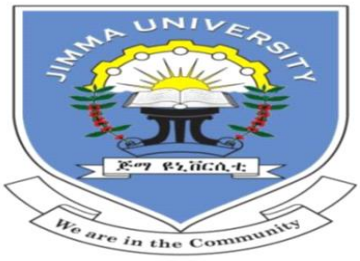


**INSTITUETES OF HEALTH L SCIENCES,**

**FACULTY OF PUBLIC HEALTH**

**DEPARTMENT OF HUMAN NUTRITION & DIETETICS**

# MAGNITUDE OF UNDER NUTRITION AND ASSOCIATED FACTORS AMONG CHILDREN AGED 6 TO 23 MONTHS IN GUCHI WOREDA, BORENA ZONE, SOUTHERN ETHIOPIA, 2022

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# ABBREVIATIONS AND ACRONYMS

ANC – Anti Natal Care

CSA – Central Statistics Agency

DHS – Demographic and Health Survey

DCH – Department of Community Health

FAO – Food and Agriculture Organization of the UN

GDP – Gross Domestic Product

HEWs_ Health Extension Workers

IDD – Iodine Deficiency Disorder

IFPRI - International Food Policy Research Institute

HHS – House Holds

HGB_ Humanitarian Policy Group

IMR – Infant Mortality Rate

LB - Live Birth

NCHS – National Center for Health Statistics

NGO – Nongovernmental Organizations

ONRS – Oromia National Regional State

PEM – Protein Energy Malnutrition

SCF (UK) – Safe the Children Fund- UK

NCHS - National Center for Health Statistics

WHO – World Health Organization

# ABSTRACT

**Back ground:** Childhood malnutrition is one of the major killers of 6 to 23months children in developing countries including Ethiopia.

**Objective**- to assess magnitude of under nutrition and its associated factors among children age 6 to 23 months in Guchi woreda Oromia region, Borana Zone, Southern Ethiopia. **Methods:** A community based cross-sectional study was used among randomly selected 453 infant/child-mother/care givers pairs in Guchi woreda, From March 30 to Dec 30. Face to face interviews with the respective child's mother/care givers and measurements of the respective child's weight and height was carried out. Information on socio-economic characteristics, household food security status, child's dietary intake, caregivers' practices and resources was collected. To identify factors associated with outcome variables; binary logistic regression was done in bi-variable analysis variables with p-value of <0.25 were included in multivariable analysis. The final model was interpreted using AOR with 95%; CI at P-value of <0.05. **Results**; The prevalence of stunting, underweight and wasting was 62.5%, 49%, and 14.4% respectively. Being male (AOR-1.93; 95%; CI (1.24-3.01) and lower level of father's educational status (AOR=7.01; 95%; CI; (1.82-26.96)) history of diarrhea (AOR=1.93; 95%; CI; (1.00-3.70), cough (AOR=2.59(95%; CI; (1.25-5.35), poor protein rich FFS (AOR=3.29; 95%; CI; 1.43-7.56)) were predictors of stunting. Sex being male were 1.93 times (AOR-1.93; 95%; CI (1.24-3.01) more likely wasted as compared to their counter parts. Children with poor Protein Food consumption score were 1.82(AOR=1.82; 95%; CI (1.65-5.08)) times more likely wasted as compared to good protein Food frequency score.

**Conclusion and Recommendation;** The prevalence of wasting, underweight and stunting was high at the study area as compared to different studies with the national wide figure. Sex being male were 1.93 times andpoor Protein Food consumption score were more likely wasted. Fathers' educational status able to read and write and Children's who has history of diarrhea were more likely to be underweight as compared to their counter parts. Children who with cough and poor protein rich food frequency score were more likely affected by stunted.Based on this finding; health workers working in in Guchi woreda should have to care and give immediate treatment for respiratory disease and diarrhea to prevent under nutrition among children's.



***Key words; under nutrition, children's 6-23 months, Guchi woreda***

# CHAPTER ONE

# 1. INTRODUCTION

## 1.1 Background

Under nutrition denotes insufficient intake of energy and nutrients to meet an individual's needs to maintain good health. In most literature, under nutrition is used synonymously with malnutrition. In the strictest sense, malnutrition denotes both under nutrition and over nutrition. Under nutrition will be discussed in terms of protein-energy under nutrition and those specific micronutrient deficiencies which are considered of public health significance in Malawi i.e. vitamin A, iron and iodine deficiency. Over nutrition which is not as prevalent as under nutrition in Malawi will not be addressed(1).Nutrition requirement varies with respect to age, gender and during physiological changes such as pregnancy, lactating mothers and older age groups (2).

Under nutrition in children occurs due to the interplay of several factors, which include variables related to the maternal age, maternal education, poor feeding practice, maternal nutritional status, parity and multiple births, sex of the child, illness, birth interval and immunization status, poor wealth status, large families, water and sanitation, place of residence, and other factors relating to health services utilization(3).

Weight-for-height below -3 SD is a highly specific criterion to identify severely acutely malnourished infants and children. Statistical theory shows that in a well-nourished population, only 0.13% of children will have a weight-for-height less than -3 SD, giving specificity of more than 99% 2 for this cut-off(1).

Under nutrition can best be described in Ethiopia as a long term year round phenomenon due to chronic inadequacies of food combined with high levels of illness in under-five children which 44.0%, 29.0% & 10.0% were stunted; underweight and wasted respectively(4).

The quality and quantity of food available to a household are not the only factors explaining the determinants of malnutrition in infants and young children. Care and feeding practices of the caregiver are key factors that lead to undernourishment in young children. The percentage of children under 5 years old whose weight for height is below -2 standard deviation (moderate wasting) and -3 standard deviation (severe wasting) from the median. With or without nutritional edema(5). Stunting is considered the most common indicator of childhood

malnutrition found in nearly all low- and middle-income countries. This reflects chronic under nutrition and thought to begin prior to birth(6).

## 1.2 Statement of the problem

Globally in 2020, 149 million children under 5 were estimated to be stunted (too short for age), 45 million were estimated to be wasted (too thin for height) around 45% of deaths among children are linked to under nutrition. These mostly occur in low- and middle-income countries. At the same time, in these same countries, rates of childhood overweight and obesity are rising. The developmental, economic, social, and medical impacts of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries(8).

Under nutrition (stunting, wasting, and underweight) being the most common nutritional problems affecting millions of children worldwide(10). Approximately 10.5 million children die each year as a result of malnutrition, with 98% of these deaths occurring in developing countries(11).Malnutrition is the largest single underlying cause of death worldwide and is associated with over a third of all childhood deaths. Over 8 million preventable deaths are estimated to occur annually among children and infants in developing countries; the majority is associated with malnutrition(12).

Malnutrition results in poor physical and cognitive development as well as lower resistance to illness. In addition to the human suffering, the loss in human potential translates into social and economic costs that no country or most countries can afford. socio cultural factors associated with feeding practices among children 6 to 23 months or during this critical period (less than 2 years of age) can increase the risk of growth faltering (wasting and stunting) and nutritional deficiencies and may have longer-term adverse effects on health, mental development and level of productivity in later years of life. During 2 years of age, it is very difficult to reverse stunting that has occurred earlier(7).

Malnutrition is still affecting huge number of children around the globe. Every country is facing a serious public health problem from malnutrition. These mostly occur in low- and middle-income countries. At the same time, in these same countries, rates of childhood overweight and obesity are rising. The developmental, economic, social, and medical impacts

of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries(9)

The periods of first two years of life pose special nutritional challenges because these are when nutrition requirements are greatest and when these population subgroups, in Africa in particular, & Ethiopia in special are most vulnerable to inadequate caring behaviors, inadequate access to health services, and inappropriate feeding practices(2).

Childhood nutrition also reflects long- and short-term negative health consequences, such as reduced economic potential, delayed cognitive development, and educational achievement, along with the increased risk of metabolic syndrome and poor birth outcomes(10).

Ethiopia demographic health survey (EDHS) 2019 also reported that the prevalence of stunting is 37% in Ethiopia. In Oromia region, the prevalence of stunting, wasting and underweight for children under 5 years of age are 39, 10 and 25%, respectively(9,13).

Under nutrition arises from a complex, multiple and interactive events or causes. The immediate causes include poor childhood feeding practice, inadequate dietary intake and disease. Underlying these are causes operating at household and community levels: household food insecurity, inadequate care for women and children, and unhealthy household environments and lack of health services, with income poverty underpinning all three. Ultimately, these factors are determined by the larger political, economic, social and cultural environment(7).

While the problems and prevalence of childhood malnutrition in poor communities of Ethiopia are not well-documented, the determinants are not well known. Previous local studies focused mainly on the prevalence of socio-economic status. A Very few studies explored the determinants such as dietary intake food security, caring practices and role of women on children's nutritional status. Therefore, it is the aim of this study to identify the sociocultural determinants of under nutrition among children of under two years in Borana zone of Guchi Woreda.

## 1.3 Significant of the study

The main question answered by this study will be what the factors are associated with under nutritional lied stunting among 6-23 moth children. Identifying this factor will be helpful to encourage local people to improve current nutritional status of children's by improving feeding pattern of children, pregnant and lactating women. Moreover, it will serve as helpful guide to plan suitable nutritional and health programs for this community based on identified factors. It will encourage government and other stake holders for the development of programs and policies related to nutrition. In addition, it would help as a baseline for other studies and may initiate other researchers to conduct similar study in various parts of the country to identify child nutritional status.

