PHARMA COLLEGE

SCHOOL OF PUBLIC HEALTH

NUTRTIONAL STATUS AND ASSOCIATED FACTORS AMONG UNDER TWO YEAR CHILDREN IN WONDOGENET DISTRICT, SIDAMA REGION, ETHIOPIA, 2024

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DECEMBER, 2024

HAWASSA ETHIOPIA

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DECLARATION

I hereby declare that this MPH thesis is my original work and has not been presented for a degree in any other university, and all sources of material used for this thesis have been fully acknowledged.

Investigator: Tereza Oche

Signature: _____

Date: _____

ADVISOR'S APPROVAL SHEET

This is to certify that the project entitled "To assess under two children nutritional status and associated factors in Wondogenet District, Sidama region, Ethiopia, 2024." submitted in partial fulfillment of the requirements for the degree of Masters of Public Health, and was carried out by: Tereza Oche, under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence, here I can give him my signature for submission of the thesis to the department.

Name of Advisor	Signature	Date
Mr. Anteneh Fikrie	_____	_____

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

ABBREVIETION AND ACRONYMS

AOR	Adjusted Odd Ratio
COR	Crud Odd Ratio
DD	Dietary Diversity
EDHS	Ethiopian Demographic and Health Survey
HAZ	Height for Age
MDD	Minimum Dietary Diversity
SPSS	Statistical package for social science
SSA	Sub Saharan Africa
UNICEF	United Nation International Children Emergency Fund
WAZ	Weight for Age
WZH	Weight for Height
WHO	World Health Organization

ABSTRACT

Background: As of many developing countries, malnutrition is one of the most important health problems among infants and young children in Ethiopia. Inadequate and/or inappropriate dietary intake is the immediate/direct causes. Although the nutritional status of children has already been studied in the countries, region specific studies are scarce in the study area. Therefore, this study aimed to assess less than two children nutritional status and associated factors in Wondogenet District, Sidama region, Ethiopia, 2024.

Method and material: - A community based cross-sectional study design was employed on 504 participants selected by multistage sampling technique from August 1, up to 30/ 2024 G.C. The data was collected using structured face-to-face interviewer administered questionnaire. The data was entered into Epi data and analyzed by SPSS version 26. Bivariate and multivariate multinomial Logistic regression analysis was done to identify factors associated with nutritional status. Descriptive statistics like mean with standard deviation and/or median and frequency and percentage for categorical variables was used. The result of the final model will be expressed in terms of Adjusted Odds Ratio (AOR) with a 95% Confidence Interval.

Result: - In this study about 46.7% (95%CI of 42.3-51.2) of study participant 6-23 month aged children affected by at least one type of malnutrition. Prevalence of stunting, underweight and wasting was found to be 31.6% (95%CI, 27.4-35.7); 17.2% (95%CI, 13.8-20.6) and 13.9% (95%CI, 10.8-17.0) respectively. Children from whose fathers educational level of no formal education (AOR=3.76; (95%CI: 1.62-8.70) and primary level of education (AOR=2.79; (95%CI: 1.10- 7.09), children from mother who had no formal education (AOR=2.75, 95%CI: 1.66-4.56) and children who consumed less than four food group (AOR=2.48, 95%CI: 1.04-5.94) were more likely to be affected by stunting. Mothers no formal education [AOR=3.18; 95%CI: (1.64-6.16)], father no formal education [AOR=3.72; 95%CI: (1.32- 10.50)] who not met recommended MDD [AOR=2.95; 95%CI (1.60-5.44)], feeding snack [AOR=0.43; 95%CI: (0.22- 0.87)] and being from household with secure food access [AOR=0.47; 95%CI: (0.23-0.96)] were significant determinant of underweight. Children who feed snack between main meals (AOR=0.28; (95%CI: 0.12-0.69) and feed by using infant formula (AOR=0.45; (95%CI: 0.21-0.95) were less likely wasted compared to their counterpart.

Key words: - Nutritional status, Dietary Diversity, under two children

1. NTRODUCTION

1.1. Background

Nutritional status of children is an important outcome measure of their health status and as well as a sensitive indicator of community health. It is the result of complex interactions between food consumption and the overall status of health and health care practices (1, 2). Numerous socioeconomic and cultural factors influence patterns of child feeding and their nutritional status. Appropriate and adequate feeding is a pre-requisite to good nutritional status in any given time of human life because consumption of nutritionally inadequate diet leads to malnutrition (3-5).

Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients. The term malnutrition addresses 3 broad groups of conditions: under nutrition; micronutrient deficiency or excess; and overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and some cancers) (3). Under nutrition includes wasting (low weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age); and deficiencies in vitamins and minerals makes vulnerable to disease and death (2).

Even though its patterns and prevalence vary significantly, malnutrition is a universal public health problem in both children and adults globally. Although malnutrition is an impediment to global poverty eradication, productivity and economic growth, beside huge effort, it has been continued to be the only unresolved public health problem worldwide. It affects one in three people globally and it's a major cause of morbidity and mortality (6). Under-two children are the most susceptible age group for malnutrition. Adequate nutrition for infants and young children is essential for healthy growth, proper organ formation, and function, as well as for a strong immune system and neurological development (2).

Under-nutrition which can make children underweight, stunted, and wasted does not only increase the risk of infections, morbidity, and mortality but can also decrease mental and cognitive development (5). It associated with poor school performance in childhood, reduced earnings and increased risks of nutrition-related chronic diseases in future. In general, the effect of child malnutrition is long lasting and goes beyond childhood (7).

Proper nutrition in the early years of life is usually determined by feeding practice, which includes the diversity and frequency of feeding, degree of stimulation and interaction with parents, especially women (8). There are different factors influence variety and frequency of dietary intake which intern determine nutritional status of children and finally resulted in high burden of early childhood infections and contribute to significant growth impairment, morbidity and mortality among children (9, 10). Therefore, creating sustainable, resilient food systems for healthy diets; providing social protection and nutrition-related education for all; aligning health systems to nutrition needs, and providing universal coverage of essential nutrition interventions is an important pre-request to avert the problem (4, 11).

Since good nutrition status is a foundation for health and well-being for all, leaving no one behind through malnutrition prevention by addressing its determinants and people centered approach should have to always consider (12). Mainstreaming nutrition as part of integrated people centered health services will put the comprehensive needs of people and communities, not only diseases, at the center of health systems, and will empower people to have a more active role in their own health (2, 11, 13). Systematically addressing the broader determinants of nutrition including social, economic and environmental factors, as well as people's characteristics and behaviors need evidence informed public policies and actions across all sectors (12). Accordingly, assessment toward nutritional status and its determinant pattern among children can be an important prerequisite to provide such update of evidence for decision concerning their health and societal development.

1.2. Statements of problem

Beside huge, global effort aims for a world free of all forms of malnutrition, every country in the world is being affected by one or more forms of malnutrition. People who are poor are more likely to be affected by all forms of malnutrition (3, 4). Moreover, beside its impact on an individual health, malnutrition increases health care costs, reduces productivity, and slows economic growth, which can perpetuate a cycle of poverty and ill-health (2).

Infants and children years are at particular risk of malnutrition. Child malnutrition remains a widespread and a major development challenge in many low- and middle-income countries (3). Especially during early childhood, nutritional deficiencies contribute to high mortality, morbidity, and impaired physical and cognitive development(14). Economic growth and human development require well-nourished populations who can learn new skills, think critically and contribute to their communities (15). Consequently, adequate nutrition is essential for early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, neurological and cognitive development (16). Therefore, optimizing nutrition early in life –including the 1000 days from conception to a child's second birthday – ensures the best possible start in life, with long-term benefits (2, 12).

More than 150 million (39.9%) children under the age of five years in African countries are malnourished (17). In sub-Saharan Africa, the prevalence of stunting and wasting was 33% and 8% respectively. The prevalence of underweight was 16% in Sub-Saharan countries. Sub-Saharan Africa is the only region that registered an increase in stunting (6). Ethiopia is one of the countries in sub-Saharan Africa with the highest rate of malnutrition. In Ethiopia as low income country, under nutrition is one of the most important health problems among infants and young children (8).

Ethiopia is among the nations with the highest under-five mortality rates in the world and at least 53% of mortality can be attributed directly or indirectly to malnutrition (18). According to 2019 mini EDHS and NNP II the prevalence of Stunting was 37 %, from those child 12% child's are severely stunted and its prevalence increase in rural Ethiopia 41%. In accordance recently, the Ethiopian government is committed to ending child hunger and under nutrition by 2030 and brings stunting in children under 2 years old to zero through its Seqota Declaration (14). However, the progress made so far has not been enough to achieve the above mentioned goals

and children in Ethiopia are reported to suffer from required macro-micronutrient deficiencies, due to poor diet quality (3).

Many researchers indicate that a complex set of factors determine malnutrition among children while not getting intake of Minimum Dietary Diversity (MDD) component appear the immediate/direct cause (9, 10). This is in turn related to several socio-economic, demographic, child-care, and environmental factors (18) which include lack of access to enough nutritious food, mothers health facility seeking behavior, low levels of parental education, maternal employment and belonging to the low-income group (18-22).

The interaction and impact of those factors on child nutrition probably vary in different settings, as well as over time (5). Policy-makers and researchers endlessly debate which of the many causes of malnutrition are most important, and which areas of intervention will be most successful in reducing the problem (23, 24). Such information is often lacking so unreliable and inadequate decisions are made based on assumptions and unjustified conclusions. This often results in selection of inappropriate policies and programs only to discover the consequences after implementation (19, 25). Therefore, investigating an actual prevailing direction and magnitude of this synergetic impact of different factors on child nutrition status in a given community has great importance for their public health decision making process.

Although many previous studies in Ethiopia focused on complex relationship between different factors and child nutrition has been conducted but not specific to the regions, localities and residence so far. Particularly in Sidama region under which this study will be conducted there was no available finding that has examined the level of nutritional status and its determinant factors. Because of this gap, this study aim to investigate child nutritional status and associated among children aged less than two year in one specific sub population group.

1.3. Significance of the study

Many intervention strategy based on existing information was not bring satisfactory improvement on child malnutrition problem and it remain as the major public health problem in our country Ethiopia as well as our target study setting Sidama region. Understanding the influence of different factors on the nutritional status of children could be useful to inform nutrition policy. Therefore, present study will examine the role of different factors on less than two year children nutrition in Wondogenet district. Hence, this study aims to identify level and pathway of the effect of each child nutrition determinant component factors and its individual impact simultaneously with other factors on final nutritional outcome. Finally, this study will give quantitative information on the likely potential impact of each factor to the different aspect child nutritional status (stunting, wasting and underweight). These would help local government body and other NGO partners working in the area to raise informed solution strategy option and to implement correct action required to improve child nutritional outcome. The result also provide information for community health provider regarding what, when and where is the different factors impact on malnutrition and gives the direction on how to implement the required solution.

