half of households, 245 (57.24%) had family size of ≥ 5 and majority of households which accounts, 166(61.21%) had no livestock (Table 2).

Table 2: Baseline Characteristics of Study Participants in babile woreda somali region, eastern Ethiopia, 2024 (n = 428)

Variables	Category	Frequency (%)
Age of mother/caregivers (years)	20-24	132(30.84)
	25-29	168 (39.25)
	30-34	73(17.06)
	≥ 35	55(12.85)
Marital status of mother/caregivers	Married	368(85.98)
	Widowed	54 (12.62)
	Divorced	6 (1.4)
Educational status of the mother/care giver	No formal education	218(50.93)
	Read and write	44(10.28)
	Primary	65 (15.19)
	Secondary and above	101(23.6)
Occupation of the mother/care giver	House wife	355(82.94)
	Government employee	21(4.91)
	Self-employee	49 (11.45)
	Others	3 (0.7)
Age husbands (Years)	Mean \pm (SD) =39.36 \pm 5.74 SD	
Educational status of husbands	Uneducated	190(51.63)
	Educated	178(48.67)
	Farmer	175 (46.42)

Occupation of husbands	Daily laborer	81(21.49)
	Government employee	62 (16.45)
	Marchant	41(10.88)
	Pastoralist	9(2.39)
	Others	9 (2.39)
Sex of child	Male	242(56.54)
	Female	186(43.46)
Child age (in months)	<6	83(19.39)
	6-11	118 (27.57)
	12-23	112 (26.17)
	24-35	102 (23.83)
	≥36	13 (3.04)
Number of under two children	<2	268 (62.62)
	≥2	160 (37.38)
Does the mothers/caregivers has monthly income?	Yes	110 (25.70)
	No	318 (74.30)
Family Size	<5	183(42.76)
	≥5	245(57.24)
Does household owns livestock?	Yes	262(38.79)
	No	166(61.21)

4.2. Child feeding practice and health care

Among the total of 428 respondents, nearly half of mothers or care givers, 210 (49.07%) did not initiate breast feeding within one hour of delivery. About three fourth of study participants, 328 (76.64%) did not exclusively feed their childs in the last 24 hrs and majority of children , 253 (59.11) breastfed and receive solid or semisolid food in previous 24 hrs . Majority of the children, 225 (61.81) started complementary feeding before six months. About, 249 (58.8%) mothers breast fed their children less than twelve times in previous 24 hrs and majority of children , 186 (43 .46%) breast feed for greater than or equal to two years. More than half, 234 (54.67%) of mother's or care givers offer their child to solid or semisolid food ≥3 times in previous 24hrs whereas about, 276 (64.49%) fed their child with bottle in previous 24 hours. Regarding to children vaccination status, 311 (72.66%) children were partially vaccinated (**Table 3**).

Table 3:Child feeding practice and health care, babile woreda, somali region, eastern Ethiopia, 2024 (n = 428)

Variables	Category	Frequency (%)
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Did you Initiated breast feeding within one hour of delivery to your child?	Yes	106 (24.77)
	No	210 (49.07)
	I don't remember	112(26.17)
Did your child exclusively breastfeed in the last 24 hour?	Yes	100(23.36)
	No	328 (76.64)
Did your child breastfed and receive solid or semisolid food in previous 24 hours	Yes	253(59.11)
	No	175(40.89)
Time of complementary feeding initiation in month	Before 6 months	225(61.81)
	At 6 months	121(33.24)
	After 6 months	18 (4.95)
How often you breast feed your child in previous 24hrs?	<12 times	249(58.18)
	≥12 times	179(41.82)
Overall duration of breast feeding (in years)	<1	59(13.79)
	1-2	183(42.76)
	≥ 2	186 (43.46)
How often did you offer your child to solid or semisolid food in previous 24hrs	<3times	194 (45.33)
	≥3 times	234 (54.67)
Have you fed your child with bottle in previous 24 hours?	Yes	276 (64.49)
	No	152(35.51)
From where did you seek medical care while your child get sick?	Health facility	293(49.49)
	Religious institution	110(18.58)
	Traditional personal	186 (31.42)
	No where	3 (0.51)
Children's vaccination status	Not vaccinated	43(10.05)
	partially Vaccinated	311 (72.66)
	Fully vaccinated	74(17.29)

4.3. Water, Sanitation and Hygiene related factors

Of the 428 households participating in the study, 367 (85.75%) had improved water sources. About, 311 (72.66%) wash their hands after visiting toilet, whereas more than three fourth of mothers or care givers which accounts, 337(78.74%) wash their hands before cooking and serving food. Most of mothers or care givers, 364 (85.05) wash their hands after cleaning child feaces. Almost all, 421 (98.36%) of households had latrine (**Table 4**).

Table 4: Family water, sanitation and hygiene, babile woreda, somali region, eastern Ethiopia, 2024 (n=428)

Variables	Category	Frequency (%)
Source of water supply	Improved(Treated and bottled water)	367(85.75)
	Unimproved water	61(14.25)
How long it is to reach the water source	< 30 minutes	143(33.41)

	≥30 minutes	276(64.49)
	Don't know	9(2.1)
Who fetch the water for house hold?	Mother or care taker	268 (62.62)
	Other family member	160 (37.38)
Do you wash your hands after visiting the toilet?	Yes	311(72.66)
	No	117(27.34)
Do you wash your hands before cooking and serving food?	Yes	337(78.74)
	No	91(21.26)
Do you wash your hands after cleaning child feaces	Yes	364 (85.05)
	No	64 (14.95)
How care giver wash their hands	Only with water	207(56.87)
	Some times with soap	128(35.16)
	Always	29 (7.97)
Availability of latrines	Yes	421(98.36)
	No	7 (1.64)

4.4. Child Health Characteristics

Out of the total 428 children 95(22.2%), 71 (16.59%) and 118(27.57%) had diarrhea, cough and fever in the last two weeks respectively(Table 5).