# CHAPTER -TWO

# 2. Literature review

## 2.1 Magnitude of under nutrition

Study done in India; Stunting prevalence is (38.4%) and varies considerably across districts (range: 12.4% to 65.1%) (13). Study done in Zambian indicates that Prevalence of stunting among children 6–23 months was very high 44.5 percent p<0.001(18). Study conducted on Prevalence of wasting and associated factors among 6 to 23 months old children in the Sahel Region of Burkina Faso The prevalence of wasting was 25% in the Sahel region(19).

A research done on Under nutrition and Associated factors among infants and young children age 6-23 months attending Menelik II Hospital, Ethiopia; indicates that; about 34.1% of young age children were under nutrition while 28.8% of them stunted, underweight 10.2% and 4.7% of them were wasted(14). Study done on under nutrition and Associated Factors among Children Aged 6–23 Months in Dessie Town, Northeastern Ethiopia, 2021: A Community Based Cross-Sectional Study; The prevalence of stunting, underweight, wasting were 36.8, 27.6% and 11.5% respectively(15). Study done in Gid Ayana District, East Wollega, Western Ethiopia.revealed that, 35.9%, 24.8 % and 12.4 % of infants and young children were stunted, underweight and wasted respectively(16).

Study done in the Hotspot and Non-Hotspot Pastoral Areas, Northeast Ethiopia indicates; the overall magnitude of underweight, stunting and wasting was 31.9%, 26.7%, and 36.8%, respectively(17).

### 2.2. Factors associated with under nutrition among children 6 to 23 months

#### 2.2.1 Factors associated with wasting among children 6 to 23 months

Study conducted in Uganda shows that; Male children are at risk of being stunted. Children in the age group 3 – 24 months were at risk of acute malnutrition, while de-worming was protective (20). Study done in tribal community of Coimbatore district; Socio- demographic factors like total number of family members exceeding four, mother's educational status, father's educational status, mother's occupational status, socio-economic status, alcohol usage by any family member, and mother's nutritional status were found to be significantly associated with wasting(21).

Study conducted in the Sahel Region of Burkina Faso indicates; being male , breastfeeding the day before the survey and having a history of illness significantly increased the risk of acute malnutrition(19).From study done in Ethiopia at Tierkidi refugee camp among South Sudanese Children, wasting was associated with diarrheal disease, non-exclusive breast feeding, short birth interval, age group of 6-11 months and prompt health seeking for sick child(24).

Study done in Gid Ayana District, East Wollega, Western Ethiopia. Revealed that; Started complementary feeding after 6 months was significantly associated with stunting. Started complementary feeding after 6 months, family monthly income <=2000 birr, age group 12-24 months, cough two weeks before this survey were significantly associated with wasting(16).Study done at East Belesa District, northwest Ethiopia revealed that; the odds of wasting were higher among children who received butter as prelacteal food (22).

From study done at Haramaya district, Eastern Ethiopia; maternal health care services such as ANC follow up, place of delivery and postnatal care had associated with nutritional status (stunting, wasting and underweight) of infants and young children. Maternal history of having ANC follow up during pregnancy of index child was also inversely associated ($P<0.05$) with underweight and wasting of children in study done in Haramaya town, Eastern Ethiopia(23)

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Safe water supply and availability of latrine are health variables that have been shown in the literatures, as they are associated to Nutritional status of children. A study done pastoral community of Dollo ado district; Somali region (2012) found that Household use of safe water supply as main source of water supply; risk of being stunted were lower than children use unsafe water for human consumption. Availability of latrine was also reported as inversely associated ($P<0.01$) with stunting and wasting of children of under five years old in study done in Kwara state, Nigeria(25). The age of the householdhead, education, income, access to irrigation, home gardening and dietarydiversity awareness affected household dietary diversity and distance from market negatively were significantly associated with wasting(26).

### 2.2.2. Factors associated with underweight among children 6 to 23 months

From study done SNNP at Hawassa zuria district indicates that Female children were more stunted, underweight and wasted relative to males, respectively. Children who had uneducated mothers were significantly more likely to be moderately underweight as compared to those of whose mothers had secondary and above educational level. Nutritional status in the study area among study population was categorized in low levels(20). From study at Wollo zone Northern Ethiopia, indicates; Age of the child 23-35 months (, number of children aged 6-59 months in the household and giving honey to the child in the morning (were remained to be significantly and independently associated with underweight (19).

From study done at Haramaya district, Eastern Ethiopia; maternal health care services such as ANC follow up, place of delivery and postnatal care had associated with nutritional status (stunting, wasting and underweight) of infants and young children. Maternal history of having ANC follow up during pregnancy of index child was also inversely associated ($P<0.05$) with underweight and wasting of children in study done in Haramaya town, Eastern Ethiopia(23).

Study done at Menelik hospital in Addis Ababa indicates that; Working condition of mother, education status of the mother, household live in rent house, illness/disease, inappropriate complementary feeding, breast feeding, receiving vitamin A and growth monitoring were factor associated with under nutrition(14). Study done in Oromia region living with domestic

animals was reported as predictor of under nutrition. Similarly families didn't have latrine at their compound are higher in the undernourished children, Families used kitchen inside the residential house were undernourished(27).Children who had uneducated mothers were significantly more likely to be moderately underweight as compared to those of whose mothers had secondary and above educational level. Nutritional status in the study area among study population was categorized in low levels(28). In hospital based age-matched Case control study done in Malaysia; households with four Children and above are found to be at higher risk of under nutrition (27).

### 2.2.3 Factors associated with Stunting among children 6 to 23 months

Stunting was statistically significant associated with sex and age of a child; birth size; breastfeeding; residence; maternal education; wealth index; twin births and the birth interval among siblings from study done in Zambia(29).Children from households whose source of drinking water was improved were less likely to be stunted compared to children from households whose source of drinking water was non-improved. Stunting was statistically significant associated with sex and age of a child; birth size; breastfeeding; residence; maternal education; wealth index; twin births and the birth interval among siblings (30).

study done in Tanzania among children aged 6 to 23 months in Ngorongoro, Arusha region, showed that under nutrition was associated with young age of mothers/caregivers Adjusted Odds Ratio , early age of initiation complementary foods, a child having diarrhea in past one month, large family size, low frequency of feeding, low birth weight and source of drinking were factors associated with under nutrition(41).

From study conducted in Urmia, Northwest of Iran, during 2013 to identify determinants of under nutrition indicated that, infants who had low literate mothers were 1.4 times more likely to have undesirable growth as compared to those children whose mothers were high literate, children who hand children who had low family income, those infants with a low birth weight were association with the undesirable growth of the infants (42).

On other hand, un age matched hospital based case control study done In Bangladesh, shows that undernourished children had revealed that children had revealed that children with acute malnutrition were more likely than well- nourished be older ( age >1year ) adjusted oR9AOR0 3.1,p=0.004), have an undernourished mother ( body mass index (BMI)<18.5), AOR,2.8,P=0.017),

have a father with (43).From study done in Bangladesh; risk factors for acute under nutrition were; place of residence, sex of child, place of delivery, child age, respiratory illness, size at birth, measles vaccination, fever, diarrhea, maternal BMI, maternal education, paternal occupation, wealth index and household toilet facilities were found to be highly significant in Bangladesh(43).

According to a study done in Nigeria; high risk of being malnourished was associated with mothers of the cases were more likely to have been uneducated or received only primary school education, unskilled or partially skilled occupations. The families of the cases were also more likely to be living in one-bedroom households, being the fourth or higher birth order, family residence in a one room apartment). However the has not found significant association with factors like sub-optimal breastfeeding practices episodes of acute illnesses such as diarrhea and acute respiratory infection(44).

Comparative cross-sectional study on Stunting and associated factors among children aged 6–59 months from productive safety net program beneficiary and non-beneficiary household in Meta District, East Hararghe zone, Eastern Ethiopia indicates: stunting were associated with child's age, mother's education level, household income, birth order, size at birth, duration of breastfeeding and cup feeding (31).

From study done at Kindo Didaye woreda, Wolaita Zone, Southern Ethiopia;exposure to acute respiratory infection, late initiation of breasmilk after child breath, squeeze out of 1st breast milk, lack of vaccination, animal source of food, and unsafe source of water for drinking were identified determinants of stunting (33).From study done in Delanta District; North East Ethiopia; Late initiation of breastfeeding , postnatal care and repeated episodes of respiratory infection were factors associated with stunting(34).

From Multilevel mixed- effects analysis of 2016 Ethiopian demographic and health survey data indicates that; ages of the child above 12 months, male gender, small size of the child at birth, children from poor households, low maternal education, and being multiple birth had significantly increased the odds of childhood stunting(35).A research done; in West Guji Zone, Oromia, Ethiopia;under-five children whose fathers had a polygamous marriage, being female sex, having below 4 meal frequencies, not vaccinated, and from poor households'

wealth status and also from severely food insecure household were short for their age(36).In pastoral community, Afar region, North East Ethiopia; No maternal education, preceding birth interval less than 24 months, no ANC follow-up, no access to latrine, short maternal height, not feeding colostrum, duration of breast feed less than 24 months and non-exclusive breast feeding were determinants of stunting(37)..

From study at Wollo zone Northern Ethiopia, Among the various socio-economic, demographic and child health and care practices characteristics considered, age of the child 11-23 months, De-worming status, sex of the child and breast feed the child remained to be significantly associated with stunting(38).The odds of stunting were higher in children born to mothers who gave their first birth before 15 years of age and gave prelacteal feeding to their child (39).