2. LITERATURE REVIEW

2.1. Nutrition Related Disease Burden

According to WHO global preview in 2024 revealed that unhealthy diets and poor nutrition are among the top risk factors for the diseases burden globally. According to this preview, malnutrition in one form or another, is estimated to affect one in three people globally and is a major cause of morbidity and mortality. Nearly half of deaths among children fewer than 5 years of age are linked to under nutrition. These mostly occur in low- and middle-income countries. Furthermore, the review indicate that 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 (2).

Systematic review and Meta-analysis study in Ethiopia showed that the double burden of malnutrition which refers to the simultaneous presence of under nutrition and overweight, obesity, or diet-related non-communicable diseases which might occur at the population, household, and individual level has been emerged as another double morbidity related to nutrition change among children and mothers and holds particular significance. The review indicate that simultaneous presence of overweight/obese mothers with undernourished children in the same household, as well as overweight children with underweight mothers was high, which affected one- third of the population in Ethiopia (5).

2.2. Nutritional Status among children

Globally, the problem of under nutrition has been shown a decline between 1990 and 2018; the prevalence of stunting in children aged under 5 years declined from 39.3% to 21.9%, representing a decrease in the number of children with stunting from 253.4 million to 149.0 million. However, global estimates mask much slower progress in Africa (42.6% to 33.1%) and South-East Asia (49.6% to 31.9%). Wasting still affects 49.5 million children aged under 5 years (7.3%) worldwide, with more than half of these children residing in South-East Asia (26). According to WHO report of global nutrition review in 2022, 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), and 37 million were overweight or living with obesity (2).

According to UNICEF-WHO-World Bank joint monitoring report prevalence of stunting among children under 5 in 2018 North America 11.6%, Eastern Europe and Central Asia, 22.5% East Asia and the Pacific 17.2%, South Asia 49.9%, Middle East and North Africa 32.4%, Eastern and Southern Africa 42.1%, West and Central Africa 39.4% and Latin America and the Caribbean 16.5% (27). In addition to this the recent new strain of the COVID-19 pandemic could throw an additional 140 million children into poverty in 2020 and increase the number of undernourished children by 7 million (16).

Study conducted in Argentina on anthropometric data showed 1.5% stunted, 5.2% wasting; 0.6% underweight (28).Study conducted in south Asia indicates that 38% of children aged 0–59months are stunted. And it is high prevalence it took about 40%of the global burden of stunting (29). A community based cross sectional survey conducted in Bangladesh revealed that the overall prevalence of stunting in children of under 5 is 29·9% (30).

Meta-analysis of the most recent Demographic Health Surveys in 32 sub-Saharan Africa: (2006-2016) were reported the highest prevalence of stunting in Burundi (57.7%) and Malawi (47.1%), Niger (43.9%), Mali (38.3%), Sierra Leone (37.9%) and Nigeria (36.8%), Democratic Republic of Congo (42.7%) and Chad (39.9%). Similarly, prevalence of wasting was Niger (18.0%), Burkina Faso (15.50%) and Mali (12.7%) in West Africa; Comoros (11.1%) and Ethiopia (8.70%) in East Africa; Namibia (6.2%) in Southern Africa; Chad (13.0%) and Sao Tome & Principle (10.5%) in Central Africa. This finding also show, the prevalence of underweight in Burundi (28.8%) and Ethiopia (25.2%) in East Africa; Niger (36.4%), Nigeria (28.7%), Burkina Faso (25.7%), Mali (25.0%) in West Africa; and Chad (28.8%) in Central Africa (31).

Cross-sectional study conducted in South Africa found that overall prevalence of stunting, underweight and thinness (wasting) was 29%, 13% and 6%, respectively (32). Study conducted in Tanzania showed that the prevalence of stunting was 31%, wasting 6% and underweight 14% (20).

According to mini Ethiopian Demographic health survey in Ethiopia show that 37% of children under 5 are stunted. In addition, stunting among children is greater in rural areas 41% than in urban areas 26%. Overall, 7% of children in Ethiopia are wasted, and 1% is severely wasted and 21% of all children are underweight, and 6% are severely underweight (7).

A study conducted in Tigray, north Ethiopia revealed that, 56.6% of children were found to be stunted, 45.3% underweight, and 34.6% wasted. Moreover, severe malnutrition was found among the stunted (22%), underweight (23.3%) and wasted (12%) children (33). A cross sectional study conducted in Amhara region found that, prevalence of underweight, stunting, and wasting were 19.5%, 36.5%, and 8%, respectively. The proportion of severe and moderate underweight children was 8.2% and 11.3%, respectively. The prevalence of underweight was higher (76.9%) among rural than among urban residents (23.1%) (3). Similar Community based cross sectional study conducted in Amhara Region also show that, prevalence of stunting, underweight and wasting were 47.3%, 25.6% and 8.9%, respectively (34).

The study conducted among children aged 6 - 23 months in Jima Geneti District, Oromia, Ethiopia found that the prevalence of underweight, stunting and wasting among children was 19.6%, 27% and 11.8%, respectively (22). Another community based study done in Wolyta sodo revealed that, the prevalence of stunting was 22.2%, (35). Another study conducted among child between the ages of 6 and 23 months in sidama region reported that, 7% of children wasted, 11.5% stunted and 9.9% underweight (36).

2.3. Factors associated with nutritional status

2.3.1. Socio-demographic and economic factors

Sex of children: Sex of the child has been observed to be a significant factor for child nutritional status. Prevalence and severity differ in these two sex groups. Study conducted in Western Maharashtra, India, reported that a higher proportion (80.3%) of females were malnourished compared to the males (37). Study conducted in Uganda also indicates that, sex of the child is an important determinants of child nutritional status (38). A study conducted in Haramaya District, Eastern Ethiopia reported that wasting among male children was 2 times higher than that of female children (39).

Children age: It is important to note that specific ages, children's nutritional status is sensitive to feeding, weaning practices, care, and exposure to infection. Majority of the studies conducted in different parts of the world confirmed that child's age was the main contributing factors to child malnutrition (8). Another study conducted in Nigeria also indicate that age of child was significantly associated with feeding practice of child (40). A study conducted in Ethiopia showed that the prevalence of stunting was low in children at age of 1 year and below year (41).

Another study conducted in East Belesa District, northwest Ethiopia reported that children aged 36–47 months were less likely to be stunted compared to infants aged 6–11 months. This could be due to the fact that the latter have poorer nutritional reserve capacity compared to the former (42).

Marital status: A study conducted in Ethiopia found that child's malnutrition is significantly associated with marital status. It was found out that malnutrition in children below five years were higher among unmarried rural and divorced/separated women compared to married ones (35). On the other hand, a study conducted in Tanzania found that mothers who were married were more likely to have undernourished children unlike those who were unmarried perhaps because of the cost of maintaining families hence sometimes these families fail to produce nutritious supplements to their children below five years (26).

Maternal education: Under nutrition seems to have relationship with education level especially of mothers. Several studies conducted within and outside the country reported that under nutrition decrease with increase of maternal education level. Study on influence of socio-economic factors on nutritional status of children in Nigeria, Children of mothers who were not educated beyond secondary school level had one and a half to two times the prevalence rate of stunting (43). On the other hand, children of mothers with post-secondary education were apparently more often affected by wasting than those with less educated mothers but there was no consistent trend in the pattern of wasting or stunting with respect to paternal educational level. According this research conducted in Sudan, maternal education was found to be the strongest factor associated with malnutrition among under five children (44).

Household income: Low maternal income and overcrowding were associated with higher prevalence of wasting. According study conducted in Ethiopia the most serious nutritional problems are mainly due to low intake of foods in general. The problem is more severe among children aged 1-3 years who suffer from Kwashiorkor and Marasmus (4%) and underweight (60%). Any change in income or income from influence of the nutritional status at the household and individual levels. The effect of income is measured by expenditure on food which reflects a household’s income and resources (35). Among the socio-economic variables included in the study conducted in Lalibela town, Northern Ethiop, middle wealth quintile was significantly associated with underweight (8).

2.3.2. Other maternal related factors

The study conducted among Filipino children aged 6-23 months revealed that child's whose mothers attended nutrition counseling and knew the right duration of exclusive breastfeeding and proper time for introducing complementary food were more likely to meet the MDD, as opposed to those whose mothers failed to attend any nutrition counseling (45). A study conducted in Ecuador indicates that maternal employment increases the probability of having stunted children, while there is no significance association of maternal employment on children suffering from wasting, underweight (46). Another cross-sectional survey conducted in Egypt suggest that maternal employment has negative effects on child nutrition (47).

Study conducted in Rural Tanzania, indicate negative effect of maternal off-farm employment on child nutrition seems to be mainly driven by the time allocation mechanism, as this is the only one for which we expect a negative direction. However, the child nutrition effects of maternal time allocation to agricultural work on the own family farm are weaker than those of off-farm employment and statistically insignificant (48).

Study conducted in Uganda implies that maternal employment is positively associated with child nutritional status. Children whose mothers engaged in agriculture and manual work had higher odds of stunting compared with those whose mothers engaged in professional work. Additionally, children whose mothers were employed by nonfamily members had higher odds of wasting and being underweight compared with children whose mothers were employed by family members. The most vulnerable children are those whose mothers belong to the low socioeconomic status, are young, reside in places that are food insecure and have low levels of education (38).

Study conducted in Nigeria on maternal employment and child feeding practice show that, the place of employment of mother's important factor in the choice of feeding practices. In this study mothers that worked outside the home had better feeding practices when compared to the non-working mothers and those that worked at home. There is a significant difference in the timing of the introduction of the complementary foods and the number of snack consumed per day. Mothers that worked at home introduced complementary foods earlier than all other groups. Higher proportion of mothers working in the offices/factories introduced complementary foods between 3 - 6 months but offered more complementary feedings per day (40).

In Ethiopia study conducted at Addis Ababa, indicate that there is no statistically significant association between maternal employment and nutritional status of their children (18). In contrary, another cross sectional study in north part suggest that, having mothers who could make financial decisions were predictors underweight prevalence among children (33).

Study conducted in Jimma town, South West Ethiopia, indicates that, the children of working mothers were observed to achieve better nutritional status from their anthropometric measurement (49). However similarly another cross-sectional study conducted in Wolayita Sodo, indicate that there is no statistically significant association between maternal employment and nutritional status of their children (35). Another study conducted in Benna Tsemay Woreda, South Omo Zone, Southern Ethiopia indicate that farming as maternal occupation and poor health service use of mother was significant factors for child under nutrition (24).

2.3.3. Feeding practice related factors

The study conducted among Filipino children aged 6-23 months indicate that household's socio-demographic profile was found to bear significant influence on the child's food intake as proxy indicator for access to food based on the household's food security status and size. As the number of children in the household increases, the children's likelihood of meeting the MDD decreases. Higher percentages of children from food secure households, living in urban areas and born to working mothers were able to meet the MDD relative to their counterpart. Furthermore, this study results reveal that MDD is significantly associated to nutritional status, in general, and to underweight and wasting, in particular. Accordingly, the study indicate that all those factors affecting MDD have direct or indirect impact on child nutritional status (45).