Table 5:Child health charecteristics , babile woreda, somali region, eastern Ethiopia, 2024

Variables	Category	Frequency (%)
Does your child had diarrhea in the last 2 weeks?	Yes	95 (22.20)
	No	333 (77.80)
Does your child had cough in the last 2 weeks?	Yes	71(16.59)
	No	357(83.41)
Does your child had fever in the last 2 weeks?	Yes	118 (27.57)
	No	310 (72.43)

(n=428)

4.5. Prevalence of Undernutrition (Stunting, Underweight and Wasting).

Among all children taking part in this study (n=428), the prevalence of stunting was 39.01% (95% CI: 34.49-43.73), underweight 25.93% (95% CI: 21.99–30.33) and wasting was 18.69% (95% CI: 15.26-22.68) (Figure 3).

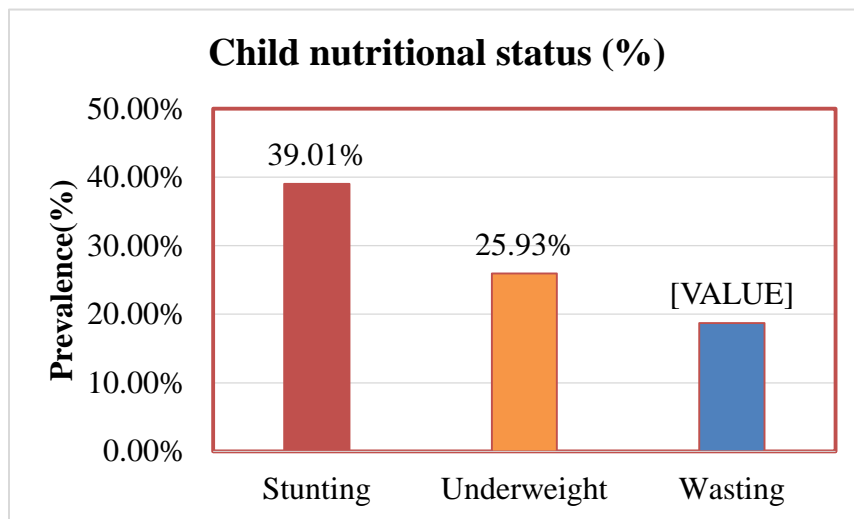


Figure 3: Prevalence of under nutrition among underfive children in babile woreda somali region, eastern Ethiopia, 2024 (n = 428)

In this study the prevalence of at least one indices of undernutrition was 64.71% (95% CI: 60.05-69.11)(Figure 4).

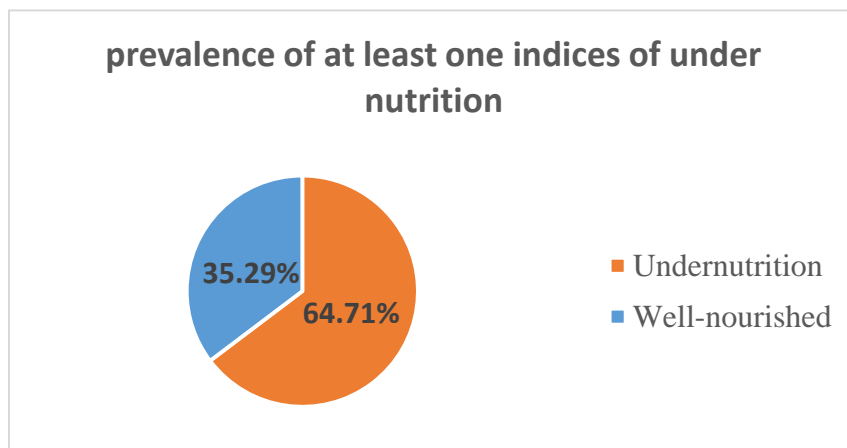


Figure 4: Prevalence of at least one indices of under nutrition among underfive children in babile woreda somali region, eastern Ethiopia, 2024 (n = 428)

4.6. Factors Associated with Undernutrition.

All independent variables were examined for possible associations with stunting, wasting, and underweight using a binary logistic regression model. A bi variable analysis was first performed to identify predictor variables associated with the outcome variables. Variables with a p value <0.25 in the bi variable analysis were fitted into the multivariable analysis to control the possible effects of confounders and to see their independent association with stunting, wasting, and underweight.

4.6.1. Factors Associated with stunting.

In bi variable logistic regression model occupation of mother or care giver, educational status of mother/caregiver, family size, sex of child, time of initiation of breast feeding, breastfed and receive solid or semisolid food in previous 24 hour, duration of breast feeding, vaccination status, source of water supply, not washing hands (after visiting toilet, before cooking and serving food after cleaning child feaces) and having diarrhea in the last 2 weeks were significantly associated with stunting at p value <0.25 .

In Multivariable logistic regression model variables like educational status of mother or care giver, dietary diversity score of children and duration of breast feeding was significantly associated with stunting at p value of <0.05 . Therefore children from illiterate mothers were 7.32 times more likely to be stunted as compared to children from literate mothers (**AOR= 7.32, 95%CI:4.04-13.27**). It was also observed that Children who breast fed for less than one years and between 1 to 2 years were 2.44 (**AOR=2.44, 95%CI:1.25-4.75**) and 2.42 times (**AOR=2.42,95%CI:1.02- 5.73**) more likely to be stunted as compared to those children who breast fed for greater than or equal to two years respectively (**Table 6**).