Children whose mothers had less than five years of schooling had an unadjusted risk of developing protein energy malnutrition that was 4.4 times higher than for those whose mothers had studied for five years or more, Households with low birthweight children are also at increased risk of under nutrition were at higher odds of having malnourished children as compared to their counterparts. In addition, children who were sick every month and had a history of worm infection were three times more likely to be malnourished as compared to their counterparts. However, An increased dietary intake of energy and vitamin A were protective factors for childhood malnutrition(40).

Study participants living in households with eight to ten, five to seven, and family members were more likely to be stunted than those living in households with two to four family members. Similarly, children living in households with three under-five children were more likely to develop stunting than those living in households with one child. Children whose mothers worked as merchants and farmers were more likely to be stunted than children whose mothers worked as house wives(45).

Study done on determinants of stunting among under-five years children in Ethiopia from the 2016 Ethiopia demographic and Health Survey indicates that; Children with illiterate mothers were 2 times more likely to be moderately and severely stunted compared with their counterparts with secondary education. The odds of being stunted for children whose age group 24–35 months respectively as compared to children 0–5 months of age were 4.71 times higher. Being female children were 9.66 times more likely to be in normal nutrition status as

compared to male. Children of families in the highest wealth quintile were 7.92 times more likely to have normal stature compared with children from poorest ones(32).

**Conceptual Framework**

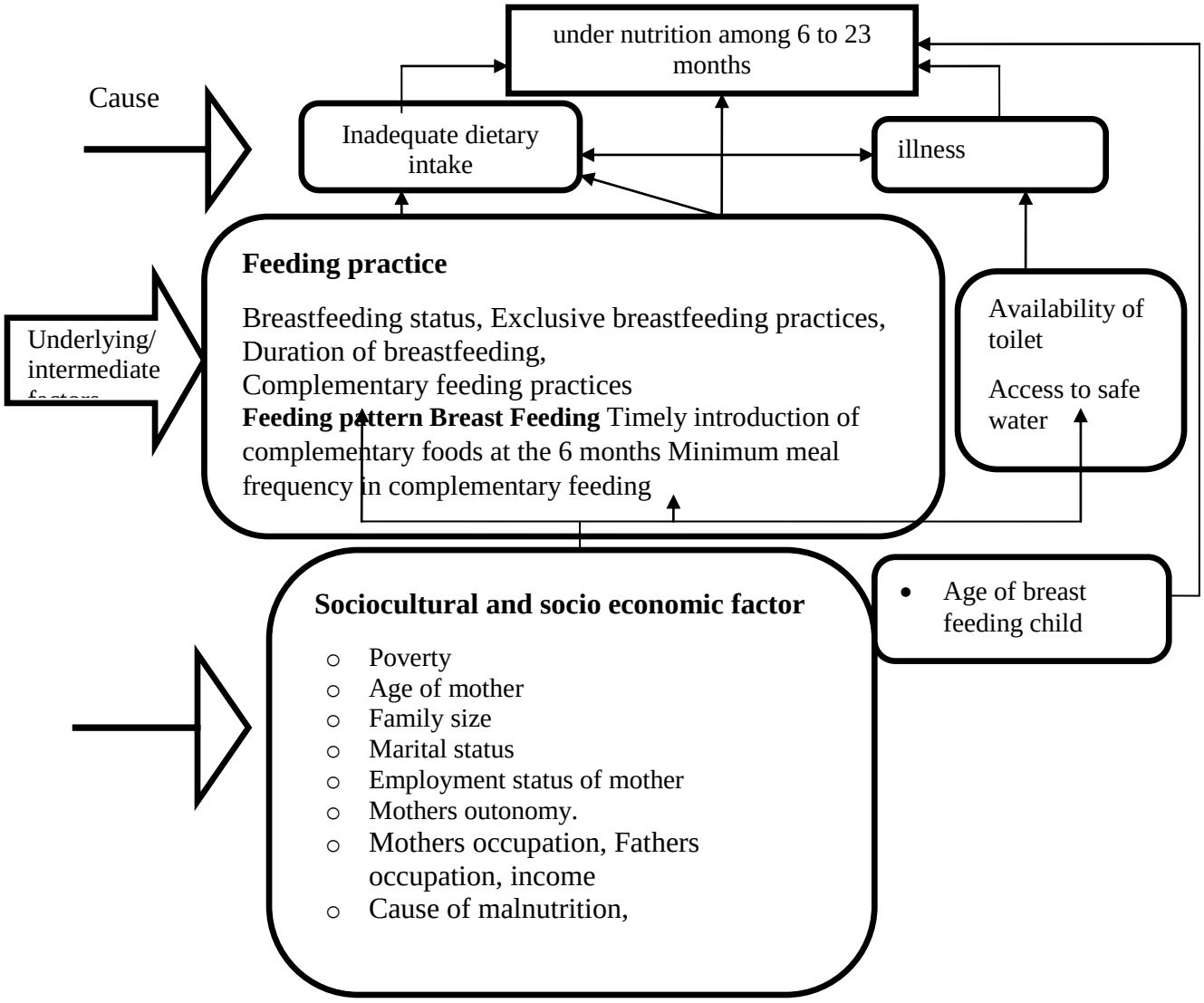



Figure 1 Conceptual frame work Adapted from different literatures

# CHAPTER THREE

# 3. Objective

## 3.1 General objective

To assess magnitude of under nutrition and associated factors among children age 6 to 23 months in Gucci Woreda, Borena zone, Southern Ethiopia, 2022

## 3.2 Specific Objective

- To determine prevalence of wasting among children age 6 to 23 months in of Guchi Woreda ,Borena zone
- To determine prevalence of underweight among children age 6 to 23 months in of Guchi Woreda ,Borena zone
- To determine prevalence of stunting among children age 6 to 23 months in of Guchi Woreda ,Borena zone
- To identify factors associated with wasting among children age 6 to 23 months in of Guchi Woreda,Borena zone
- To identify factors associated with underweight among children age 6 to 23 months in of Guchi Woreda ,Borena zone
- To identify factors associated with stunting among children age 6 to 23 months in of Guchi Woreda ,Borena zone

# CHAPTER FOUR

# 4. METHODS AND MATERIALS

## 4.1 Study area & study period

A cross sectional study was carried out in the Oromia regional state, Borena zone, Guchi woreda. Guchi woreda is one of the 14 woreda of Borena zone. .It also shares internal borders with Somali regional state, Miyo, Dhas and Moyale woreda of Borena zone. Guchi woreda is classified as pastoralist community. Administratively, the woreda is divided into 19 kebeles and two town kebeles. The district is classified as a drought arid and semi-arid area. The arid nature of the district makes livestock keeping the major economic activity. The main types of livestock reared include, cattle, camel, sheep and goats and main livestock products are milk, meat, hides and skin. The urban population is involved in mainly private business, others are government employees. People in the ruler keep livestock as major economic activity, based on traditional pastoralist systems. The total number of populations is about 108,104. The Age of the population is typical of developing countries, with 3.22% under 1 year, 17% under five years, 47 % under the age of 15 years and 3,47% was pregnant women. A large proportion of women (22.1%) are in the reproductive age (15-49 years).

Annual population growth rate was estimated to be 2.3%. Average household size wa nearly 4.8 persons per household. About more than 95% of the population reside in rural areas. The people in the lowlands keep livestock as major economic activity, based on traditional pastoralist systems Geographical distribution and settlement pattern greatly affects health service coverage and utilization of existing health facilities.

## 4.2 Study design

A community based cross-sectional study design was used

## 4.3 Populations

### 4.3.1 Source population

All children aged 6-23 months and their mothers / caregivers (Mother/care giver - child pair) in Guchi woredas.

### 4.3.2 Study population

Children aged 6-23 months from selected Kebeles during data collection period.

### 4.4 Inclusion Criteria:

All children aged 6-23 months whose mothers had lived six months (permanent residents) in the study area were included in the study.

### 4.5 Exclusion Criteria

Infants and young children aged 6-23 months whose mothers were seriously sick, had mental health problem, children with known chronic illness/bed ridden, caught serious acute disease during data collection and factors affecting anthropometric measurement (physical disability in lower extremities and abnormal spinal curvature) in children were excluded from the study.

### 4.6 Sample size determination

The sample size was determined by using single population proportion formula by the following assumption for prevalence of stunting 21.85% which is taken from study done on Stunting and associated factors among 6–23 month old children in drought vulnerable kebeles of Demba Gofa district, southern Ethiopia(Tadele *et al.*, 2022). Sample (n) size= 362 and prevalence of stunting which was taken from the same above study.