Study finding from South Africa revealed that the association between dietary diversity and nutritional indicators was strong and a higher dietary diversity score was significantly associated with lower odds of being stunted. This study also state that low occurrence of diversity in the diet of the children is a reflection of monotonous and less diverse diets of the households and could be attributed to economic reasons. Low economic status of household creates an inability to purchase nutritious food, which determines households' food availability, and ultimately affects the feeding practices of children. This could in turn lead to the poor nutritional status of the child (32). Study conducted in Tanzania showed consumption of a diverse diet was significantly associated with a reduction of stunting, wasting and being underweight in children. In this study

the likelihood of being stunted, wasted and underweight was found to decrease as the number of food groups consumed increased. Similarly, this study also indicates that children who did not receive the MDD had a significantly higher likelihood of being stunted and underweight. Consumption of animal-source foods has been found to be associated with reduced stunting among children.

Study conducted in Ethiopia revealed that, a very high proportion of the mothers (80%) initiated feeding of newborns with pre-lacteal feeds primarily butter or water and inadequate complementary foods and area of residence were the main contributing factors to child malnutrition (50). Study conducted in Addis Ababa indicates that, children who were not met minimum dietary diversity score were more likely to be stunted (18). Another study conducted in Addis Ababa, Ethiopia revealed that mother's education, household income and knowledge on dietary diversity and child feeding were significantly associated with minimum dietary diversity feeding practices (21).

Study conducted in Jima Geneti District, Oromia, Ethiopia found that child DD score were associated with stunting and wasting (22). Another study conducted at Bale Robe, indicate that the child's age, mothers' education, media exposure, fathers' occupational status, and knowledge of mothers on food diversification were the variables which have shown a statistically significant and independent association with minimum dietary diversity practices (51).

2.3.4. Environmental factors

Study conducted on prevalence and factors affecting nutritional status of under-five Children in Nigeria, nutritional status was significant associated with access to clean water and presence of toilet in the households (40). Other study also indicates that poor urban areas where insufficient water supply and sanitation coverage combine with overcrowded conditions tend to maximize the possibility of fecal contamination and linked to acute malnutrition. Without sufficient access to safe drinking water and an adequate water supply for basic hygiene, children's health suffers and probability of malnutrition increase (16). Study conducted in Benna Tsemay Woreda, showed, use of treated were significantly associated with stunting of pastoralist children in Benna Tsemay Woreda ($p<0.05$) (24).

2.4. Conceptual frame work

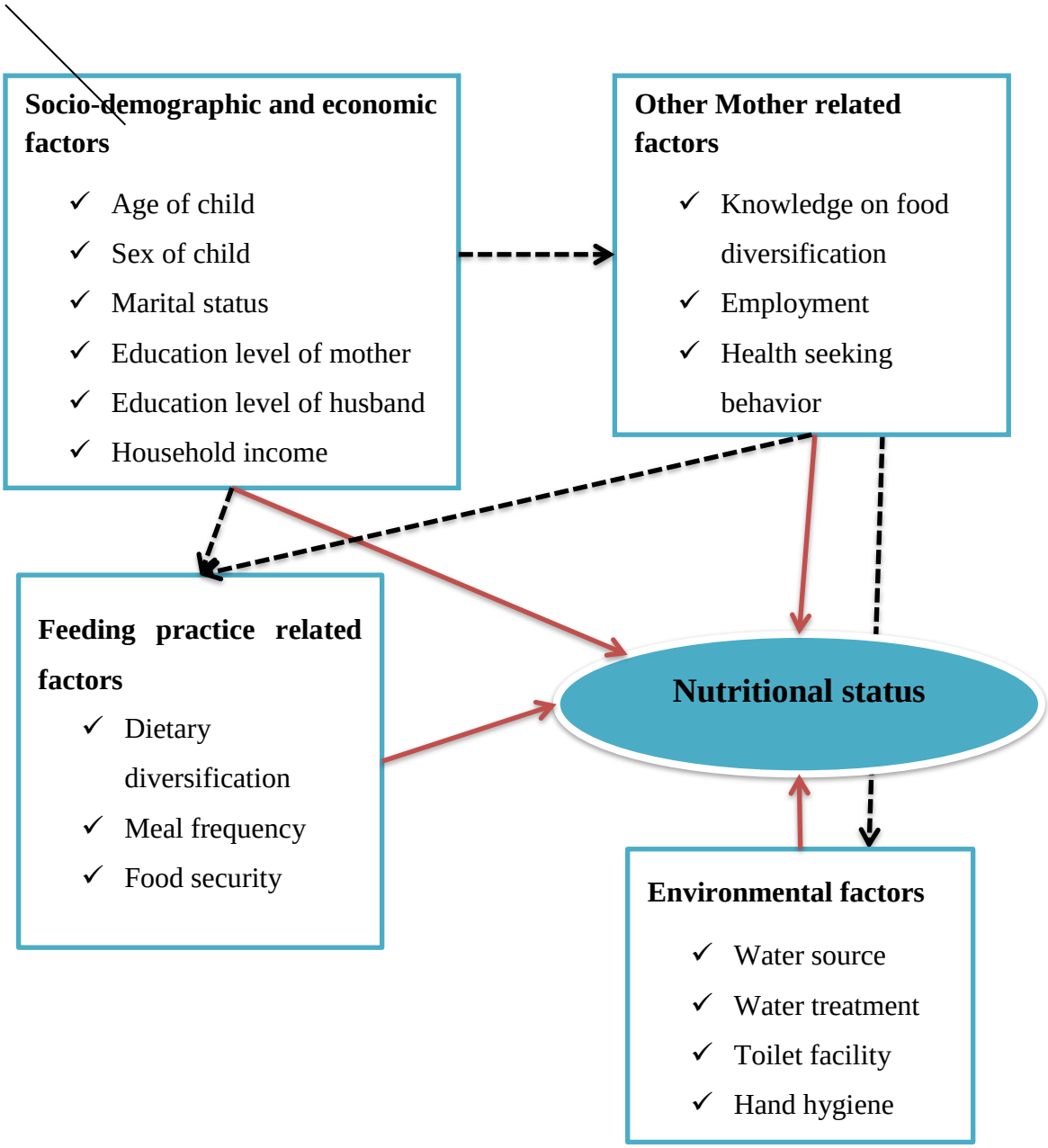

Figure 1: Conceptual framework to assess nutritional status and its determinant in Wondogenet District, sidama, Southern Ethiopia.

Source: Adapted after reviewing different litrature (22, 32, 45)

3. OBJECTIVES

3.1. General objective

- To assess prevalence of nutritional status and associated factors among children under two age in Wondogenet District, Sidama region, southern Ethiopia on 2024.

3.2. Specific objectives

- To determine the prevalence of stunting among children aged 6-23 months in Wondogenet District, Sidama Region, Southern Ethiopia in 2024.
- To determine the prevalence of wasting among children aged 6-23 months in Wondogenet District, Sidama Region, Southern Ethiopia in 2024.
- To determine the prevalence of underweight, among children aged 6-23 months in Wondogenet District, Sidama Region, Southern Ethiopia in 2024.
- To identify factors associated with nutritional status among children aged 6-23 months in Wondogenet District, Sidama Region, Southern Ethiopia in 2024.

4. METHOD AND MATERIAL

4.1. Study area

This study was carried out from August 1up to 30, 2024 in Wondogenet district which is found in the Sidama region, Southern Ethiopia, far from 292 km far from Adis Abeba, which is the capital city of Ethiopia. Wondogenet lacated at 17 Km from Hawassa City which is capital city of Sidama Region. There are 16 kebele in Wondogenet District (two urban and 14 rural) and 5 health center, one primary hospital and 396 all type health proffesionals found in Wondogenet. Wondogenet health facilities serves for a ctchment population of 312,633 (280,944 rural resident and 31,633 urban resident). Maternal and child health services including nutritional screening and acute malnutrition tratment is one of the component of the key health services that delivered in all of listed health facility found Wondogenet district. Estimated number of under two year children in the district was 16,204 (14,558 in rural cachment and 1646 in urban catchment area). The map of study area Wondogenet district administration presented below.

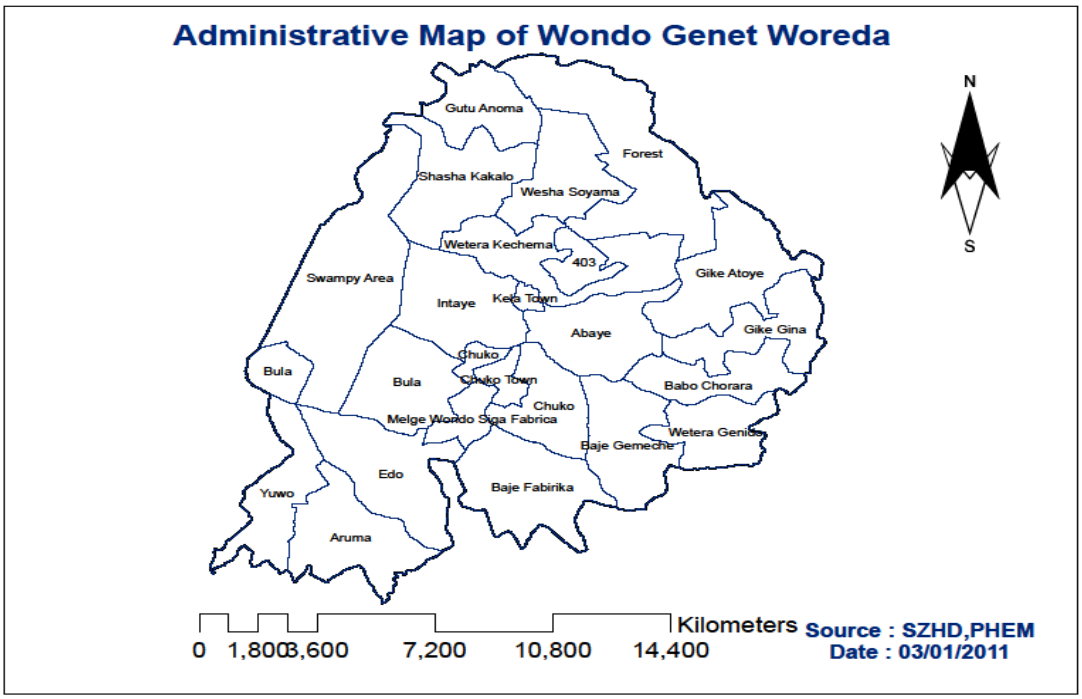

Figure 2 map of Wondogenet area udopted in 2024

Source: Wodogenet Woreda GIS

4.2. Study design and period

Community based cross sectional study was conducted to assess nutritional status

4.3. Population

4.3.1. Source population

All households in Wondogenet district with a pair of less than two year children and mother/care giver.

4.3.2 Study population

All under two year children and mother/care giver pair in the selected kebeles of Wondogenet district was the study population.

4.3.3. Study unit

Randomly selected household with a pair of mother and at least one alive child below the ages of two years

4.4. Eligibility criteria

4.4.1. Inclusion criteria

All children 6-23 month of age were included.

4.4.2. Exclusion criteria

A child who are known and registered by HEW for being on hospital admission or diagnosed of chronic diseases or conditions such as HIV, tuberculosis, sickle cell disease during data collection was excluded.