Table 6: Bivariable and Multivariable logistic regression model for factor associated with stunting among underfive children in babile woreda somali region, eastern Ethiopia, 2024 (n = 428)

Variables	Category	Stunting		COR (95% CI)	AOR (95% CI)
		Yes	No		
Family size	≥5	141	104	8.18(5.03, 13.31)	1.81(0.83 , 3.97)
	<5	26	157	1	1
Educational status of the mother/caregiver	Illiterate	131	87	7.27(4.64, 11.41)	7.32(4.04,13.27)*
	Literate	36	174	1	1
Vaccination status	Not fully Vaccinated	149	205	2.26(1.27, 4.0)	1.99(0.97, 4.06)
	Fully Vaccinated	18	56	1	1
Duration of breastfeeding	<1 Year	32	27	1.39(0.9,2.129)	2.44(1.25,4.75) *
	1-2 years	74	109	2.43(1.33, 4.41)	2.42(1.02, 5.73) *
	≥ 2 years	61	125	1	1
Do you wash your hands Before cooking and Serving food	No	49	42	2.16(1.35, 3.46)	1.55(0.83, 2.88)
	Yes	118	219	1	1
Source of water supply	Untreated water	17	44	0.55(0.30, 1.01)	0.54(0.25, 1.16)
	Treated	150	217	1	1

NB: 1: reference group; COR: crude odds ratio; AOR: adjusted odds ratio; * statistically significant at P value <0.05.

4.6.2 . Factors Associated with wasting.

In bi variable logistic regression model child age, family size, sex of child, time of initiation of breast feeding, frequency of breast feeding, source of water supply, not hand washing after cleaning child feaces and having diarrhea in the last 2 weeks were significantly associated wasting at p value <0.25.

In Multivariable logistic regression model only family size and exposure to diarrheal disease in the last two weeks were significantly associated with wasting at p value of <0.05. Accordingly, the odd of wasting among child in households with family size greater or equal to five were 7.57 higher as compared child in household with family size less than five (**AOR=7.57, 95%CI:2.64-21.74**). Children who had diarrhea in the last two weeks were 2.51 times more likely to be wasted than their counterpart (**AOR=2.51, 95%CI:1.37- 4.58**) (**Table:7**).

Table 7: Bivariable and Multivariable logistic regression model for factor associated with Wasting among underfive children in babile woreda somali region, eastern Ethiopia, 2024 (n = 428)

Variables	Category	Wasting		COR (95% CI)	AOR (95% CI)
		Yes	No		
Child age in months	<6	9	74	0.40(0.093- 1.75)	0.43(0.08- 2.18)
	6-11	28	90	1.03(0.26- 4.03)	1.89(0.40- 8.84)
	12-23	24	88	0.9(0.23- 3.56)	1.45(0.31-6.69)
	24-36	16	86	0.62(0.15- 2.50)	0.86 (0.19-3.85)
	≥36	3	10	1	1
Sex of child	Male	59	183	2.53 (1.47- 4.34)	1.71(0.92-3.18)
	Female	21	165	1	1
Family Size	≥5	69	176	6.13(3.13- 11.98)	7.57(2.64-21.74) *
	<5	11	174	1	1
Does your child had diarrhea in the last 2 weeks	Yes	32	63	3.01 (1.78- 5.09)	2.51(1.37- 4.58) *
	No	48	285	1	1
Do you wash your hands after cleaning child feaces	No	17	47	1.72(0.93- 3.20)	0.99(0.5- 2.00)
	Yes	63	301	1	1
Source of water supply	Untreated water	16	45	1.68(0.89-3.16)	1.37(0.63- 2.95)
	Treated	303	64	1	1

NB: 1: reference group; COR: crude odds ratio; AOR: adjusted odds ratio; * statistically significant at P value <0.05

4.6.3 . Factors Associated with underweight.

In bi variable logistic regression model family size, income status mothers/caregiver, number of under two years children's, time of initiation of breast feeding, breastfed and receive solid or semisolid food in previous 24 hour, vaccination status, source of water supply, wash hand (after visiting toilet, before cooking and serving food after cleaning child feaces) presence of fever in the past two weeks prior to the study and presence of diarrhea in the past two weeks prior to the Study were significantly associated with underweight at p value <0.25.

In Multivariable logistic regression model variables like not having monthly income and presence of diarrhoea in the past two weeks prior to the Study were significantly associated with underweight at p value<0.05. Accordingly, children whose mothers had no monthly income were three times more likely to be underweight as compared to those mothers who have monthly income (**AOR=3.08, 95%CI:1.62-5.85**). Children who had diarrhoea in the past two weeks prior

to the study were 3.73 times more likely to be wasted than those children without diarrhoeal disease (AOR=3.73,95%CI: 2.10-6.64)(Table 8).