Pq/n

$$N = \frac{((z/2)\,\alpha)^2\, p\,(1-p)}{d^2}.$$

- Prevalence of stunting; P=0.22;
- 1- p =0.78
- d (Margin of error)=0.04
- Z $\alpha/_{2}$ ; 95% $_{\text{Confidence}}$ level =1.96
- = 0.04

$$N=\frac{(1.96)^2 * 0.22 * 0.78}{0.04^2}$$

N=412

By adding 10% for non-response rates a

The final sample size will be 453

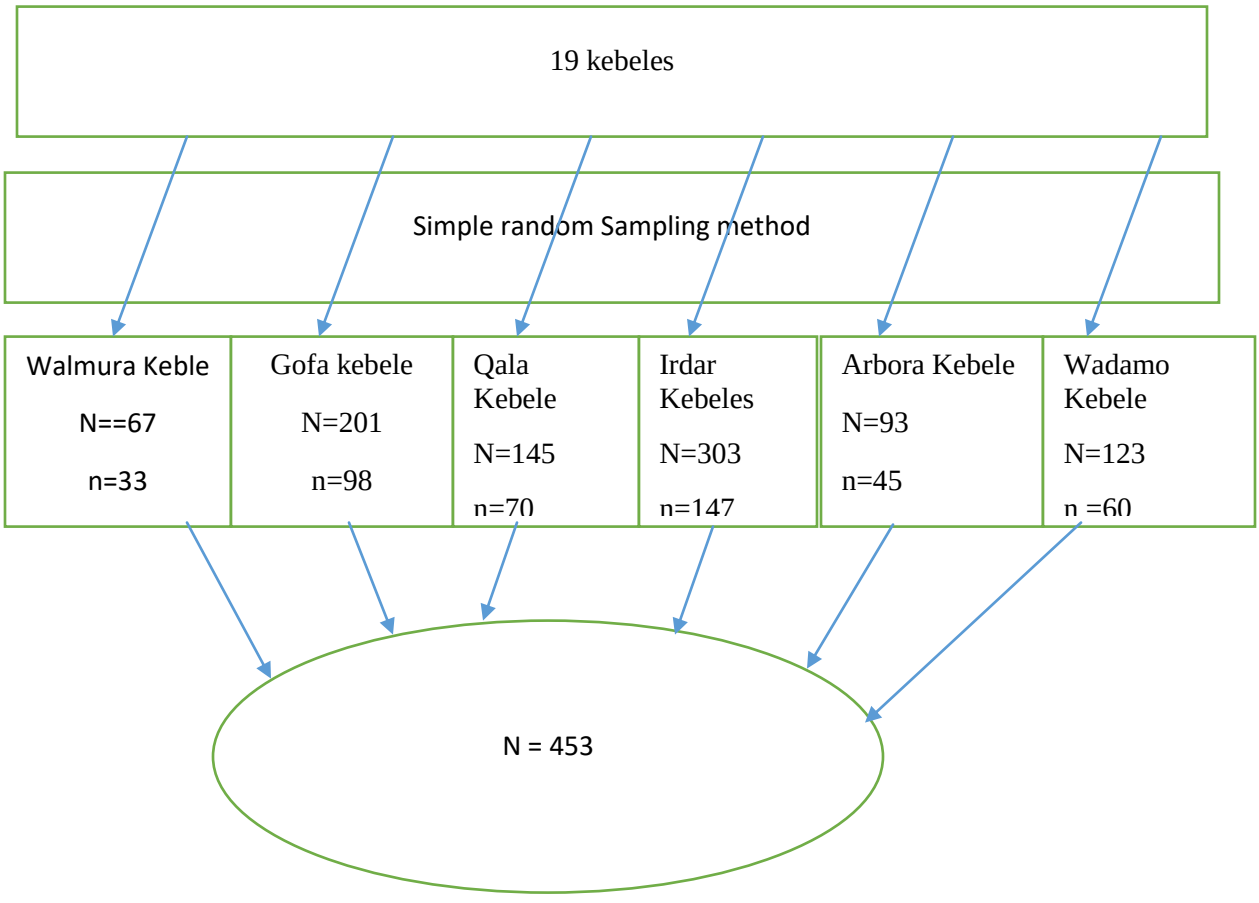
Table 1; **Sample size determination for second objective**

| Variables | % among exposed | % among non-exposed | Power | AOR | CI | Sample size fleiss w/CC | **10% non-repose rate** | Reference |
|---|---|---|---|---|---|---|---|---|
| De-worming | 80.95 | 19.04 | 80 | 2.19 | 95% | 298 | 328 | Yalew BM et al (2014) |
| Diarrhea | 29.8 | 70.2 | 80 | 3.77 | 95% | 148 | 163 | Yenealem, Lemesa etal 2017) |

The sample size determined by second objective is higher than second objective so n= 453 was taken

## 4.7. Sampling Procedure

The households were selected using cluster sampling technique by considering kebeles as clusters. There were 19 kebeles in Guchi woreda and from those 19 kebeles, clusters were selected randomly. Since, Health extension workers already documented number of children aged 6-23 months in each kebele with their respective house numbers in family folder and the number of children lived in each kebeles are received. Finally, all mothers paired with their children in randomly selected clusters will be included in this study. If mothers with their child pairs would not present during the household visit, a revisit will be arranged at a



### 4.8.2 Independent variables

This study identified two domains affecting children's nutritional status. Each domain comprised of several variables as presented below:

a) **socio-economic characteristics**: parental age, ethnicity, parental working status, parental education level, income, total household members, sex of children, total number of children, latrine and sources of drinking water, distance from health facilities

b) **Nutrition related factors;** Food consumption score, Food frequency,

C. **Medical illness;** Diarrhea, Fever in the last two week, Cough, History of TB infection

D) **Health care and service use characteristics:** ANC follow up, place of delivery of index child, PNC and Birth interval.

## 4.10. Data Quality Control

The questionnaire was translated into the local language i.e. AfaanOromoo for data collection and then retranslated back into English. Two days training was done on purpose of study, on the accuracy of anthropometric measurements, method of data collection and on consideration of ethical issues by principal investigator (PI).

Questionnaire were tested prior to actual data collection period among 5% of the study sample from kebele that will not be part of study during actual Study. This was verify the clarity of instruments and helps to familiarize data collectors to the instrument and necessary correction will be made accordingly. Relative Technical error of Measurement (%TEM) will be done to minimize the random anthropometric measurement errors. Investigator and the supervisors would check Questionnaire for its completeness on daily basis. Two data clerks would do separate double data entry then comparing the two separately entered data, consistency of the data would be crosschecked on EpiData. Finally, multivariate analysis would be run in the binary logistic regression model to control the confounding factors.

## 4.11 Data processing and analysis

Data would be entered into EpiData Version 3.1 and export into Social Sciences (SPSS) version 21 For data analysis.Thez-score values of weight for age (WAZ), height for age (HAZ) and weight for height (WHZ) would be computed using the WHO Anthro (version 3.2.2, 2011) WHO 2007. Descriptive analyses was computed and precented by table figure and text. Logistic regression analysis was used to compute Crude odds ratio to identify

candidate variables for multivariate analysis. Accordingly, variables with P value of 0.25 and below would be candidate for Multivariate model. Univar ate and multivariate logistic regression analyses was used to determine predictors of under nutrition. Bothe the Crude odds ratios (OR) and adjusted odds ratios (AOR) with 95% confidence intervals (CI) was computed. P values less than 0.05 would be used as a cut off point for statistically significant.

## 4.12 Operational Definition of Terms

**Stunting:** A child was defined as stunted if the height for age index was found to be below -2 SD of the median of the Standard.

**Underweight:** Refers to a deficit and is defined as underweight below the -2 SD from the NCHS/WHO reference of the median of the standard curve. A severely underweight was diagnosed if it was below -3 SD.

**Wasting**: Nutritional deficient state of recent onset related to sudden food deprivation or mal-absorption utilization of nutrients which results weight loss, weight-for-height below-2SD from the NCHS/WHO median value. Severe wastage if it was below -3 SD.Diarrheais defined as having three or more loose or watery stool in a 24-hour's period the two weeks period prior to the survey

**Undernourished**: A child labeled as Undernourished if any of the nutritional assessment indices weight for height, weight for age, or height for age is abnormal ((with stunting, Underweight, Wasting).

**Food frequency score;**The frequency of consumption of each food group over the past seven days (how many days each food group has been consumed in the last 7 days(24)

**Poor, Borderline and Acceptable food frequency score;** Comprehensive questions for each nutrient (protein, CHO and vitamin A) in the past seven days which was taken by the child was assessed and computed. Then the category for each nutrient was made based on the mean score. For those who scored below the mean was considered as poor FFS, mean borderline FFS and those who score above the mean was acceptable FFS.

**Food consumption score;** FCS is used to identify the most food insecure households(24). Comprehensive questions about food variety which was taken by the child within 24hrs was assessed and computed. Then those who scored below the mean (<2.3) were categorized as poor FCS and those who scored mean and above (≥ 2.3) were taken as good FCS.

The dependent variables of this study were gender specific anthropometric z-scores of weight-for-heights. Based on the z-scores, a child was classified into two categories: i) undernourished (case); or ii) well-nourished (control).

## 4.13 Dissemination plan:

Copies of this thesis would be provided to Jimma University, Department of nutrition & Dietetics, college of public health & medical sciences, to Guchi woreda health and administrative office; more over the findings of the study would be disseminated to all the concerned bodies.

## 4.14 Ethical Consideration

Ethical approval would be secured from Jimma University institute of public Health ethical committee. The purpose of the study would be informed for respondents so that they can provide accurate & honest response. The data collector would assure that the self-administered questionnaire is filled in private, confidential and the information collected would be used only for study purpose and their name would not be written on the questionnaire, their participation is voluntary and they have the full right to refuse to take part in or interrupt the study at any time. Informed Voluntary written and signed consent would be obtained from individual respondents

# Results

**Socio demographic characteristic of children aged 6 to 23 months with caregivers in Guchi Woreda Borena zone**

A total of 451 respondents were participated in the study with response rate of 99.5%. The mean age of the study participants were 15.07 month with SD of ±5.27. Among 451 study subjects majority of them 322(69.2%) were in age groups of 12-23 months. Of 451 age 6-23 months children's almost half of them 236(52.3%) were male sex (table 2).