4.5. Sample size determination

Sample size for the first objective was calculated by using single population proportion formula, by considering the following assumptions: n = required sample sizes, Zα/2 = critical value for normal distribution at 95%CI which equals to 1.96 (z value at α = 0.05) P = prevalence of stunting (27.4%) in conducted in Benna Tsemay Woreda, South Omo Zone of Southern Ethiopia (24), w = margin of error 5%). The formula is:

$$n=\frac{Z^2\,P(1-P)}{w2}=\frac{(1.96)^2\,0.274(1-0.274)}{(0.05)^2}=\frac{3.8416\times0.198924}{0.0025}=305.67\approx306$$

Therefore, the total sample size required for the first objective of the study was **504** children by considering 10% of non-response rate and design effect (d) of 1.5.

Sample size for the second and third objective

Sample size for third study objective was calculated by double population proportion formula using computer software epi-info version-7 based on the assumption prevalence of one of nutritional indicator stunting among unexposed and exposed to dietary diversity [prevalence of stunting among children with good dietary diversity (23.28%) and prevalence of stunting among children with poor dietary diversity (44.62%) is taken from the study conducted in Jima], power (80%), CI (95%), OR (2.41) design effect (1.5) and none response rate (10%) (22) see (table 1).

Table 1 sample size for the second and third objective

Selected variable	unexposed to exposed ratio	Unexposed coverage	Power	CI	OR	Sample size (SS)	Final SS with design effect and NRR	Reference
Poor dietary diversity	1	47.8%	80%	95%	16.84	174	**287**	**(22)**
Meal frequency	1	29.89%	80%	95%	2.11	244	**403**	**(23)**
Family size	1	41%	80%	95%	3.35	94	**155**	(18)

After comparing sample size calculated for both objectives of the study the largest one was taken as the end final sample size to answer all of the study objective. Accordingly sample size 504 was the largest sample size than all sample size calculated for the second objective. Therefore, **504** was the required final sample size to answer both of the study objectives.

4.6. Sampling technique and procedure

Multistage sampling method was used to conduct this study. First Wondogenet district is purposively selected as study site since there was no study done before in the study area regarding, and nutritional status of children. Then, Wondogenet district required number of kebele was included from naturally stratified residence in rural and urban area. Accordingly from 2 kebele in urban residence both of them was included and from 14 kebel in rural residence 4 of them was included randomly. After that, total sample size (nf=504) of the study was proportionally allocated to selected 6 Kebele based on the number of eligible children in each Kebele. This was done by using the formula ni = (nf× N1)/N'. Where n'i (i= 1,2,3….10) = the required sample women from each kebele, nf = total sample size from all 6 Kebele, N1= each selected kebele total number of children under two and N'= total number of children under two in all 6 kebeless. Finally, during data collection period sampling frame list containing all eligible participant was listed as labeled with household code in housing order based on information taken from HEWs delivery registration book and household family folder. From prepared sampling frame list in each kebele individual participant was recruited systematically at every Kth interval starting from first randomly selected number between 1 up to K (where K= N'/nf) and interviewed at their home until the required total sample size reached (see figure 3).

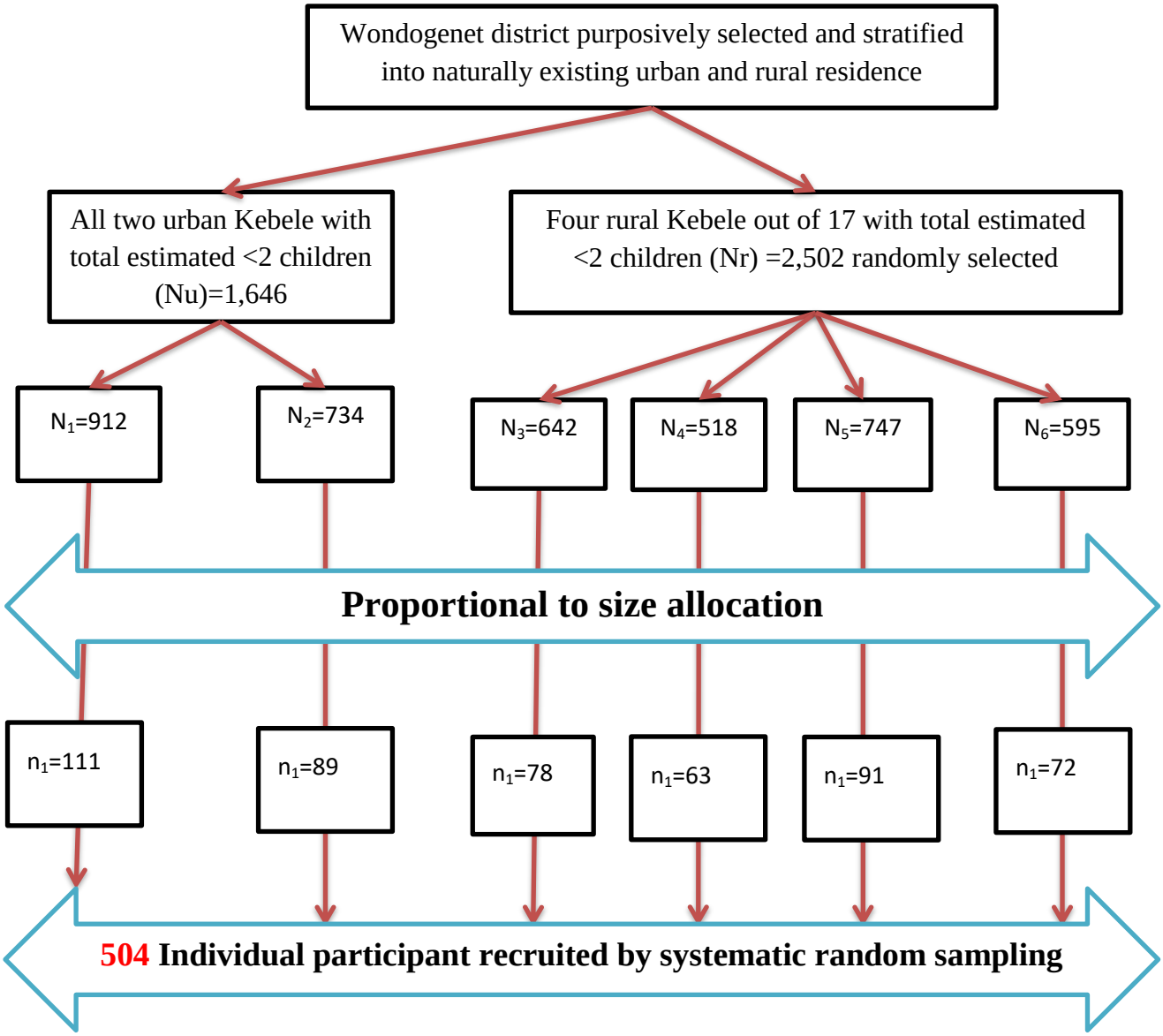

Figure 3: schematic presentation of sampling procedure for assessment of prevalence of nutritional status and associated factors among children under two age in Wondogenet District, Sidama region, southern Ethiopia on 2024.

4.7. Variable of the study

4.7.1. Dependent variables

Nutritional status (Stunting, Wasting, Underweight, Normal weight and Overweight)

4.7.2. Independent variables

Socio-demography and economic factors like age, sex, marital status, occupation mother, education mother, religion, income, food security and residency

Other mother related factors: health seeking behavior, knowledge and employment status;.

Feeding practice related factor: breastfeeding Practice: - breastfeeding, introduction of complimentary breast feeding, dietary diversification and food security.

Environmental factors: water supply, hygiene practice and sanitation

4.8. Operational Definitions

Stunting: - Low height-for-age or height-for-age will be compared to the WHO child growth standard reference population Z (standard deviations) score. If Z score was < - 2 it will refer as stunned. Other similar studies used the same classification (18, 35).

Wasting: - will be defined as low weight for height or weight for length will be compared to the WHO child growth standard reference population Z (standard deviations) score. If Z score was < - 2 it will refer as Wasted. Other similar studies used the same classification (18, 35).

Underweight: - low weight-for-age standard (WHZ) will be compared to the WHO child growth standard reference population Z (standard deviations) score. If Z score was < - 2 it will refer as underweight. Other similar studies used the same classification (18, 35).

Normal: If WHZ Z-score was lies between $-2 \leq Z \leq 2$ it will refer as underweight when compared to WHO reference Population. Other similar studies used the same classification (18, 35).

Overweight: If WHZ Z-score was lies ≥ 2 it will refer as underweight when compared to WHO reference Population. Other similar studies used the same classification (18, 35).

Dietary diversification practice: will be measured as minimum dietary diversity practice. It will be defined as proportion of children aged 6–23 months receives four or more out of seven food groups. The seven food groups used to create the score of this indicator are grains, roots, and tubers; legumes and nuts; dairy products (milk, yogurt, and cheese); flesh foods (meat, fish, poultry, and liver/organ meats); eggs; vitamin A rich fruits and vegetables; other fruits and vegetables (22, 51).

Food insecurity: In this study household food insecurity was measured by using the Household Food Insecurity Access Scale (22). The mothers were asked eight (8) questions related to the households experience of food insecurity in the past 3 months preceding the survey. Each item starts with an occurrence question that identifies if the condition has been experienced in the household. The responses were coded as 1 = if yes, and 2= if no. From these questions, two indicators of household food insecurity (HFI) were constructed: Household Food Insecurity Access Prevalence (HFIAP) score, which ranges from 0 to 8. For this study, only two levels of Household Food Insecurity Access Scale (food secure and insecure) were used since the sample size was small. Food secure if participant scored above the mean and above and food insecure if participant scored below mean.

4.9. Data Collection Tool and Technique

Data was collected by using structured interviewer-administered questionnaire which consists of socio-demography and economic characteristics, mother related characteristics, nutritional status, dietary diversification, environmental factors, medical and health seeking behavior. The questionnaire was developed by reviewing WHO recommended and other nationally adopted nutrition guideline and other similar study (22, 24, 51). It was first prepare by English version and then translated to local Sidamic language. For data collection 6 data collector of diploma nurse health professional and two supervisors of BSc nurse and environmental health professionals were employed. The questionnaire was fill by data collector based the response of participant and data was collected for up to 30 days including training and pretest.

Dietary diversification assessment: A 24-hour recall was used to collect dietary information on the different types of food groups the child had eaten for the previous 24-hour period preceding the interview. Mothers were asked to recall if their children ate foods and drinks from any of the food groups (grains, roots, and tubers; legumes and nuts; dairy products (milk, yogurt, and

cheese); flesh foods (meat, fish, poultry, and liver/organ meats); eggs; vitamin A rich fruits and vegetables; other fruits and vegetables) for the past 24-hours.

Anthropometry measurement

Recumbent length and weight measurements with data on age and sex were collected to assess the nutritional status of children aged 6-23 months. Age of the child was calculated both from the child's date of birth and date of interview, since the year of birth was frequently reported in correctly. Immunization card was also use as an official document to estimate age of the child. In events where birth dates are not recorded or known with certainty, the mother/caregiver was probed for the approximate date of birth based on a local events calendar like harvesting time. If the age of a neighbour's child is known, the mother was asked whether their child was born before or after the "reference" to estimate their child age. The age was calculated using precise day by subtracting the date of birth from the date of data collection. Height cut-offs (<85cm) was also be used to estimate child age (24).