Table 8: Bivariable and Multivariable logistic regression model for factor associated with underweight among underfive children in babile woreda somali region, eastern Ethiopia, 2024 (n = 428)

Variables	Category	Underweight		COR (95% CI)	AOR (95% CI)
		Yes	No		
Does household has monthly income	No	96	222	2.73(1.51-4.96)	3.08(1.62-5.85)*
	Yes	15	95	1	1
Do you wash your hands Before cooking and serving Food?	No	30	61	1.55(0.93- 2.57)	1.11(0.63-1.95)
	Yes	81	256	1	1
Do you wash your hands after cleaning child feaces?	No	15	49	0.85(0.45- 1.59)	0.55 (0.28-1.21)
	Yes	96	268	1	1
Does your child had fever in the last 2 weeks?	Yes	38	80	1.54(0.96- 2.45)	1.07(0.60-1.93)
	No	73	237	1	1
Does your child had diarrhea in the last 2 weeks?	Yes	47	48	4.11(2.53- 6.69)	3.78 (2.14-6.68)*
	No	64	269	1	1

NB: 1: reference group; COR: crude odds ratio; AOR: adjusted odds ratio; * statistically significant at P value <0.05.

5. DISCUSSION

This study was aimed to assess prevalence of under nutrition (stunting, wasting, and underweight) and associated factors among under five children in babile Woreda, Somali region, eastern Ethiopia. The current study revealed that, 39.01% (95% CI: 34.49-43.73), 25.93% (95% CI: 21.99–30.33) and 18.69% (95% CI: 15.26-22.68) of under five children were stunted, underweight and wasted respectively. A factors like educational status of mother or care giver, and duration of breast feeding was significantly associated with stunting. Family size and presence of diarrhea in the past two weeks prior to the study were significantly associated with wasting, whereas a variables like not having monthly income and presence of diarrhea in the past two weeks prior to the Study were significantly associated with underweight.

The prevalence of stunting in the current study , 39.01% (95% CI: 34.49-43.73), was consistent with a national figure (37%)(EMDHS, 2019), Afar regional state north eastern Ethiopia(43.1%)(Gebre et al., 2019), Dessie town north eastern Ethiopia(36.8%)(Sewenet et al., 2022) and Debra berhan Ethiopia(41%)(Menalu et al., 2021). It was much higher than other studies done in Ethiopia (Dollo Ado district, 34.4% (Demissie and Worku, 2013), Gumbrit district, 24.0%(Edris, 2007)), Kenya, 28.9%(Isaac et al., 2014), Sudan, 24.9%(Musa et al., 2014) . However the prevalence of stunting in this study was lower than Libokemekem, Ethiopia, 49.4%(Geberselassie et al., 2018), Semien Bench district, Ethiopi(48.9) (Fufa and Laloto, 2021),India, 74.2%(Amritanshu et al., 2013). This difference might be due to difference in cultural and child

feeding habits, study setting, and period of the study, socioeconomic characteristics of the (Sewnet et al., 2021)population and difference in sample size.

The prevalence of underweight in this study(25.93%) was in line with the study conducted in Afar regional state north eastern Ethiopia (24.8%)(Gebre et al., 2019), Addis Ababa, Ethiopia(25.5%), Dessie town north eastern Ethiopia(27.6%) (Sewenet et al., 2022)and Debra berhan Ethiopia(26%)(Menalu et al., 2021).This prevalence was higher than the findings of the national prevalence of underweight(21%)(EMDHS, 2019) and study conducted in kenya (11.8%)(Olack et al., 2011). However the finding of underweight in this study was lower than

the finding of the study conducted in studies done in Ethiopia such as West Gojam zone, 49.2% (Teshome et al., 2009), Dollo Ado district, 47.7%(Demissie and Worku, 2013) and Sudan, 52.0% (Abdelrahman et al., 2017).This variation could be due to study setting difference, design employed, sample size taken, cultural variation in child care and feeding.

The prevalence of wasting ,18.69%(15.26-22.68) was consistent with the study conducted in Afar regional state north eastern Ethiopia (16.2%)(Gebre et al., 2019) and Hidabu Abote district, Ethiopia, 16.7%(Mengistu et al., 2013). However this finding is higher than the national figures (7%)(EMDHS, 2019), different parts of Ethiopia (Haramaya district(10.7%)(Yisak et al., 2015), Metekel zone (10.2%) (Wuneh and Guracho, 2017)) and in Nigeria (8.8%)(Emmanuel et al., 2016). But this prevalence was lower than the study conducted in Debre Berhan Town, North Shewa of Amhara region (33%)(Menalu et al., 2021) and Dollo ado district eastern Ethiopia (42.3%)(Demissie and Worku, 2013). This discrepancy may be caused by variations in the study period, sample size, socioeconomic disparities within and across nations, and child feeding cultures. Due to its diversity, Ethiopia may have varying feeding practices in different regions, which could lead to an increase or decrease in the prevalence of malnutrition.

In this study educational status of mother or care giver was significantly associated with under five children stunting. Children from illiterate mothers were 7.32 times more likely to be stunted as compared to children from literate mothers. This finding is consistent with the study conducted in Debre Berhan Town, North Shewa of Amhara region (Menalu et al., 2021) and Dollo ado district eastern Ethiopia(Demissie and Worku, 2013). This could be explained by the possibility that education could have an impact by giving mothers more control over the kind and dosage of preventive therapy. Encouraging health nutrition knowledge may also assist the mother in choosing foods for her children that are appropriate from a nutritional standpoint. Lack of understanding of the significance of nutrients might result in malnutrition since the person will not be eating a balanced, healthful diet.

In this study duration of breast feeding was significantly associated with stunting. Children who breast fed for less than one years and between 1 to 2 years were 2.44 and 2.42 times more likely to be stunted as compared to those children who breast fed for greater than or equal to two years respectively. This is supported by the World Health Organization recommendations that a child

should be breastfed up to 2 years of age as it is essential for proper growth and development(WHO, 2001).