*Table 2;* Socio demographic characteristic of children aged 6 to 23 months in Guchi Woreda Borena zone, southern Ethiopia 2022

| Variables | | Frequency | % |
|---|---|---|---|
| Age | 6–11 | 143 | 30.8 |
| | 12–23 | 322 | 69.2 |
| Sex | Male | 236 | 52.3 |
| | Female | 215 | 47.7 |
| Fathers educational status | Illiterate | 113 | 25.1 |
| | Read and write | 43 | 9.5 |
| | Primary | 211 | 46.8 |
| | Secondary school | 74 | 16.4 |
| | Collage and above | 10 | 2.2 |
| Mothers educational status | Illiterate | 269 | 59.6 |
| | Read and write | 37 | 8.2 |
| | Primary | 122 | 27.1 |
| | Secondary school | 23 | 5.1 |
| Fathers occupation | Daily laborer | 58 | 12.9 |
| | Merchant | 393 | 87.1 |
| Mothers occupation | Daily laborer | 2 | 0.4 |
| | Merchant | 6 | 1.3 |
| | Civil servant | 6 | 1.3 |
| | House wife | 437 | 96.9 |

**Nutritional and Medical status of children aged 6 to 23 months in Guchi Woreda**

Among the study subjects 37(8.2%) of children had no history of exclusive breast-feeding practice**.** About 16(3.5%) children eat their breakfast some times. Of the study participants 191(42.4%) children's food consumption score is poor. The highest food frequency score among 6 to 23 monthschildren at the study area was Carbohydrate reach food as compared to Protein and Vitamin rich food. The prevalence of wasting, underweight and stunting at the study area was 14.4%, 22.6% and 62.2 % respectively (table 3).

Table 3; Nutritional and health status of children aged 6 to 23 months in Guchi Woreda Borena zone, southern Ethiopia 2022

| Variables | Category | frequency | % |
|---|---|---|---|
| How many times eat per day | One meal a day | 30 | 6.7 |
| | Two meals a day | 53 | 11.8 |
| | Always | 363 | 80.5 |
| How often eat breakfast | Often | 12 | 2.7 |
| | Sometimes | 62 | 13.7 |
| | Never | 14 | 3.1 |
| | Always | 362 | 80.3 |
| How often eat meal | Often | 66 | 14.6 |
| | Sometimes | 7 | 1.6 |
| | Never | 16 | 3.5 |
| | Poor | 191 | 42.4 |
| FCS | Good | 260 | 57.6 |
| | Poor | 239 | 53 |
| Protein FF | Border line | 118 | 26.2 |
| | Acceptable | 94 | 20.8 |
| | Poor | 164 | 36.4 |
| Vitamin FF | Border line | 130 | 28.8 |
| | Acceptable | 157 | 34.8 |
| | Poor | 150 | 33.3 |

| | | | |
|---|---|---|---|
| carbohydrate FF | Border line | 51 | 11.3 |
| | Acceptable | 250 | 55.4 |
| | | | |

**Factors associated with Wasting during bi-variable analysis among children aged 6 to 23 months in Guchi Woreda Borena zone**

In bi-variable analysis age, sex, not practicing exclusive breast feeding, frequency of meal, protein rich food frequency score, Vitamin rich food frequency score and Poor CHO food frequency score were nominated for malty-variable analysis.Finally: in multi variable analysis Sex and Age were the independent factors associated with wasting. Sex being male were 1.93 times (AOR-1.93; 95%; CI (1.24-3.01) more likely wasted as compared to their counter parts. Children with poor Protein FFS were 1.82(AOR=1.82; 95%; CI (1.65-5.08)) times more likely wasted as compared to good protein Food frequency score (table 4).

Table 4;; Factors associated with Wasting among children aged 6 to 23 months in Guchi Woreda Borena zone, southern Ethiopia 2022

| | | Wasting | | | | |
|---|---|---|---|---|---|---|
| Variables | category | Yes (%) | No (%) | COR(95%; CI) | AOR(95%;CI) | P-value |
| Sex | Male | 76(63.3) | 160(48.3) | 1.85(1.84-2.83) | 1.93(1.24-3.01) | 0.004 |
| | Female | 44(36.7) | 171(51.7 | 1 | 1 | |
| Exclusive breast feeding | No | 107(89.20) | 307(92.7) | 1.55(0.76-3.16) | 1.58(0.27-1.21) | 0.15 |
| | Yes | 13(10.8) | 24(7.3) | 1 | 1 | |
| How often the child eat meal | Always | 100(84.10) | 260(78.80) | 1 | 1 | |
| | Often | 10(9.89) | 54(16.3) | 0.57(0.29-1.12) | 1.07(0.42-2.73) | 0.89 |
| | Some times | 5(2.7) | 5(1.3) | 1.94(0.43-8.81) | 2.23(0.43-11.62) | 0.34 |
| | Never | 6(3.40) | 12(3.6) | 0.86(0.27-2.73) | 2.03(0,48-8.64) | 0.34 |
| Vitamin FFS | Acceptable | 41(34.2) | 123(37.2) | 1 | 1 | |
| | Borderline | 40(33.3) | 90(27.2) | 1.33(0.79-2.23) | 1.28(0.74-2.19) | 0.38 |
| | Poor | 39(32.5) | 118(35.6) | 0.99(0.59-1.64) | 1.28(0.74-2.21) | 0.38 |
| CHO FFS | Poor | 34(28.3) | 116(35.0) | 0.67(0.42-1.07) | 1.1(0.61-2.00) | 0.74 |
| | Borderline | 10(8.3) | 41(12.4) | 0.56(0.26-1.17) | 0.56(0.25-1.23) | 0.15 |
| | Acceptable | 76(63.3) | 174(52.6) | 1 | 1 | |
| Protein FFS | Poor | 57(47.5) | 182(55.0) | 0.91(1.53-1.58) | 1.82(1.65-5.08) | 0.026 |
| | Borderline | 39(32.5) | 79(23.9) | 1.44(0.78-2.63) | 2.25(1.61-8.29) | 0.26 |
| | Acceptable | 24(20.0) | 70(21.1) | 1 | 1 | |

**Factors associated with underweight among children aged 6 to 23 months in Guchi Woreda Borena zone**

In bi variable analysis Sex, Fathers educational status, having fever and diarrhea in the last two weeks, poor food consumption score and poor protein rich food frequency score were candidate variables for malty variate analysis. Finally, Fathers educational status able to read and write was 7.01 times (AOR=7.01; 95%; CI; (1.82-26.96)) more likely underweight as compared to secondary and above educational status.Children's who have history of diarrhea were 1.93 times (AOR=1.93; 95%; CI; (1.00-3.70) more likely underweight as compared to their counter parts (table 5).

Table 5;the overall factors associated with underweight among children aged 6 to 23 months in Guchi Woreda Borena zone, southern Ethiopia 2022

| | | Underweight | | | | |
|---|---|---|---|---|---|---|
| Variable | Category | Yes (%) | No (%) | COR(95%; CI) | AOR(95%;CI) | P- value |
| Sex | Male | 114(49.6) | 122(55.2) | 0.23(0.55-1.15) | 0.76(0.41-1.44) | 0.405 |
| | Female | 116(50.4) | 99(44.8) | 1 | 1 | |
| Father's Educational status | Illiterate | 52(22.6) | 61(27.6) | 1.19(0.67-2.11) | 1.64(0.52-5.20 | 0.4 |
| | Abel to read and write | 28(12.2) | 15(6.8) | 2.61(1.22-5.60) | 7.01(1.82-26.96 | 0.01 |
| | Primary | 115(50.0) | 96(43.4) | 1.68(1.01-2.80) | 2.39(0.87-6.59) | 0.09 |
| | Secondary &> | 35(15.2) | 49(22.2) | 1 | 1 | |
| Fever | Yes | 40(17.4) | 50(22.6) | 1.47(0.83-2.60) | 1.49(0.81-2.77) | 0.2 |
| | No | 54(23.5) | 46(20.8) | 1 | 1 | |
| Diarrhea | Yes | 25(10.9) | 38(17.2) | 1.81(0.98-3.34) | 1.93(1.00-3.70) | 0.05 |
| | No | 69(30.0) | 58(26.2) | 1 | 1 | |
| FCS | Poor | 153(66.5) | 134(60.60) | 1.29(0.88-1.89) | 1.03(0.54-1.98) | 0.92 |
| | Good | 77(33.5) | 87(39.40) | 1 | 1 | |

**Factors associated with Stunting in bi-variable analysis among children aged 6 to 23 months in Guchi Woreda**

In bi-variable analysis covariates which were nominated for malty variable analysis were; sex being male with COR=1.23(95%;CI; (0.84-1.80)), those in age groups of 12–23monthes with COR=1.34(95%; CI (1.08-4.21), having fever with COR=1.42(95%;CI; (0.78-2.56)), having cough with COR=2.86(95%;CI; (2.86-1.47)), poor protein rich FFS with COR=1.82(95%;CI; (1.12-2.96)) candidate variables for malty variable analysis (table 6).