The weight of the children age 6-23 was measured to the nearest 0.1kg on a battery powered digital scale (Seca 770, Hanover Germany) and length of the child aged 6-23 months was measured in a recumbent position to the nearest 0.1cm using a length board with a sliding head bar following standard anthropometric techniques. Children who were unable to stand on the scale weighed with the mother or caregiver, then the mother/caregiver will weighed alone, and the difference was used to obtain the net weight of the child. Each study subjects removed their shoes, jackets and wearing light cloth during weight and height measurements. The instrument was checked and adjusted to zero for each measurement. A form in the structured questionnaire was used to record information on anthropometric measurements. Duplicate measurements of weight and height taken at the same day from each study subject using calibrated equipment's and standardized techniques. To avoid variability among the data collectors, all the anthropometric measurements were taken by the researcher (principal investigator). Anthropometric data will be collected to calculate three indices of nutritional status: length-for-age, weight-for-length, and weight-for-age.

Outcome (child nutritional status) variable measurement

All the anthropometric variables and age was used in the evaluation of nutritional status. Then our outcome composite indicator dichotomous variable was created from the height-for-age Z-

score, weight for height Z-score and weight for age Z-score which equals (A-M)/σ where A is the individual value of child height or weight, M is the median of the reference population (WHO Growth Standard Population) for the same sex and age, and σ is the standard deviation (SD) in the reference population (23).

4.10. Data quality control

Data quality control orientation was given for data collectors and the questionnaire was pre-tested in other similar study setting which helps for clarification of some terms and assessment tools, aim of the study, concerning need for strict confidentiality of respondents information, time of data collection, timely collection and reorganization of the collected data from respective household and submission on due time. In addition to appropriate recruitment and orientation of data collectors the quality of the data was monitored frequently both in the field and during data entry. This was done in the field through close supervision of data collectors. A data quality table was utilized and each questionnaire was also check for completeness, missed values and unlikely responses and then manually cleaned up on such indications during data entry. Data was double entered using a programmed computer software package to ensure consistency.

4.11. Data Processing, analysis and interpretation

The coded data was entered on to computer using Epi-data software for its customizing and skip benefit, then after data cleaning, it was exported to SPSS version 26. The descriptive statistics was presented by using the Frequencies and proportions table, graph, and summary of statistics. Data was also further analyzed by multi-nominal logistic regression to interpret and generalize the finding. First bivariate analysis was employed to check the association between each individual independent variable and nutritional status. To make adjustment for cofounding effect of explanatory variable with each other that potentially mask actual relationship between independent variables and nutritional status multivariate logistic regression analysis was run to find out independent effect of each variable on outcome (nutrition status). Finally, P.V <0.05 was used to declare significance and presented by using crude odd ration (COR), adjusted odd ratio(AOR) with their 95% confidence interval(CI). To check model fitness Hosmer and lemshow and multicollinarity diagnosis will be used.

4.12. Ethical consideration

Ethical clearance was obtained from Pharma College, Institutional Research Ethics Review Committe (PC-IRERC) of Hawassa campus. Permission for conducting the study was obtained from the respective administration of Wondogenet District. Interviewees were informed of the objective and procedure of the study and verbal consent of agreement will be obtained. To keep confidentiality, the information collects from this research thesis was kept confidential and information collected by this study was stored in the file, without participant's name. In addition, it was not revealed to anyone except the investigator and data collector was kept confidential by using key and locked system like computer pass word whereby no one have an access to see it and at the end of the data analysis and thesis presentation, the check list will be locked within box until 5 years.

4.13. Result dissemination plan

The final report will be presented as partial fulfillment of the degree of Masters of Public Health to Pharma College Hawassa campus and copies of the finding will be sent to Wondogenet District Health Department and other stake holders. It will also disseminate through publication on peer reviewed scientific journal and will present on scientific conferences.

5. RESULT

5.1. Socio-demographic and economic factors

In this study out of 504 total questioners planned for data collection, 488 of them filled completely and make a response rate of 96.8%. Out of those participated child more than half 262 (53.7%) of them were male. The mean (± standard deviation (SD)) age of the participated children was 15.54 (±3.4) month and having their minimum age of 6 month and a maximum age of 23 month. The mean (± standard deviation (SD)) age of participated mother was 27.57 (±6.96) and their minimum and maximum age was 16 years and 46 years respectively. About 178 (36.5%) of participant mothers had no formal education and majority 413 (84.6%) of mothers were housewife in their occupation. Average family size of studied household was 5.73 with SD =1.58 . The study participant's monthly average family income was 1905.53 Ethiopian birr (ET birr) with minimum of 400 ET birr and maximum of 10,000 ET birr. Regarding electronic social media access, most 359 (73.6%) of respondent were had social media access (see table 2).

Table 2 Children and mothers socio-demographic and economic characteristics distribution for the study on nutritional status and risk factor among children aged 6–23 months in Wondogenet District, Sidama Region, Southern Ethiopia, 2024

Variable		**Frequency**	**Percentage (%)**
Age of child in month	6-11	69	14.1
	12-23	419	85.9
Sex of child	Male	262	53.7
	Female	226	43.6
Mather age	15-19	19	3.9
	20-24	213	43.6
	25-29	110	22.5
	≥ 30	146	29.9
Residence	Rural	283	58.0
	Urban	205	42.0
Marital status of	Single	38	7.8

mother	Married	450	92.2
Mothers religion	Protestant	299	61.3
	Orthodox	113	23.2
	Muslim	60	12.3
	Catholic	16	3.3
Mothers ethnicity	Sidama	364	74.6
	Amhara	30	6.1
	Oromo	73	15.0
	Wolayita	21	4.3
Mother education level	No formal education	178	36.5
	Primary (1-8)	154	31.6
	Secondary and above	156	32.0
Mother occupational status	Housewife	413	84.6
	Merchant	33	6.8
	Daily laborer	30	6.1
	Government employ	12	2.5
Spouse education level	No formal education	176	36.1
	Primary (1-8)	134	27.5
	Secondary (9-12)	123	25.2
	College and above	55	11.3
Spouse occupational status	Farmer	313	64.1
	Merchant	110	22.5
	Daily laborer	38	7.8
	Government employ	27	5.5
Number of under-five children	One	214	43.9
	Two	243	49.8
	Three	31	6.4
Family size	≤ 4	269	55.1
	> 4	219	44.9

Family monthly income	≤ 1000	180	36.9
	1001-2000	174	35.7
	2001-3000	92	18.9
	>3000	42	8.6
Electronic media access	Yes	359	73.6
	No	129	26.4
Child care giver support	Yes	295	60.5
	No	193	39.5

5.2. Feeding practice related factor

5.2.1. Breast feeding and complimentary feeding practice

Out of total participated 6-23 month aged child all them were ever been breastfed (100%) and almost all 480 (98.4%) of them were still breastfeeding as at the time of the study. Nearly half of mothers 236 (48.5%) reported that they breastfed their children five times a day. All 488 (100%) of mothers reported that they practiced complimentary feeding to their children. Out of those practiced complimentary feeding, more than half 297 (60.7%) of them were introduced to complementary foods at six month and above. From total study participant about 131 (26.8%) of them were provide infant formula feeding for their child and more than half 125 (25.6%) of them were giving snack between main meal (Table 3).

Table 3 Child feeding practice distribution for the study conducted in Wondogenet District, Sidama Region, Southern Ethiopia, 2024.

Variable		Frequency	Percentage (%)
Still breastfeeding	Yes	480	98.4
	No	8	1.6
Breastfeeding frequency	≤ 4 times	75	15.4
	5 times	236	48.4
	> 5 times	177	36.3
Type of breast feeding	Breastfeeding	413	84.6
	Both breastfeeding and bottle feeding	75	15.4
Initiation of CF	< 6 month	191	39.1
	≥ 6month	297	60.7
Feeding frequency	≤ Three times	287	58.8
	4 times	174	35.7
	More than 4 times	27	5.7
Snacking	Yes	125	25.6
	No	363	74.4
Infant formula	Yes	131	26.8
	No	357	73.2

5.2.2. Dietary diversity

In this study the most commonly consumed types of foods were grains, roots and tubers (90.8%), legumes and nuts (87.3%) and vitamin A containing fruits and vegetables (60.7%). Lesser proportions of mothers were reported as their children have consumed food items of the remaining food groups including meat or flesh (12.5%), eggs (15.6%) and dairy products (18.2%) (Fig. 3).

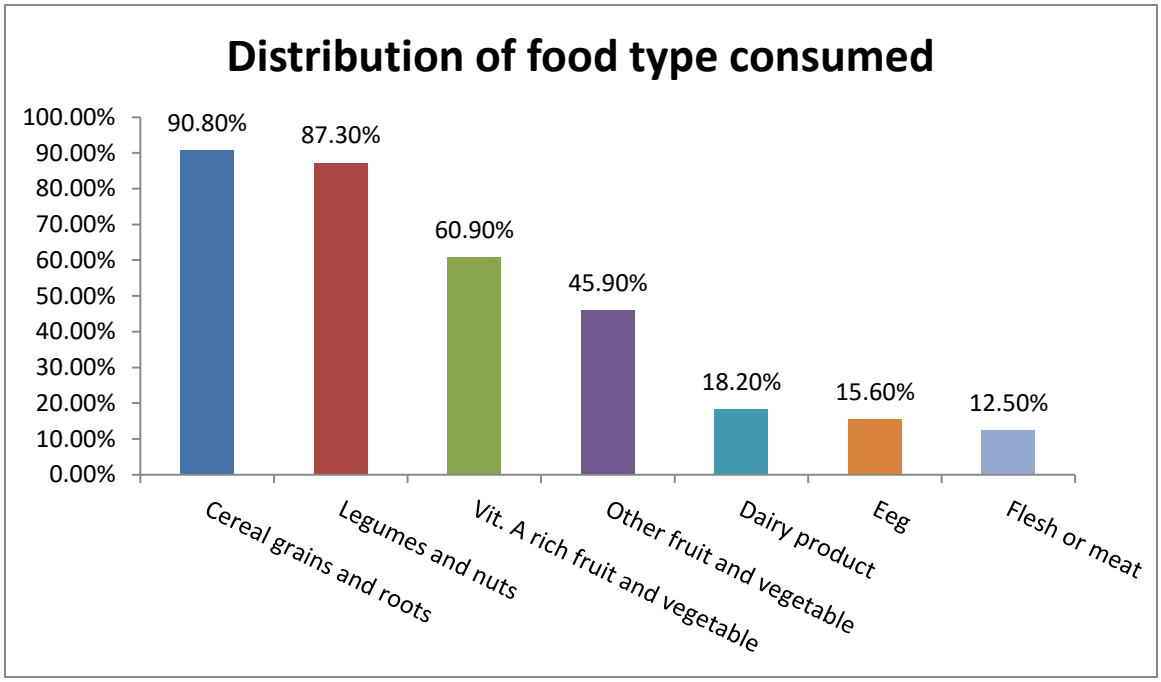

Figure 3: shows the proportion of children in terms of food groups consumed in the last 24 hour before the survey in the study conducted at Wondogenet District, Sidama Region, Southern Ethiopia, 2024.