In this study Family size was significantly associated with wasting. The odd of wasting among child in households with family size greater or equal to five were 7.57 higher as compared child in household with family size less than five. This association was consistent with the study conducted in dibate district of Ethiopia(Fufa et al., 2022) and study conducted in southern Ethiopia(Mengesha et al., 2021). This may be because larger families, particularly those with lower incomes, have more difficulty accessing food and healthcare. Another explanation could be that mothers who live in families with a large number of family members, may not have the time to provide their kids with the care they need.

In the current study, previous exposure to diarrheal disease was significantly associated with increased risk of developing underweight and wasting. Children who had diarrheal disease in the past two weeks were 3.78 and 2.51 times more likely to be underweight and wasted respectively than those children without diarrheal disease. This finding is consistent with the study conducted Debre Berhan Town, Ethiopia(Menalu et al., 2021),Afar Regional State, Northeast Ethiopia(Gebre et al., 2019),Bule Hora district, South Ethiopia(Asfaw et al., 2015b).This could be because diarrhea causes malabsorption and appetite reduction. A child who has diarrhea may also lose weight and become malnourished more quickly.

In this study having monthly income was significantly associated with underweight. Children whose mothers had no monthly income were three times more likely to be underweight as compared to those mothers who have monthly income. This finding was supported by study conducted in Botswana (Kadima, 2012) and Nepal(Sigdel et al., 2020) which shows that children of unemployed parents were more likely to be underweight. This could be justified by mothers who have income have better access to the health system and are more empowered to make decisions to care for and prepare nutritious food and feed their children.

5.1 Strength and Limitation of the study

5.1.2. Strength of the study

Community based nature of the study will allow us to identify the true estimate of magnitude of the undernutrition and it may not potentially confounded by other factors. The data were collected by using a well-structured questionnaire, and the data collectors were experienced health extension workers and training was given before survey.

5.1.3. Limitation of the study

Cross-sectional nature of the study design may inhibit as Causal inference between the dependent and independent variables. A recall and social desirability bias may also exist for certain infant and young child feeding (IYCF) indicators, such as breast feeding habits and the child's past medical history.

6. CONCLUSSION AND RECOMMENDATION

6.1. Conclusions

In this study the prevalence of stunting, underweight and wasting were about 39.01% (95% CI: 34.49-43.73), 25.93% (95% CI: 21.99–30.33) and 18.69% (95% CI: 15.26-22.68) respectively. This indicated the prevalence of child malnutrition (wasting, stunting, and underweight) was very high significant public health problem in babille community according to the WHO classification for public health significance cut off point. Duration of breast feeding for less than two years, illiterate mothers were positively associated with stunting. Family size greater than or equal to five was increased the likelihood of wasting and having monthly income was protective factor of underweight. Exposure to diarrhea in the last two weeks were positive predictors of both wasting and underweight.

6.2. Recommendation

We recommend **babille woreda health bereou**

- ✓ To integrate nutrition counseling into routine health care services.
- ✓ To promote use of family planning and preventing diarrhoeal diseases which are vital interventions to improve nutritional status of the children.
- ✓ To ensure access to clean drinking water and improved sanitation facilities to reduce the incidence of diarrhea and other waterborne disease
- ✓ To educate mothers/caregivers on proper hygiene practices, such as handwashing with soap, to prevent diarrhea and related health issues.

We recommend **health extension workers**

- ✓ To provide nutritional counselling for mothers who had no formal education regarding to children breast feeding duration

We recommend **babille woreda Administrations**

- ✓ To develop and provide adult education classes focusing on health and nutrition.
- ✓ To implementing microfinance initiatives, and income-generating activities for families.
- ✓ To develop and expand social safety nets to support low-income families and reduce economic barriers to nutrition.

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1. ANNEXIS

7.1 Participant Information Sheet & Informed Voluntary Consent Form for parent or caretaker.

Introduction:

Hello my name is, I am working as data collector for the study being conducted this community by Suleyman Ahmed who is studying for his master's degree at Haramaya University, College of Health and Medical Sciences. Your child is randomly selected

to be participant in this study. I kindly request you to lend me your attention to explain you about the study and the child's participant

Study title:

Assessment of under nutrition and associated factors among children under five in Babile Woreda Fafan zone Somali region Ethiopia

purpose of Study:

The findings of this study can be of a paramount for the Babile Woreda health office to plan intervention program to prevent child hood under nutrition in your community; there by improve child health and survival in general. Moreover, the aim of this study is to write a thesis as a requirement for the partial fulfillment of master's program.

Procedure and duration:

I will be measure the Middle Upper Arm Circumference (MUAC), length and weight of your child using a standard measuring instrument as well I will ask you 42 question about your child that will help us to know the nutritional status of the child. this procedure will take 15 to 20 minute, so I kindly request you to spare me this time and allow me to perform

Risks and Benefits: The risk of being participating for your child in this study is very minimal; but only taking few minute from your time. You will not get any direct payment for the participation. But the findings from this research may reveal important information for the local health planers.

Confidentiality: The information that we will collect from this study will be confidential. There will be no information that will identify your child or yourself in particular. The finding of the study will be general to the study population and will not reflect any thing particular of individual person or housing.

The data that we gather from the measurements will exclude showing names. No reference will be made in oral or written reports that could link participant to the research

Rights: Your participation in this study is fully voluntary. You have a right to declare to allow your child to be involved in this study or not. If you will allow your child, you have right to withdraw him/ her from the study at any time and this will not label you/your child for any lose of benefit which you/your child otherwise are entitled. You do not have to answer any question that you do not as well.