Table 6; Factors associated with Stunting in bi-variable analysis among children aged 6 to 23 months in Guchi Woreda Borena zone, southern Ethiopia 2022

| | | Stunted | | | |
|---|---|---|---|---|---|
| Variables | Category | Yes | No | COR(95%;CI) | P-value |
| Sex | Male | 153(54.3) | 83(49.1) | 1.23(0.84-1.80) | 0.25 |
| | Female | 129(45.7) | 86(50.9) | 1 | |
| Age months | 6–11 | 51(29.3) | 34(23.6) | 1.34(1.08-4.21) | 0.06 |
| | 12–23 | 123(70.69) | 110(76.4) | 1 | |
| Fever | Yes | 53(18.8) | 37(21.9) | 1.42(0.78-2.56) | 0.25 |
| | No | 67(23.8) | 33(19.5) | 1 | |
| Diarrhea | Yes | 43(15.2) | 20(11.8) | 0.72(0.38-1.36) | 0.31 |
| | No | 77(27.3) | 50(29.6) | 1 | |
| Cough | Yes | 65(23.0) | 54(32.0) | 2.86(2.86-1.47) | <0.01 |
| | No | 55(19.5) | 16(9.5) | 1 | |
| Exclusive breast feeding | Yes | 23(8.2) | 14(8.3) | 1.02(0.51-2.03) | 0.96 |
| | No | 259(91.2) | 156(91.7) | 1 | |
| How often eat break fast | Always | 225(79.8) | 138(81.5) | 1 | |
| | Often | 8(2.8) | 6(2.6) | 1.23(0.36-4.15) | 0.74 |
| | Sometimes | 41(14.5) | 21(12.4) | 1.2(0.68-2.11) | 0.53 |
| | Never | 8(2.8) | 6(2.6) | 0.82(0.28-2.41) | 0.72 |
| FCS | Poor | 181(64.2) | 106(62.7) | 1.07(0.71-1.58) | 0.76 |
| | Good | 101(35.8) | 63(37.3) | 1 | |
| Protein rich FFS | Poor | 161(57.1) | 78(46.2) | 1.82(1.12-2.96) | 0.02 |
| | Border line | 71(25.2) | 47(27.8) | 1.33(0.77-2.29) | 0.31 |
| | Acceptable | 50(17.7) | 44(26.0) | 1 | |
| Vitamin rich FFS | Acceptable | 108(38.3) | 56(33.1) | 1 | |
| | Border line | 78(27.7) | 52(30.8) | 0.78(0.483-1.25) | 0.3 |
| | Poor | 96(34.0) | 61(36.1) | 0.82(0.518-1.28) | 0.38 |
| CHO rich FFS | Poor | 96(34.0) | 54(32.0) | 1.15(0.75-1.74) | 0.52 |
| | Border line | 34(12.1) | 17(10.1) | 1.29(0.68-2.43) | 0.43 |
| | Acceptable | 152(53.9) | 98(58.0) | 1 | |

**Factors associated with stunting among children aged 6 to 23 months in Guchi Woreda**

In the final model, cough and poor protein rich FFS was the independent determinants of stunting. Children who had cough was 2.59 times (AOR=2.59(95%; CI; (1.25-5.35) more likely affected by stunting as compared to their counter parts, children's having poor protein rich FFS was 3.29 times (AOR=3.29;95%;CI; 1.43-7.56)) more likely affected by stunting as compared to acceptable ranges (table 7).

Table 7; the overall factors associated with stunting among children aged 6 to 23 months in Guchi Woreda Borena zone, southern Ethiopia 2022

| | | Stunted | | | | |
|---|---|---|---|---|---|---|
| Variables | Category | Yes (%) | No (%) | COR(95%; CI) | AOR(95%; CI) | P-value |
| Sex | Male | 153(54.3) | 83(49.1) | 1.23(0.84-1.80) | 0.92(0.47-1.78) | 0.81 |
| | Female | 129(45.7) | 86(50.9) | 1 | 1 | |
| Age | 6–11 | 51(29.3) | 34(23.6) | 1.34(1.08-4.21) | 2.59(0.91-7.38) | 0.09 |
| | 12–23 | 123(70.69) | 110(76.4) | 1 | 1 | |
| Fever | Yes | 53(18.8) | 37(21.9) | 1.42(0.78-2.56) | 1.23(0.65-2.76) | 0.01 |
| | No | 67(23.8) | 33(19.5) | 1 | | |
| Cough | Yes | 65(23.0) | 54(32.0) | 2.86(2.86-1.47) | 2.59(1.25-5.35) | 0.01 |
| | No | 55(19.5) | 16(9.5) | 1 | 1 | |
| Protein FFS | Poor | 161(57.1) | 78(46.2) | 1.82(1.12-2.96) | 3.29(1.43-7.56) | 0.03 |
| | Border | 71(25.2) | 47(27.8) | 1.33(0.77-2.29) | 2.65(1.09-6.45) | |
| | Acceptable | 50(17.7) | 44(26.0) | 1 | | |

# Discussion

The prevalence of wasting in Guchi woredaamong children's age 6-23 months was 14.4% with 95%; CI (21.9-29.7). This result is low as compared to study done in the Sahel Region of Burkina Faso; the prevalence of wasting among 6-23 months children was 25 % (Paré and Dahourou, no date). This difference could be due to the difference of setting.

In this study the prevalence of underweight among 6-23 months children at the study area was; 48.8% with 95%; CI (44.3-53.1). Thigh result is high as compared to study done in Northeast Ethiopia which indicates; the magnitude of underweight was 31.9%,(46)

In this study the overall prevalence of stunting among 6-23 months was 62.5%; 95%; CI(57.4-3.66.5). This result was low as compared to study done at Demba Gofa district, southern Ethiopia; magnitude of stunting in was 79(21.82%)(11). This figure is high as compared to study done in the Hotspot and Non-Hotspot Pastoral Areas, Northeast Ethiopia; which indicates that; prevalence of stunting among Children Aged 6 - 23 Months was 26.7%(7). Modeling the predictors of stunting in Ethiopia: analysis of 2016 Ethiopian demographic health survey data (EDHS)identified that 39.2% of children included(10).

At the study area; Sex being male were 1.93 times (AOR-1.93; 95%; CI (1.24-3.01) more likely wasted as compared to their counter parts. This finding was agrees with study done in Burkina Faso; being male 1.99 times more likely wasted than female children (Paré and Dahourou, no date). This result was contradicted the finding of Hawassa Zuria District, Female children were more wasted relative to males. The difference could be related difference of the population group. Children with poor Protein Food consumption score were 1.82(AOR=1.82; 95%; CI (1.65-5.08)) times more likely wasted as compared to good protein Food frequency score. Study done in Tanzania indicates that; a child low frequency of feeding were more likely malnourished(41). The fact for this is protein rich food is essential for growth and maintenance in children and this poor protein deficiency leads failure to thrive

At the study area;Fathers educational status able to read and write was 7.01 times (AOR=7.01; 95%; CI; (1.82-26.96)) more likely underweight as compared to secondary and above educational status.Children's who has history of diarrhea were 1.93 times (AOR=1.93; 95%; CI; (1.00-3.70) more likely underweight as compared to their counter parts. The finding

is in line with Study done in Tanzania, a child who had diarrhea were more likely malnourished(41). The justification for this finding was children's who had diarrheal disease were exposed for nutritional loss and metabolic disorders due to the disease.

In this study Children who had cough were 2.59 times (AOR=2.59(95%; CI; (1.25-5.35) more likely affected by stunting as compared to their counter parts, the finding was in line with study done at Kindo Didayeworeda, Wolaita Zone, Southern Ethiopia, ARI was more likely affected by stunting(27). This could be infected children's may suffers loss of appetite and metabolic disorder.

In this study Children's having poor protein rich FFS was 3.29 times (AOR=3.29; 95%; CI; 1.43-7.56)) more likely affected by stunting as compared to acceptable ranges. This finding supported by study done on Stunting and associated factors among 6–23 month old children at southern Ethiopia; child eating animal source food were less likely affected by stunting(47),

Study done in Tanzania indicates that; a child low frequency of feeding were more likely malnourished(41). The fact for this is protein rich food is essential for growth and maintenance in children and this poor protein deficiency leads failure to thrive.

## Conclusion

The prevalence of wasting, underweight and stunting was high as compared to different studies with the national wide figure. Sex being male were 1.93 times and poor Protein Food consumption score were more likely wasted. Fathers educational status able to read and write and Children's who has history of diarrhea were more likely to be underweight as compared to their counter parts. Children who with cough and poor protein rich food frequency score were more likely affected by stunted.

### Recommendation

Based on this finding; health workers working in in Guchi woredashould have to care and give immediate treatment for respiratory disease and diarrhea to prevent under nutrition among children's.Stake holders and government should have to supply protein containing foods for Guchi woreda children's for their growth and maintenance.It is batter to give

awareness for child's care takers on the frequency of giving protein containing foods to their child.