In general, in this analysis it was found that the more than half 304 (62.3%) of children did not meet the recommended MDD of more than 4 food groups during the last 24 hour. Only 184 (37.7%) of them had received a diversified diet (Fig. 4).

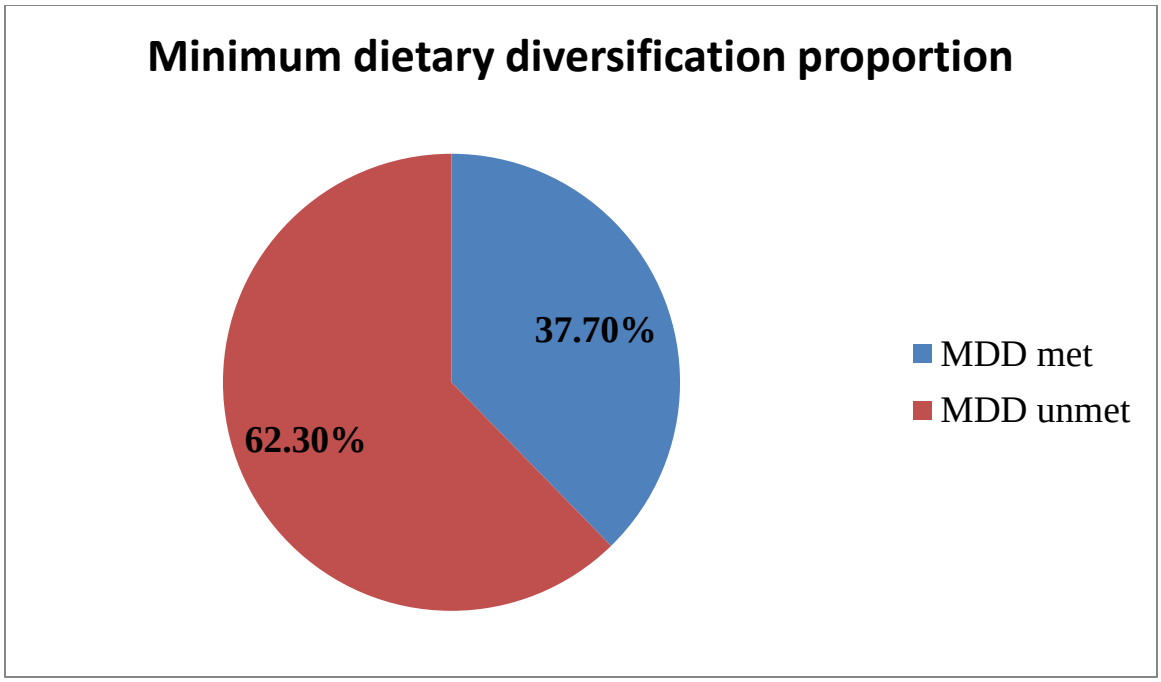

Figure 4: Proportion of children reaching the recommended minimum dietary diversity in the study conducted at Wondogenet District, Sidama Region, Southern Ethiopia, 2024

5.2.3. Food insecurity

In this study household food insecurity was measured by using the Household Food Insecurity Access Scale which consist nine (9) questions related to the households experience of food insecurity in the past 3 months preceding the survey. Participant score on the provided questions were classified as food secure if participant scored mean and above and food insecure if participant scored below mean. Accordingly, it was found that majority 352 (72.1%) of participant women were classified under household food insecurity and only 136 (27.9%) of them were categorized under household having secured food access (fig. 5).

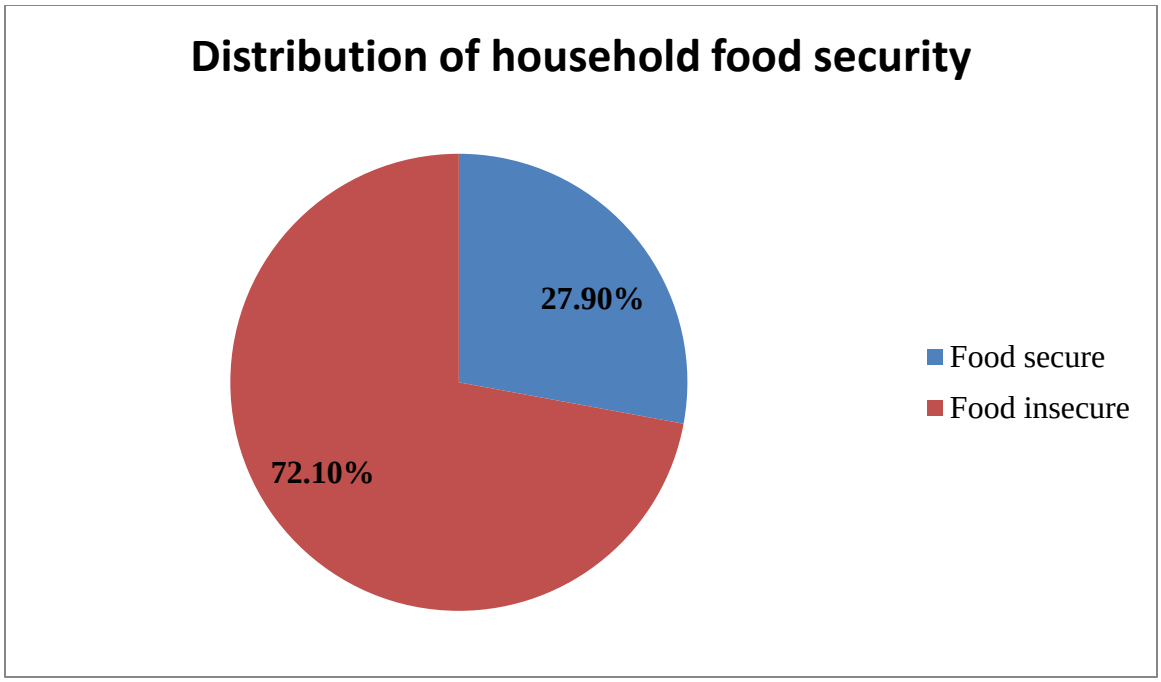

Figure 5: Distribution of household food insecurity level in the study conducted at Wondogenet District, Sidama Region, Southern Ethiopia, 2024

5.3. Other mother related factors

5.3.1. Mother's knowledge on dietary diversification

In this study almost all 474 (97.1%)of participant mothers were reported as they were heard about dietary diversification. In general, nearly more than half 255 (52.3%) of participant mothers were had good knowledge toward dietary diversification and about 233 (47.7%) of participant mothers were had poor knowledge toward dietary diversification (Fig. 6).

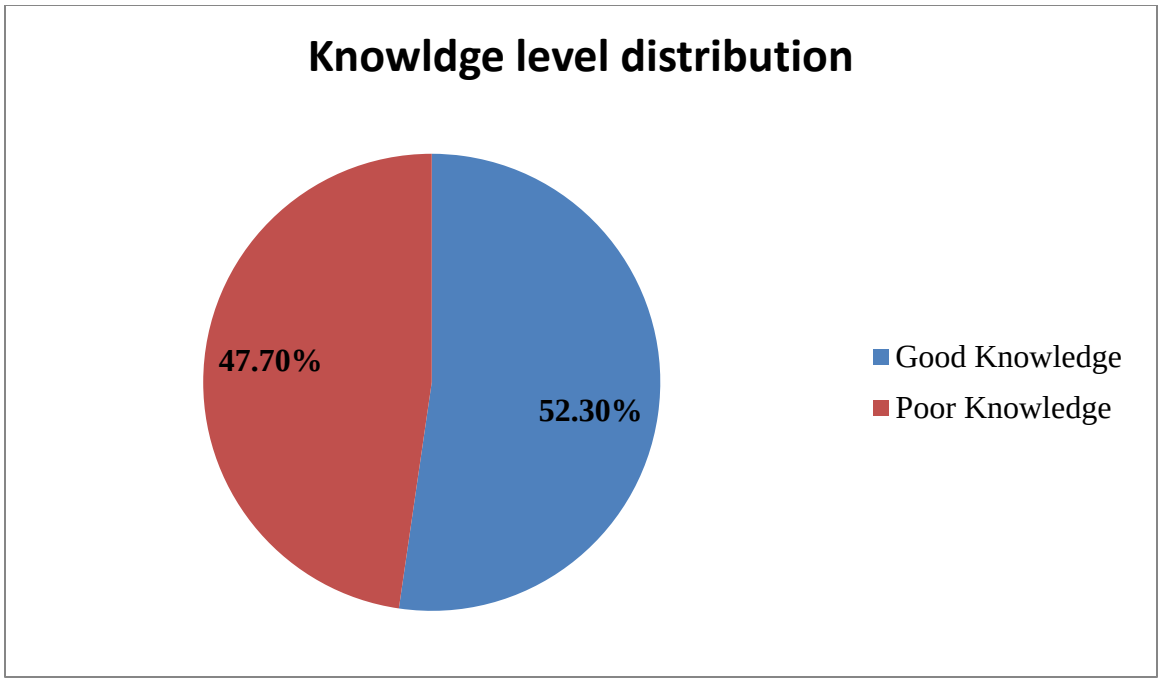

Figure 6: Mothers knowledge level toward dietary diversification and child feeding practice in the study conducted at Wondogenet District, Sidama Region, Southern Ethiopia, 2024

5.3.1. Health seeking behavior

Regarding preventive health seeking behavior, from total participant 478 (98.0%), 469 (96.1%) and 431 (88.3%) of children were immunized polio, DPT, and measles. Around three fourth 371 (76.0%) of the children were attend post-natal visit and about 380 (77.9%) of participant treat their child within health facility. Most 458 (93.9%) of participant get health facility access within less than 4KM distance (Table 4).

Table 4 Health seeking characteristics distribution of mothers in the study of nutritional stutus and associated factors in Wondogenet District, Sidama Region, Southern Ethiopia, 2024

Variable		Frequency	Percentage (%)
Does the child received polio-immunization	Yes	478	98.0
	No	10	2.0
Does the child received DPT-immunization	Yes	469	96.1
	No	19	3.9
Does the child received measles-	Yes	431	88.3

immunization (n=432)	No	57	11.7
Does the child attended post-natal care	Yes	371	76.0
	No	117	24.0
Where do you treat your child	Health facility	380	77.9
	Traditionally	108	22.1
Distance of health facility from your home	< 2KM	120	24.6
	2-4KM	338	69.3
	> 4KM	30	6.1

5.4. Environmental factors

Among the respondents, all (100%) of the households have toilet facility. Regarding the type of toilet facility most 385 (78.9%) of participant reported as they had pit latrine without slab. Sources of drinking water for the majority households were from piped water source 203 (41.6%) and protected well/spring 134 (27.5%). Most 416 (85.2%) of the respondents did not treat water before drinking. This study has revealed that majority 476 (96.9%) of the mothers practiced washing their hands before feeding their child (Table 5).