Contact Address;

If there are any questions or enquire any time about the study or the procedure, please contact;
Principal Investigator: Suleyman Ahmed

Mobile Phone:0915100021/ 0906151313

Email: rayanyarey114@gmail.com

As well as contact address of the Institutional Health Research Ethics Review Committee (IHRERC)

Office phone:0254662011

P.O. Box 235, Harar, Ethiopia

Declaration of informed voluntary consent:

I have read/was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that have been unclear. I will have informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to allow my child to participate in this study with my initials (signature) as indicated below.

Name & Signature of the participant _____ Date _____

Name & Signature of data collector _____ Date _____

7.2 Participant Information Sheet & Informed Voluntary Consent Form for parent or caretaker (Somali version)

1. Hordhac:

Waan ku Salaamay magacaygu waa, waxaan ka shaqaynayaa xog ururiyaha daraasadda uu wado Suleyman Ahmed oo shahaadada Masterka ka barta Haramaya University, College of Health iyo Cilmiga Caafimaadka. Ilmahaaga si bakhtiyaa nasiib ah ayaa loo doortay inuu ka qaybqaato daraasaddan. Si naxariis leh waxaan kaa codsanayaa inaad i siiso dareenkaaga si aan kuugu sharaxo daraasadda iyo ka qaybqaataha ilmahawa Magacaygu waa (_____) waxaan kashaqaynayaa xogururinta daraasaadkan lagu lagu qiimaynayo nafaqadarada iyo xaladaha laxiriira ciyaalka da' doodu ka

hoosayso 5 sano suleymaan axmed oo dhigta culuunta waxbarashada heerka labaad ee **Jaamacada Haramaya**, qaybteeda Caafimaadka iyo Duruusta Dawaynta. Waxaan sinaxariisla iniiga codsanayaa inaad amaahisasaan dareenkiina intaan idiin sharaxayo daraasaadkaniyo sida looxulanayo kaqaybqaatayaasha.

2. Ciwaanka daraasaadkan:

Qiimaynta nafaqadarada iyo xaladaha laxiriira ee ciyaalka da dodo ka hoosayso shan sano Ee degmada babili gobolka fafaan degaanka somalida

3. Ujeedada / ahmiyada daraasaadka:

Natijjooyinka daraasaddan ayaa noqon kara mid muhiim u ah xafiiska caafimaadka ee degmada babile si uu u qorsheeyo barnaamij wax-ka-qabasho si looga hortago in caruurta ay nafaqeyaan bulshadaada; halkaas oo lagu wanaajiyo caafimaadka caruurta iyo guud ahaan badbaadada. Intaa waxaa dheer, ujeeddada daraasaddan ayaa ah in la qoro tesis-ka shuruud ahaan dhammaystirka qayb ahaan barnaamijka masters-ka.

4. Nidaamka iyo Waxkhtiga:

Waxa la igu cabbiri doonaa wareegga cududda sare ee cududda (MUAC), dhererka iyo miisaanka ilmahaaga aniga oo isticmaalaya qalabka cabbiraadda caadiga ah sidoo kale waxa aan ku weydiin doonaa 42 su'aalood oo ku saabsan ilmahaaga taas oo naga caawin doonta in aan ogaano xaaladda nafaqada ee ubadka. Habkani wuxuu qaadan doonaa 15 ilaa 20 daqiiqo, markaa waxaan si naxariis leh kaaga codsanayaa inaad ii tudhiso wakhtigan oo aad ii ogolaato inaan sameeyo.

5. Waxyeelada iyo Waxtarka:

Halista ka-qaybgalka ubadkaaga daraasaddan aad ayay u yar tahay; laakiin wax yar ka qaadanaya wakhtigaaga. Ma heli doontid lacag toos ah ka qaybqaadashada. Laakiin natijjooyinka ka soo baxay cilmi-baarista ayaa laga yaabaa inay daaha ka qaadaan macluumaadka muhiimka u ah qorshayaasha caafimaadka maxalliga ah.

6. Ilaalinta xogta ka qayb galayaaasha daraasaadkan:

Macluumaadka aan ka ururin doono daraasaddan waxay noqon doontaa qarsoodi. Ma jiri doono macluumaad si gaar ah u aqoonsan doona ilmahaaga ama naftaada. Natijjooyinka daraasaddu waxay noqon doontaa mid guud oo loogu talagalay dadka daraasadda ah mana ka tarjumayso wax gaar ah qof ama guri. Xogta aan ka soo ururinay cabbirada waxay ka reebaysaa muujinta

magacyada. Wax tixraac ah laguma samayn doono warbixino hadal ama qoraal ah oo xidhiidhin kara ka qaybqaataaha cilmi baarista.

7. Xuquuqda kaqayb qaatayaasha :

Ka qaybqaadashadaada daraasaddan waa ikhtiyaari. Waxaad xaq u leedahay inaad caddayso inaad u ogolaato ilmahaaga inuu ka qaybqaato daraasaddan iyo in kale. Haddi aad u ogolaato ubadkaaga, waxa aad xaq u leedahay in aad isaga/iyada kala baxdo waxbarashada wakhti kasta tanina kuma calaamadayn doonto adiga/ilmahaaga wax kasta oo lumiyo faa'iido adiga/ilmahaagu haddii kale aad xaq u leedahay. Uma baahnid inaad ka jawaabto su'aal kasta oo aadan sidoo kale samayn..