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**QUESTIONNAIRE**

**DATE OF DATA COLLECTION____**

Keble _____ House code_____

Name of Data collector. _____ Signature_____date_____

Name of supervisor. _____

**Part I: Socio-Demographic characteristics**

| S.No | Question Response | category | Code |
|---|---|---|---|
| 201 | | | |
| 202 | What is your age (in completed year?) | | |
| 203 | Name of the father ---------- | | |
| 204 | Family size | | |
| 205 | Number of 6-23 months of age children | | |
| 206 | living in the house? | | |
| 207 | Who is the head of the house? | • Male<br>• Female | |
| 208 | What is your religion? | 1. Orthodox | |
| | | 2. Muslim | |
| | | 3. Catholic | |
| | | 4. Protestant | |
| | | 5. Others ---------- | |
| 209 | What is your education status? | 1 = Illiterate | |
| | | 2 = Read and write | |
| | | 3 = The higher class | |
| 210 | What is your ethnicity? | completed | |
| | | 1. Oromo | |
| | | 2. Amhara | |
| | | 3. Somale | |
| | | 4. Gurage | |
| 211 | What is your marital status? | 5. Others specify---------- | |
| 212 | What is the ownership of your house? | Married and in union<br>2. Married lived separately<br>3. Divorced<br>4. Widow<br>5. Never married<br>6. No response | |
| 214 | What is the main source of drinking water for members of your | | |

| | | | |
|---|---|---|---|
| | household? | | |
| 215 | What kind of toilet facility does your household have? | 1. Piped water<br>2. Well water<br>3. Surface water (river, spring )<br>4. Others specify--------- | |

**Part II; Behavioral and Medical history**

| | | | |
|---|---|---|---|
| PMH 1 | Was the child sick in the past two weeks | 1. yes | if 2 skip to MPH3 |
| | | 2. no | |
| PMH 2 | What type of illness he/she faced | 1. fever | |
| | | 2.Diarrhea | |
| | | 3. Cough | |
| PMH 3 | Was the infected by TB in the past 3 month | 1. yes | |
| | | 2. no | |
| PMH 4 | Was the child started additional feeding before 6 month (exclusive breast feeding) | • Yes<br>• no | |
| PMH5 | birth interval in year before delivered last child | | |

**Part III: Food frequency questionnaire**

Now, I will ask your child food intake practices during the last one week.

| NO | QUESTIONS | | If yes How many times do |
|---|---|---|---|
| FFM1 | Was the child eat consume milk/milk and yogurt during 1 week? | **1.yes**<br>**2. no** | |
| FFM2 | Was the child eat pasta/macaroni rice/bread | **1.yes** | |

| | | | |
|---|---|---|---|
| | during 1 week? | **2. no** | |
| FFM3 | Was the child eat fruit in 1 week? | **1.yes**<br>**2. no** | |
| FFM4 | Was the child eat vegetables in 1 week? | **1.yes**<br>**2. no** | |
| FFM5 | Was the child eat meat in 1 week? | **1.yes**<br>**2. no** | |
| FFM6 | Was the child eat fish during 1 week? | **1.yes**<br>**2. no** | |
| FFM7 | Was the child eat egg during 1 week? | **1.yes**<br>**2. no** | |
| FFM8 | Was the child eat maize/sorghum in1 week? | **1.yes**<br>**2. no** | |
| FFM9 | Was the child eat pea/beans/ groundnuts during 1 week? | **1.yes**<br>**2. no** | |
| FFM10 | Was the child eat potatoes /sweet potatoes during 1 week? | **1.yes**<br>**2. no** | |
| FFM11 | Was the child eat sugar/honey during 1 week? | **1.yes**<br>**2. no** | |
| FFM12 | Was the child eat oils/fats/butters during 1 week? | **1.yes**<br>**2. no** | |
| FFM13 | Was the child eat tea/coffee/ small milk in tea/coffee during 1 week? | **1.yes**<br>**2. no** | |

**Annex IV Afan oromoo version**

| Lakk | Gaafii | Deebii | Code |
|---|---|---|---|
| 201 | Maqaankeeenyuu? | 1. kand hunfaa<br>2. kirraa<br>3. Nama waliin jiraachuu<br>4. kan biraa ---------- | |
| 202 | Gannikeemeeqaa (waggaan? | | |
| 203 | Maniii sinkeessajiraattankaneenyutii? | | |
| 204 | Baay`inakuutaa ------- | | |
| 205 | Maddii bishaan dhugaatii maatiikeessanitiif eessarraa? | 1. Bishaan boonbaa<br>2. Bishaan qulqullu(Well water)<br>3. Bishaan lafaa (laga,haaroo)<br>4kan biraa--------- | |
| 206 | Manii fincaani kan isiin ittifayadamtan kan akkamitii? | 1.mana fincanii bishaanin hojjatu<br>2. Mana fincaani Aadaa<br>4. Hinjiru | |
| 207 | Maqaa abbaa ---------- | | |
| 208 | Bay`ina maatii | | |
| 209 | Baay`ina ijooleeji`a 6-23 | | |
| 210 | Who is the head of the house? | 3. Dhira<br>4. Dhalaa | |
| 211 | Maqaan abbaa enyuu? | | |
| 212 | Amantiin keessan maal? | 1. Orthodox<br>2. Muslim<br>3. Caatoliki<br>4. Protestaant<br>5. Others ---------- | |
| 213 | Sadarkaan barumsakee? | 1 = kanhinbaratiin<br>2 = Dubisuufberressu<br>3 = sadarkaatokkoffa (1-6)<br>4 = sadarkaalammaffa (7-12)<br>5 = (12+) | |
| 214 | Sabnii keessan maal | ? 1. Oromo<br>2. Amhara<br>3. somale<br>4. Gurage | |

| | | | |
|---|---|---|---|
| | | 5. Others ---------- | |
| 215 | 11 Haali fudhaaf heerumaa? | • kan fudheef<br>• kanwaliinjiraatu<br>2.kanfudheef kan waliinhinjiraane<br>3. Addaanbaanee<br>4. abbaanmanaadu`ejira<br>5. Hinfunee<br>6. deebinhinjiru | |
| 216 | Baayini kutaa mana keessani meeqaa? | | |
| 217 | Maatiin keessan madda elektrikaatiini fayyadamaa? | 1. Eyeen<br>2. mitii | |
| 218 | Maatiin keessan raadiyoo niqabaa? | 1. Eyeen<br>2. mitii | |
| 219 | MaatiinkeessanTeleevizhiniiniqabaa? | 1. Eyeen<br>2. mitii | |
| 220 | Keesson lafa mana keessanii maalinni | ? 1. lafa<br>2. muuka<br>3. simintoo | |
| 221 | Nyaanii yeroo bay`ee nyaatta maal? | 1. xaafii<br>2. Boqollo<br>3. Garbuu<br>4.Missingaa<br>5. Qamadii<br>6. kanbiraa---------- | |
| 222 | Galiin keessan ji`aan meeqaa? | 1. Birri 500 gad<br>2. Birri 500 - 1000<br>3. Birri 1001- 1500<br>4. Birri 1500 ol<br>98 = hinbeeku | |
| 223 | Hoorii manaa ni qabduu? | 1. Eyeen<br>2. mitii | |
| 224 | Yoo qabaatan,bay`inii isaanii meeqaa | ? horii -----<br>qootiyyo----<br>Holaa ----<br>Re`e ----<br>Gaala --------<br>haaree ----<br>luukku ------<br>kanbiroo --------- | |
| 225 | Hojiinabbaamanaamaal | ? 6. Horsiisee bulaa<br>7. Horsisaaf qotee bulaa<br>8. qoteebulaa<br>9. Qacaramaa hojii dhunfaa<br>10. Hojjataa motumaa<br>6. Hojjataa NGO<br>7. hojii dhunfaa/ofii<br>8. hojjataa guyyaa<br>9. Daldaalaa | |

| | | | |
|---|---|---|---|
| | | 10. Hojiihin qabu11. kanbiraa ---------<br><br>(gara gaafi1.23tii utaali) | |

**Kutaa II Gaafilee Daa`ima Irratti xiyyeffatuu**

| | | | |
|---|---|---|---|
| 226 | Lakk Gaafii Deebii Code<br>Maqaa daa`imaa? ---------- | | |
| 227 | daa`ima meeqafaatii? ---------- | | |
| 228 | Ganii isaa meeqaa?<br>(youngest child)<br>Ji`aan | | |
| 229 | Saala (youngest child) | 1.Dhira<br>2. Dhalaa | |
| 300 | Essatii dhalatee/tte? | 1.Dhabbilee fayyaatii<br>2.Manatti | |
| 301 | Gargaarsa eenyutiin dhaluu dandessee? | 1.Hojjatoota Fayyaatiin<br>2.Dessistoota leenji`aniin<br>3.Deesistoota Aadaatiin<br>4.Olaa/hiriyaatiin<br>5.Kan biraa ---------- | |
| 302 | Daa`imtii yoodhalatu ulfiniiisaamadaalamee jiraa? | (The youngest child)<br>1.Eyeen<br>2.mitii<br>(gara 2.11tii utaalii | |
| 303 | Yoo madaalamee jiraa te e ulfiniiisaa haamam turee? | Graamiikaardirra----------<br>yaadachuu ----------<br>98 = Hinbeekuu | |
| 304 | Daa`ima kee haarama hoosistee beektaa? | 1.Eyeen<br>2.mitii | |
| 305 | (gara 2.15tii utaalii)<br>Yoo hosistee jiraattee,ji`ameeqaatiif haarma Qoofa hoosistee? | 1. ji`a 4 gad<br>2. Ji`a 4 - 6<br>3.Ji`a 7 – 9<br>4. Ji`a 10 – 12<br>5. Ji`a 12 ol | |
| 306 | Yeroo ammaa daa`imti kee haarma hoodhuuti jiraa? | 1.Eyeen<br>2.mitii | |
| 307 | Yoo daa`imtii yeroo amaatii hodhuti ijiraatee, Yeroo kamitti haarma keenitaaf? | 1. yoodaa`imtibooyu<br>2. Haalayerootinwalqabate<br>3. FeedhiHaadharraaka`udhaan<br>4. Kanbiraa | |
| 308 | Haama ji`a meeqaatii daa`imtii tookko haarma Hadhaa qoofa argachuu qabaa jetee yaaddaa?<br>Ji`aan | | |