Table 5 Hygiene practice related variable distribution in the study conducted on child nutrition status and associated risk factor in Wondogenet District, Sidama Region, Southern Ethiopia, 2024

Variable		**Frequency**	**Percentage (%)**
Does child/caregiver wash hand before feeding	Yes	473	96.9
	No	15	3.1
Type of toilet facility	Pit latrine with slab	103	21.1
	Pit latrine without slab	385	78.9
Source of drinking water	Tap water in yard	203	41.6
	Public stand pipe	94	19.3
	Protected spring/well	134	27.5
	Unprotected spring/well	57	11.7

Water treatment practice before drinking	Yes	72	14.8
	No	416	85.2

5.5. Nutritional status of children

In this study about 46.7% (95%CI of 42.3-51.2) of study participant 6-23 month aged children affected by at least one type of malnutrition. Regarding the share of each type malnutrition/under nutrition, prevalence of stunting was found to be 154 (31.6% with 95%CI of 27.4-35.7) and around seventeen (17.2% with 95%CI of 13.8-20.6) of children also were underweight while 68 (13.9% with 95%CI of 10.8-17.0) were wasted (Fig. 7).

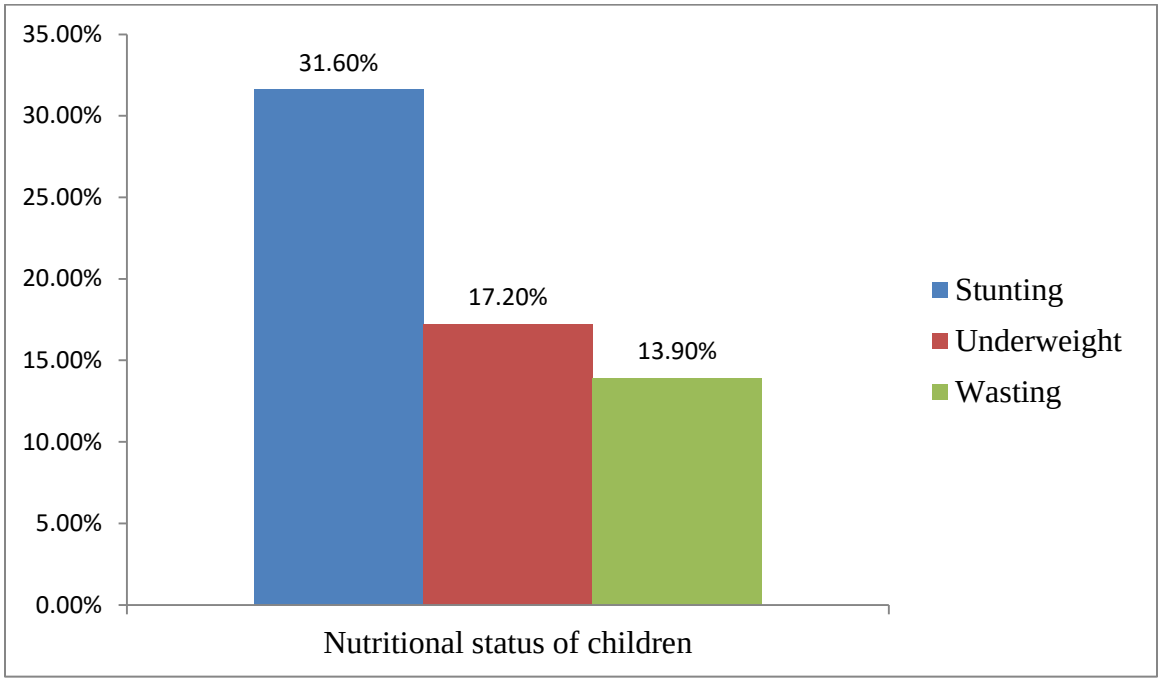

Figure 7: Distribution of nutritional status of children in the study conducted on child nutrition status and associated risk factor in Wondogenet District, Sidama Region, Southern Ethiopia, 2024

5.6. Factors associated with nutritional status of 6-23 age children

5.6.1. Factors associated with stunting among 6-23 age children

Here type of malnutrition assessed and analyzed for its association with independent variable was chronic malnutrition or stunting. First bivariate Logistic regression was performed to

identify the association of each independent variable with stunting among participant children. Under this bivariate regression analysis father educational level of no formal education [COD=4.26, 95%CI (1.90-9.55)] and primary level of education [COD=2.78, 95%CI (1.21-6.38)]; mother educational level of no formal education [COR=2.76, 95%CI (1.71-4.45) and children feeding less than four food group or who unmet MDD [COR=1.80, 95%CI (1.19-2.72)] were significant positive predictors of stunting among 6-23 month aged children. On the other hand, giving snack for child between main meal [COR=0.54, 95%CI (0.34-0.87)] and using infant feeding formula [COR=0.53, 95%CI (0.33-0.84)] were significant negatively associated variables with stunting among 6-23 month aged children. After bivariate analysis variables that had a p-value of 0.25 and less were added to multivariate logistic regression model for further analysis of association significance.

Multivariate logistic regression analysis revealed that father level of education, mother's level of education, MDD were significant determinant of chronic malnutrition (stunting) at P-value < 0.05. Children from whose fathers educational level of no formal education and primary level of education was 3.76 (AOR=3.76; (95%CI: 1.62-8.70) and 2.79 (AOR=2.79; (95%CI: 1.10- 7.09) times more likely stunted respectively when compared to children of college and above father educational level. Children from mother who had no formal education was 2.75 (AOR=2.75, 95%CI: 1.66-4.56) more likely to be stunted when compared to children from mother educated secondary and above level of education. Children who consumed less than four food group in the last 24 hour or unmet MDD were about 2.48 (AOR=2.48, 95%CI: 1.04-5.94) times more likely to be affected by stunting compared to those children who consumed four or more food group in the last 24 hour preceding the study period (Table 6**)**.

Table 6 Binary logistic regression analysis result summary to find factors associated with stunting among children age 6-23 months in Wondogenet District, Sidama Region, Southern Ethiopia, 2024

Predictors	**Stunting status**		**COR(95%CI)**	**AOR(95%CI)**	**p-value**
	Stunted (N=154)	Not stunted (N=266)			
Gender					

Male	90	172	1.32(0.90-1.95)	1.24(0.82-1.89)	0.312
Female	64	162	1	1	
Marital status					
Married	147	303	2.15(0.92-4.99)	1.92(0.78-4.69)	0.154
Single	7	31	1	1	
Mother level of education					
No formal education	79	99	2.76(1.71-4.45)**	2.75(1.66-4.56)**	<0.001
Primary	40	114	1.21(0.72-2.04)	1.11(0.64-1.92)	0.720
Secondary and above	35	121	1	1	
Husband level of education					
No formal education	74	102	4.26(1.90-9.55)**	3.76(1.62-8.70)*	0.002
Primary	43	91	2.78(1.21-6.38)*	2.48(1.04-5.94)*	0.041
Secondary	29	94	1.81(0.77-4.27)	2.02(0.82-4.95)	0.125
College and above	8	47	1	1	
Treat water					
Yes	18	54	0.69(0.39-1.21)	0.78(0.42-1.47)	0.441
No	136	280	1	1	
Snacking					
Yes	28	97	0.54(0.34-0.87)*	0.63(0.38-1.04)	0.072
No	126	237	1	1	
Giving Infant formula					
Yes	29	102	0.53(0.33-0.84)*	0.63(0.38-1.03)	0.068
No	125	232	1	1	
Knowledge level					
Good knowledge	73	182	0.75(0.51-1.10)	0.83(0.55-1.25)	0.376
Poor knowledge	81	152	1	1	
Dietary diversification					
MDD unmet	110	194	1.80(1.19-2.72)*	1.71(1.10-2.67)	0.018

MDD met	44	140	1	1

** indicate values significant at p<0.001, * indicates values significant at p<0.05, MDD=Minimum dietary diversity, Hosmer and Lemeshow test p-value=0.402

5.6.2. Factors associated with underweight

Here type of malnutrition assessed and analyzed for its association with independent variable was acute malnutrition type of underweight. First bivariate Logistic regression was performed to identify the association of each independent variable with underweight among participant children. Under this bivariate regression analysis variables including being male child [COD=1.81, 95%CI (1.11-2.95)]; father educational level of no formal education [COD=4.06, 95%CI (1.54-10.82)]; mother educational level of no formal education [COR=3.42, 95%CI (1.85-6.30)] and children feeding less than four food group or who unmet MDD [COR=2.56, 95%CI (1.46-4.47)] were significant positive predictors of stunting among 6-23 month aged children. On the other hand, giving snack for child between main meal [COR=0.43, 95%CI (0.22-0.82)] and being from household with secured food access [COR=0.38, 95%CI (0.20-0.72)] were significant negatively associated variables with underweight among 6-23 month aged children. After bivariate analysis variables that had a p-value of 0.25 and less were added to multivariate logistic regression model for further analysis of association significance.

Multivariate logistic regression analyses revealed that variables including mother's education level, father level of education, giving snack for children between main meals, food security and dietary diversification were significantly associated with underweight at P-value < 0.05. Children from mothers who had no formal education was 3.18 [AOR=3.18; 95%CI: (1.64- 6.16)] times more likely to be underweight when compared to children whose mother educated secondary and above level of education. Children from father who had no formal education was also (AOR=3.72; 95%CI: (1.32- 10.50)) times more likely to be underweight when compared to children whose father educated college and above level of education. The odd of being underweight was 2.95 [AOR=2.95; 95%CI (1.60-5.44)] times higher among children who consumed less than four food group or who not met recommended MDD compared to children who not met recommended MDD or consuming four or more food group. On the other hand, feeding snack between main meals decrease the odd of being underweight by 57% (AOR=0.43; 95%CI: (0.22- 0.87)) compared to those who were not feed snack. In addition, children from

household with secure food access was 53% (AOR=0.47; 95%CI: (0.23-0.96)) less likely being underweight when compared to children from household with no secure food access for detail see (Table 7).