8. Cidda lala xidhiidhayo:

hadii ay jiraan waxaanad fahmin wakhti alla wakhtigaad hesho intuu daraasaadkani socdo waxaad laxidhiidhi kartaa Telefoonka; **0906151313/0915100021** E-mailka; **rayanyarey114@gmail.com** sidookale waaxda kamasuulka ah ee Macadka Darasaada iyo Nidaamka Anshaxa kala xidhiidh .Telefoonka; **0254662011 P.O.Box 235**, Harar ,Ethiopia

9. Ubandhigida ogolanshaha :

Waan akhriyay/la akhriyay xaashida macluumaadka ka qaybqaataaha. Waxaan si cad u fahmay ujeedada cilmi-baarista, hababka, khatarta iyo faa'iidooyinka, arrimaha sirta, xuquuqda ka qaybgalka iyo ciwaanka xiriirka wixii su'aalo ah. Waxaa la i siiyay fursad aan ku weydiiyo su'aalo aan caddayn. Waxaan ku wargelin doonaa inaan xaq u leeyahay inaan ka baxo daraasadda wakhti kasta ama inaan ka jawaabin su'aal kasta oo aanan rabin. Sidaa darteed, waxaan caddaynayaa oggolaanshahayga ikhtiyaarka ah si aan uga qaybqaato daraasaddan oo leh xarfaha hore (saxiixa) sida hoos ku cad.

Magaca & Saxeexa ka qaybqaataaha _____ Taariikhda _____

Magaca & Saxeexa xog ururiyaha _____ Taariikhda _____

7.3 English Version Questioner

Table 4: English Version Questioner

S. no	Questions	Answers choices	Code	Skipping pattern
Section 1: Basic Factors				
1.1. socio-demographic characteristics(mater/care taker, father & child)				

001	Age of mother /care taker in completed years	_____years		
002	Marital status	1. Single 2. Married 3. Widowed 4. Divorced		
003	Educational status of the mother/care taker	1. No formal Education 2. Read & write 3. primary 4. Secondary E. Above Secondary		
004	Occupation of the mother /care taker	1. Housewife 2. Government employee 3. Self-employee 4. Farmer 5. Other		
005	What is your husband 's age in completed years? In year:	_____year s		
006	What is your husband's educational status?	1. Illiterate 2. Primary 3. Secondary 4. Diploma and above		
007	What is your husband's occupation?	1. Farmer 2. Daily laborer 3. Gov't employee 4. Merchant 5. Pastoralist 6. Other (specify)		
008	What is your family size? (In number)	-----		
009	Does Household has monthly income	1. yes 2. No		

010a	Does the household own milk cow	1. Yes 2. No		
010a	Does the household own Ox	1. yes 2. No		
010c	Does the household own Donkey	1. yes 2. No		
011				
012	Child sex	1. Male 2. Female		
013	Number of under two year children	_____ childr en		
014	Child's age of birth(DD/MM/YYYY) or in month	_____/_____/_____ —		

Section 2. Underlying Factor

2.1. Child care and feeding practice

015	Did you Initiated breast feeding within one hour of delivery to your child?	1. yes 2. No 3. I don't remember		
016	Did your child exclusively breastfed in last 24 hour?	1. yes 2. No		
017	Did your child breastfed and receive solid or semisolid food in previous 24 hours?	1. yes 2. No		
018	At what age (in months) you started to give your child to solid or semisolid foods	_____ Month		
019	Over all duration of breast feeding in months	_____ Month		
020	If breastfed and aged 6-8 month, how many times does he/she received solid or semi-solid food in previous 24 hrs	1. Two or more than 2. two Less than two times		
021	If breastfed and aged 9-23 month, how	1. Three or more than two times		

	many times does he/she received solid or semi-solid food in previous 24 hrs	2. Less than three times		
022	If not breastfed and aged 6-23 month, how many times does he/she received solid or semi-solid food in previous 24 hrs	1. Four or more than two times 2. Less than four times		
024	How often you breastfed your child in previous 24 hrs?	_____Times		
025	How often you offer your child to solid or semisolid food in previous 24 hrs?	_____Times		
026	Have fed with bottle to your child in the in previous 24 hrs?	1. Yes 2. No		
027	Where did you take when your child get sick?	1.health facility 2. Religious institutions 3 . traditional personals 4. No where 5. others, specify_____		
028	Children's vaccination status	1. Not vaccinated 2. Partially vaccinated 3. Fully vaccinated		
2.2. Environment factor				
029	Source of water supply	1. Improved water (treated river &bottled water) 2. Untreated river water		
030	How far it takes to reach the water source	1. Less than 30 minute 2. More than minute 3. Don't know		
031	Who fetch the water for the household	1. Mother/caretaker 2. Other family member		
032	Do you wash your hand after visiting toilet	1. Yes 2. No		

033	Do you wash your hand before cooking and serving food	1. Yes 2. No		
034	Do you wash your hand after cleaning child feaces	1. Yes 2. No		
035	How wash care giver their hands	1. Only with water 2. Some times with soap 3. Always with soap 4. Other (specify)_____		
036	Availability of latrine in the household	1. Yes 2. No		

Section 3. Immediate Factor

3.1. Child morbidity status

037	Does your child had diarrhea in the last 2 weeks	1. Yes 2. No		
038	Does the child had cough in last 2 weeks	1. Yes 2. No		
039	Does your child had fever in last 2 weeks	1. Yes 2. No		

Section 4. Child anthropometrics

040	Child's age of birth(DD/MM/YYYY)	_____/_____/_____		
041	Weight of the child(in KG)	_____KG		
042	Length of the child(in CM)	_____CM		

This is the end of the interview. THANK YOU!