| | | | |
|---|---|---|---|
| 309 | Daa`imti tookko nyaata dabalataa yoom Argachuu qabaa jattee yaaddaa? | 1. ji`a 4 dura<br>2. Ji`a 4- 6<br>3. Ji`a 7- 9<br>4. Ji`a 10- 12<br>5. Ji`a 12n boodatii | |
| 310 | Ji`a meeqatii nyaata dabalataaegale? Ji`aan | | |
| 311 | Nyaani dabalataan yeroo duraatiif daa`imaaf Keenamee maal turee? | 1. Annan<br>2. Marqa<br>3. shoorbaa<br>4. kanbiraa ---------- | |
| 312 | Ganna kanatti (yerooammaa) guyyati yeroo Meeqaa daa`imti kee nyaachu qabaajattee yaaddaa? | 1. yeroo 3 gad<br>2. Yeroo 3-4<br>3. Yeroo 5-6<br>4. Yeroo 6 ol. | |
| 313 | Ganna kanatti (yerooammaa) guyyati yeroo Meeqaa daa`imti kee nyaachuti jiraa? | 1. yeroo 3 gad<br>2. Yeroo 3-4<br>3. Yeroo 5-6<br>4. Yeroo 6 ol. | |
| 314 | Ganna kanatti (yerooammaa),nyaata Akkam ituudaa`imti kun akka hin nyaanee dhoorkamaa? | 1. Foon<br>2. Alkoolii<br>3. Buuna<br>4. Kanbiraa | |
| 315 | Daa`imti kun torbaan lamaan darban keessatti Dhukkuba o`ina qaamaatiin qabamee beekaa? | 1. eyyen<br>2. mitti<br>(gaafii 2.23tii dabrii)<br>98 = hinbeeku | |
| 316 | Yoo deebin gaafii 2.20 tiif keenname eye yoo ta'e qoorssa ykn dawaa dhukkuba o`ina qaamaatiif argatte? | 1.Eyeen<br>2.mitii<br>(gara 2.23tii utaalii) | |
| 317 | Yoo deebin gaafii 2.21 tiif keennamee yoo Eyyen ta`e,qoorssa yokiin dawaa dhukkuba o`ina qaamaatiif essa aargatte? | 1. DhaabileeFayyaamotummaa (Hosp.,HC,<br>Clinic, HP,)<br>2. DhaabileeFayyaadhunfaa (Hosp.,Clinic,Pharmacy)<br>3. Hojjatoot4. Kan biraa--------- | |
| | TFS<br>2. Safety net<br>3. WFP<br>4. MERLIN<br>5. Kan biro----------<br>2.35 Yeroo meeqaaf daa`imti keenyaata dabalataa<br>Kana argatee?<br>Ji`aan ---------<br>2.36 Madaalii Anthropometri? 1ffaa 2ffaa 3ffaa Average<br>Ulfina ---- ----- ------ ---------<br>Dheerina ---- ----- ------ --------<br>2.37 Edema ni qabaa? 1. Eyeen | | |

| | | | |
|---|---|---|---|
| | 2. Mitii | | |
| 318 | Daa`imti kun torbaan lamaan darban keessatti Dhukkuba qufaatiin qabamee beekaa? | 1.Eyeen<br>2.mitii<br>(gara 2.27tii utaalii)<br>98 = Hinbeeku | |
| 319 | 2.24 Yoo deebin gaafii 2.23 tiif keennamee yoo<br>eyyenta`e,yeroo qufaan jiru daa`imtiidafee dafee haafura fudhataa? | 1.Eyeen<br>2.mitii<br>98 = Hin Beeku<br>Yoo deebin gaafii | |
| 320 | tiif keennam eeyoo<br>eyyenta`e, goorssa yokiin dawaa dhukkuba qufaatiif argate?<br>1.Eyeen<br>2.mitii<br>(gara 2.27tii utaalii) | | |
| 321 | 2.26 Yoodeebingaafii 2.25 tiif keennameeyoo<br>eyyenta`e, goorsa yokiin dawaa dhukkuba qufaatiif essarra argate? | 1. DhaabileeFayyaamotummaa (Hosp.,HC,<br>Clinic, HP,)<br>2. DhaabileeFayyaadhunfaa (Hosp.,Clinic,Pharmacy)<br>5. HojjatootaAadaa<br>6. kan biraa _____ | |
| 322 | 2.27 Daa`imti kun torbaan lamaan darban keessatti Dhukkuba Garaa kaasaatiin qabamee beekaa? | 1.Eyeen<br>2.mitii<br>(gara 2.31tii utaalii)<br>98 = Hinbeekuu | |
| 323 | 2.28 Yoo deebin gaafii 2.27 tiif keennamee eyyen ta`e,yeroo meqaaf issa Garaakaasee? | 1.Yeroo sadii<br>2.Yeroo Afuriinol<br>98 = Hinbeeku | |
| 324 | 2.29 Yoo deebin gaafii 2.28 tiif keennamee yoo<br>eyyenta`e, goorssa yokiin dawaa dhukkuba Garaa kaasaatiif argate? | 1.Eyeen<br>2.mitii<br>(gara 2.31tii utaalii) | |
| 325 | 2.30 Yoo deebin gaafii 2.29 tiif keennam eeyoo<br>eyyenta`e, goorssa yokiin dawaa dhukkuba Garaa kaasaatiif essarraa argate? | 1. DhaabileeFayyaamotummaa (Hosp.,HC, Clinic, HP,)<br>2. DhaabileeFayyaadhunfaa (Hosp.,Clinic,Pharmacy)<br>3. HojjatootaAadaa<br>4.qoorsa manatiiqoophaaye (Bishaan,<br>shukaara, soogida) | |
| 326 | Daa`imtii keetalaalamee beekaa?(kaardii ilaalii) | | |
| | | 1.Eyeen<br>2.mitii<br>(gara 3.39tii utaalii)<br>2.32 Yoodeebiingaafii 2.37tiif eyeen | |

| | | | |
|---|---|---|---|
| 327 | ta`e,talaali<br>goossa kamii fudhate/tte?(tokkofiladhu) | A) kaardiirraa ()<br>B) GabaassaHaadharraa ()<br>1. BCG qoofa<br>2. BCG, DPT1, Polio1<br>3. BCG, DPT1 – 2, Polio1 – 2<br>4. BCG, DPT1 – 3, Polio1 – 3<br>5. BCG, DPT1-3, Polio1-3, Meseales | |
| 328 | 2.33 Daa`imtii kee nyaata dabalataa madda biro<br>Irraa argatee beekaa?<br>. | 1. Eyeen<br>2. mitti (garagaafii 2.42tii dabrii 2.34<br>yooargatee/tteeessarraaargatee/tte? 1 | |
| | | | |
| 329 | Yoo argatee/tteeessarraa argatee/tte | ? 1. TFS<br>2. Safety net<br>3. WFP<br>4. MERLIN<br>5. Kan biro---------- | |
| 330 | 2.35 Yeroo meeqaaf daa`imti kee nyaata dabalataa Kana argatee? | Ji`aan --------- | |
| 331 | 2.36 Madaalii Anthropometri? | 1ffaa 2ffaa 3ffaa Average<br>Ulfina ---- ----- ------ ---------<br>Dheerina ---- ----- ------ -------- | |
| 332 | 2.37 Edema ni qabaa? | 1. Eyeen<br>2. Mitii | |

**kuutaa III: Gaafii Haadhaaf/Guudistuuf qoophaayee**:-

| | | | |
|---|---|---|---|
| | Gaafii Deebii Code<br>. | | |

| | | | |
|---|---|---|---|
| 333 | Ganni kee meeqa turee yeroo duraafutu? | waggaan ---------- | |
| 334 | .2 Yoodaa`ima kee issa duraa deessu ganni Kee meeqa turee? | Waggaan ---------- | |
| 335 | 3 Bay`ina ulfaa? | Lakkofsaan ---------- | |
| 336 | 4 Baay`ina ijoolee nagaan dhalatte?:- | Dhiira ----<br>Dhalaa ---- | |
| 337 | Hundinuu lubuun jirti? | 1.Eyeen(gara 3.7tii utaalii)<br>2.mitii | |
| 338 | Ijoolen dote yoo jiraatee,sababa isaa ibsi? | Baasaa ----<br>Qufaa ----<br>Febrile illness and chills ----<br>Balaa -----<br>Sababababiraa ---------- | |
| 339 | 7 Ulfa baastee beektaa? | 1.Eyeen<br>2.mitii<br>(gara 3.9tii utaalii) | |
| 340 | Yoo baastee jiraatte,yeroo meeqa baastee? | Lakkofsaan ---------- | |
| 341 | Qussanaa maatiti fayadamtee bektaa | ? 3. Eyeen<br>4. mitii (gara 3.11tii utaali) | |
| 342 | Yoo fayadamtee beektaa ta`e, mala issa Kam fayyadamte beektaa? | 1. Pills<br>2. Lilmoo<br>3. Condom<br>4. kanbiraa | |
| 343 | Hojii dabalata manaan alatti ni hojjattaa? | 1.Eyeen<br>2.mitii | |
| 344 | Nyaata bilchesuuf yeroo ga`aa ta`e qabdaa? | 1. eyyen<br>2. mitii | |
| 345 | Yeroo hundaa yoodaa`imti kee Dhukubsatu gara dhaabilee fayyaatii geessitaa? | 1. Eyen (gara 3.15tii utaali)<br>2.mitii | |
| 347 | Yoo hin geessine ta`ee,essa geessitaan? ---------- | | |
| 348 | 15 Haala akkamitin daa`ima ganna lama Gaditiif nyaata qophesitaaf? | 1. Nyaata maatii waliin hojjatamaaf<br>2. Koophaatiihojjatamaaf | |