Date of data collection _____

Name of data collector _____ Signature_____

Name of supervisor_____ Signature_____

7.4 Questionnaire (Somali Version)

Table 5: Questioner Somali Version

Qaybta kowaad: socio demographic characteristics of parents(dabecadaha bulsho bulsheed ee waalidiinta)				
Tiro	Suaal	Dooro jawaabtada	Jawabta uu doortay	kabood
100	Jinsiga	1.lab 2.dhedig		
101	Da'da	_____sano		
102	Diinta	1.muslim 2.orthodex cristian 3.protestant 4.kuwakale (cadee)		
103	Qowmiyada	1.somali 2.oromo 3.amxaro 4.kuwo kale(cadee)		
103	Xalada Waalidka	lamaane ama	1.aan guursan 2. guursadey	

	xanaaneyaa	3. is furay 4.laga dhintay		
104	Heerka waxbarasho ee Waalidka	1.aan waxbaran 2.akhrinkara qorina kara 3.dugsi hoose(1-8) 4.dugsi sare(9-12) 5.diploma 6.degree iyo wixii		
105	Shaqada Waalidka ama xanaaneyaha	1.shaqo la'aan 2.shaqaaale dawladeed 3.shakhsi ahaan 4.waxkale(cadee)		
106	Meeqa dhaqaale ah ayaa kusoo gala bishii	_____birr		
107	Qoysku inta uu kakooban yahay	1. Kayar 1000ETB 2. 2000ETB 3. Kabadan 2000ETB		

Qaybta labaad: child characteristics (sifooyinka ilmaha)

s/no	Suaal	Jawaabaha	Jawaabta uu doortay	kabood
200	Da'da cunugasano		
201	Jinsiga cunuga	1.male		

		2.dhedig		
202	Culayskakg		
203	Dhererka cunugacm		
Qaybta sadexaad: Environmental health conditions(Xaaladaha caafimaadka deegaanka)				
Tiro	Suaal	Dooro jawaabtada	Jawaabta udoortay	ka bood
300	Xageed kaheshaan biyaha aad cabtaan?	1.qasabada 2.ceelasha spring gaa 3. dameerle 4.biyaha roobka 5.waxkale(cadee)		
301	Biyaha ma dabooshan sieysan uwasoobin	1.wey daboolanyihin 2.ma daboolna		
302	Xageed kaheshaan biyaha aad cuntada ku karsataan?	1.qasabada 2.ceelasha spring gaa 3. dameerle 4.biyaha roobka 5.waxkale(cadee)		
303	Xagey kutaala meesha aadbiyaha ka heshaan	1. Daarada guriga 2. Guriga deriska		

		3. Meel kale		
304	Waqti intee le eg ayey biyuhu kukeentan guriga	Minutes..... Magaranayo		
305	Marna biyaha maweydeen labii asbuuc ee lasoo dhaafay	1.haa 2.maya		
306	Biyaha ma kadhigtaan kuwa nadiif ah loo lacabi karo	1.haa 2.maya		
307	Maxaad ku nadiifisan biyaha	1.waan karkarinaa 2.chlorine 3.biya miiraha 4.waxkale		
308	Suuli nooce ah ayaad isticmaashan	1. God laqoday 2. Suukiga qaadimiga 3. Waxkale		
309	Suuliga miyaa laydinla isticmaala	1.haa 2.maya		
310	Xaguu suuligu kuyaala			
311	Maxaad cuntada kukarsataan	1.koronto 2.gaaska dabiiciga ah 3.karoosin 4.dhuxusha 5.qoryo 6.kale		

312	Xageed cuntada ku karsataan	1.guriga dhexdisa 2. qol goorni ah 3.banaanka		
313	Qol gaar ah ood cuntada ku karsataan miyuu jiraa	1.haa 2.maya		
314	Jikadu meel qiiqu kaboxo maleedahay	1.haa 2.maya		
315	Imisa qol ayu kakooban yahay gurigu	Qolal.....		
316	Meel gacmaha lagu dhaqdo miyuu leeyahay suuligu	1.haa 2.maya		
317	Biyo miyey lyaalan meesha	1. wey yaalan 2. mayaalan		
318	Saabun miyey taala meesha	1.wey taala 2.mataalo		
319	Eeg cagdhiga guriga	1.sibidh 2.roogaag 3.ciid 4.digo 5.kuwa kale		
320	Eeg saqafka guriga	1.bireed 2. looxyo		

		3. kartoonnada 4. saqaf la'aan 5. kuwa kale		

Tariikhda xog ururinta -----

Magaca xog ururiyaha ----- saxixisa-----

Magaca kormeeraha ----- saxixisa-----

7.5 CURRICULUM VITTE (CV)

Name: - Suleyman Ahmed Abdulahi

Date of Birth 1991 GC

Place of Birth Babile

Nationality Ethiopian

Sex Male

Marital Status Married

Address Babile

Switch Board / Cell Phone 0906151313/0915100021

Email- rayanyarey114@gmail.com

3. Educational background.

- ❖ Babile primary and Elementary school (1-8)
- ❖ Babile Karl Heinz Boehm Sec School (9-10)
- ❖ Jigjiga Senior Secondary School (11-12)
- ❖ Wolaita Sodo University (BSc Nurse)

1. Training and Workshops

- EPI and IMNCI training **from RHB**

- Management of sever acute malnutrition training from **RHB project by UNOPS**
- Quality of nutrition service improvement training from **Save the Children**
- Leader Ship and Management by **Hope**
- CMAM training from **Save the Children**
- EPI training from **JSI**