Table 7 summery of logistic regression analysis for factors associated with Underweight in the study conducted among children age 6-23 months in Wondogenet District, Sidama Region, Southern Ethiopia, 2024

Predictors	Underweight		COR, 95%CI	AOR, 95%CI	p-value
	Yes n=84	No n=404			
Sex of child					
Male	55	205	1.81(1.11-2.95)*	1.73(1.00-2.98)	0.050
Female	29	197	1	1	
Residence					
Rural	54	229	1.38(0.84-2.24)	1.49(0.86-2.57)	0.156
Urban	30	175			
Mother education					
No formal education	50	128	3.42(1.85-6.30)**	3.18(1.64- 6.16)*	0.001
Primary	18	136	1.16(0.57-2.36)	1.04(0.59-1.81)	0.657
Secondary and above	16	140	1	1	
Father education					
No formal education	51	125	4.08(1.54-10.82)*	3.72(1.32- 10.50)*	0.013
Primary	16	118	1.37(0.47-3.90)	1.28(0.42-3.94)	0.664
Secondary	12	111	1.08(0.36-3.23)	1.36(0.43-4.35)	0.601
College and above	5	50	1	1	

Snacking					
Yes	12	113	0.43(0.22-0.82)*	0.43(0.22- 0.87)*	0.019
No	72	291	1	1	
Knowledge level					
Good knowledge	38	217	0.71(0.44-1.14)	0.87(0.51-1.47)	0.599
Poor knowledge	46	187	1	1	
Food security					
Food secure	12	124	0.38 (0.20- 0.72)*	0.47(0.23-0.96)*	0.038
Food insecure	72	280	1	1	
Dietary diversification					
MDD unmet	18	166	2.56(1.46-4.47)*	2.95(1.60-5.44)*	0.001
MDD met	66	238	1	1	

** indicate values significant at p<0.001, * indicates values significant at p<0.05, Hosmer and lemeshow = 0. 335

5.6.3. Factors associated with wasting

Here another type of malnutrition assessed and analyzed for its association with independent variable was acute malnutrition or wasting. Multivariate logistic regression analysis revealed giving snack for children between main meals; and using infant formula for child feeding were significantly associated with wasting at P-value < 0.05. Children who feed snack between main meals were about 72% less likely to be affected by stunting compared to those who were feed snack (AOR=0.28; (95%CI: 0.12-0.69). Children who feed using infant formula was 55% less likely to be affected by wasting compared to those children who not feed using infant formula (AOR=0.45; (95%CI: 0.21-0.95) for detail see table 8 below.

Table 8 summery of logistic regression analysis for factors associated with Wasting in the study conducted among children age 6-23 months in Wondogenet District, Sidama Region, Southern Ethiopia, 2024

Predictors	**Wasting**		**COR, 95%CI**	**AOR, 95%CI**	**P-value**
	Yes n=29	No n=244			
Residence					
Rural	46	237	1.61(0.94-2.78)	1.73(0.98-3.05)	0.058
Urban	22	183	1	1	
Mather education					
No formal education	26	152	1.40(0.73-2.69)	1.28(0.65-2.52)	0.483
Primary	25	129	1.58(0.82-3.07)	1.41(0.71-2.81)	0.329
Secondary and above	17	139	1	1	
Snacking					
Yes	6	119	0.24(0.10-0.58)	0.28 (0.12-0.69)*	0.005
No	62	301	1	1	
Infant formula					
Yes	9	122	0.37(0.18-0.78)	0.45(0.21-0.95)*	0.037
No	59	298	1		
Knowledge level					
Good knowledge	26	229	0.52(0.31-0.87)*	0.62(0.36-1.07)	0.087
Poor Knowledge	42	191	1	1	
Food security					

Food secure	12	124	0.51(0.26-0.99)*	0.52(0.26-1.03)	0.061
Food insecure	56	296	1	1	
Dietary Diversification					
MDD unmet	49	255	1.67(0.95-2.94)	1.44 (0.80-2.60)	0.226
MDD met	19	165	1	1	

** indicate values significant at p<0.001, * indicates values significant at p<0.05,

Hosmer and lemeshow = 0.758

6. DISCUSSION

This study was aimed to assess nutritional status prevalence and associated factors among children age 6-23 month. Accordingly, the study revealed that prevalence of stunting, underweight and wasting was 31.6%, 17.2% and 13.9% respectively. In this study level of father education, mother education and dietary diversification were variables that significantly predict chronic malnutrition (stunting). Regarding acute malnutrition determinant factors, variables including mother's education level, father level of education, giving snack for children between main meals, food security and dietary diversification were significantly associated with underweight. Whereas, giving snack for children between main meals; and using infant formula for child feeding were negatively associated with wasting.

This study finding result on stunting (31.6%), underweight (17.2%) and wasting 13.9%) was relatively consistent with study finding conducted in Benna Tsemay Woreda, South Omo Zone, Southern Ethiopia which revealed prevalence of stunting, wasting and underweight was 27.40%, 9.90% and 15.3%, respectively (24). The study also consistent with finding from Jima Geneti District, Oromia, which found that the prevalence of underweight, stunting and wasting among children was 19.6%, 27% and 11.8%, respectively (22).

In contrast, this study finding result was relatively higher than study conducted in Burkina Faso which revealed that 20.6% were stunted, 10.0% wasted and 13.9% underweight (52). On the other hand, in another study conducted at Ghana even if relatively consistent result on underweight (11.0%) and wasting (13.1%), the finding on the level of stunting (38.6%) was relatively higher than the current study finding (53). This variation in the result could be due to the fact that, these communities are differing in their privilege status, socio economic characteristics, health service access and literacy. This might be also be due to the difference in feeding frequency, food security at household level, lack of knowledge of the caregivers to provide balanced diet to their children and time variation. In addition, variability in the result also might be attributed to differences in agro-ecology, feeding habits, lifestyles and demography between the study areas.

In this study it was found that children from whose mother educational level of no formal education was 2.75 and 3.18 times more likely stunted and underweight respectively when compared to children of secondary and above mother educational level. In addition to this, 6-23

age child from father who had no formal education was also more likely to be stunted and underweight compared to children whose father educated college and above level. Similar to this finding, study on influence of socio-economic factors on nutritional status of children in Nigeria, Children of mothers who were not educated beyond secondary school level had one and a half to two times the prevalence rate of stunting (43). Possible explanation for this can be that well educated mother may now about their child feeding practice and care which ultimately prevent their children from malnutrition problem.

In this study children who not consume MDD in the last 24 hour was more likely to be stunted and underweight when compared to children consume at least four food group in the last 24 hour. This result was supported by study conducted in Tanzania and Burkina Faso which indicated that he likelihood of being stunted and underweight was found to decrease as the number of food groups consumed increased (20, 52). This could be attributed to dietary diversity is a good predictor of dietary quality and micronutrient density in children and lack of a diversified diet is often associated with poor nutritional and health outcomes in children (20, 32). The finding of the current study also showed that children who lived in household with secured food access were 53% less likely to be underweight than those who lived in food insecure household. This finding was supported by another study conducted in Jima Geneti District (22). This could be due to the fact that food secure households are able to get food access and provide it for their family.

Children who snacking between main meal were 57% less likely to be underweight when compared to those who not given snack between main meal. In addition to this, children who feed snack between main meals were had 72% decreased odd of wasting when compared to those who snacked between main meals. This finding was supported by other study finding in Nigeria which state that frequency of snacking significantly associated children nutrition status (40). The reason was clear since that appropriate feeding practice including giving necessary snack between meals can improve child nutrition and development and at the same time prevent malnutrition. The result of this current study also found that children who feed by using infant formula was less likely being wasted compared to those children who did not feed using infant formula. This finding was supported by the study finding from Jima Geneti District which indicated that feeding safely prepared foods that rich with appropriate nutrient and

micronutrients are vital for growth and mental development and further it used in preventing malnutrition problem (22).

Strength and limitation

Strength

The research findings add to the body of literature that addresses the issue of nutritional status and associated factors in Ethiopia. This study was conducted on large enough sample size to answer the study objective and it was incorporate most of important determinant variables of child nutritional status.

Limitation

Estimates of the child's nutritional intake were obtained by 24-h dietary recall. This method may not accurately reflect consumption on a regular basis; it is also subject to recall bias. Moreover, there were no specific measurements of chronic family food insecurity, infection and disease and other possible contributing factors to dietary diversity and malnutrition.

6. CONCLUSION

Prevalence of malnutrition (stunting, underweight and wasting) was relatively higher among children aged 6-23 months and it remains as major public health problem in Wondogenet Woreda. Father education level of no formal education, mother educational level of no formal and primary education, MDD being unmet were an important predictor of stunting. Therefore, this could be an important implication for proper preventive measure implementation to manage malnutrition problem in the area. Variables including mother's education level, father level of education, giving snack for children between main meals, food security and dietary diversification were significantly associated with underweight. Whereas, giving snack for children between main meals; and using infant formula for child feeding were negatively associated with wasting.

7. RECOMMENDATION

Based on the findings of the study, the following recommendations are made.

- Sidama regional health biro, Wondogenet Woreda health office and other relevant stakeholder should have to made strong commitment ensure adequate foods and education on what to feed are available.
- The government and all relevant stakeholders must be concerned about empowering the household economy and offering alternative access to diverse foods.
- Detailed health promotion education on the importance of snacking and using infant formula for better nutritional outcomes should be advocated with involvement of traditional stakeholder.
- Health professionals and health extension worker in the study community should have to promote lower educated mothers and father to decrease stunting and underweight.

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8. ANNEX'S

8.1. Information Sheet

My name is _____. I am working as a data collector for this study being conducted in this community by Treza Oche who is studying for her master's degree at Pharma College Hawassa Campus, Weekend Postgraduates Program. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

The study title: Assessment of Nutritional status and associated factor among under two years children in Wondogenet District, Sidama Region, Ethiopia, 2024

Purpose of the study: The finding of this study can be of a paramount importance for the district Health Office to plan intervention on the improvement of child health and ultimately general child morbidity and mortality caused by malnutrition. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master‟s Program in General Public Health program for the principal investigator.

Procedure and duration: I will be interviewing you using questionnaire to provide me with pertinent data that is helpful for the study. There are questions to answer where I will fill the questionnaire by interviewing you. The interview will take 30 minutes, so I kindly request you to spare me this time for the interview.

Risk and Benefits: There is no risk of participating in this study, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

Confidentiality: The information you will provide us will be kept confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons or housing. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

Rights: Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at

any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

Contact address: If there are any questions or enquires any time about the study or the procedure, please contact Ms. Tereza Oche at Mobile phone: +2519 26459357.

8.2. Consent form

I have been read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures the risk 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 may have been unclear. I was 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 participate this study with my initials signature.

Name and signature of Participant: _____

Name and Signature of Data Collector: _____

8.3. Questionnaire in English version

Name of Kebele: _____ Questionnaire Code: _____

Name of data collector: _____ Signature_____ Date: _____

Name of supervisor: _____ Signature_____ Date_____

Part 1- socio-demographic and economic characteristics of respondents

Instruction: Circle the appropriate answer provided and where applicable writes the required responses in the spaces provided.

SECTION I: SOCIO-DEMOGRAPHIC CHARACTERISTICS

No	Question	Response	Remark
101	Age of child?	--------- in month	
102	What is the gender of the Child?	1. male 2. female	
103	Mother's age	…….. years old	
104	Where is your residence?	1. Urban 2. Rural	
105	What is your marital status	1.Single 2.Married 3.Divorced 4. Widowed	
106	What is your religion?	1.Protestant	

		2.Orthodox 3.Muslim 4.other(specify)_____	
107	Mother's ethnicity	1. Sidama 2.Wolaita 3. Amhara 4. Guraghe 6.other(specify)_____	
108	Educational status of mother	1.illitrate 2.read and write only 3.primary 4.secondary 5. above secondary	
109	Occupational status of mother?	1.Gov't employee 2. Merchant 3. House wife 4. Non-government employee 5. Daily laborer 6.Other(specify)_____	
110	What is your spouse's education level?	1.illitrate 2.read and write only 3.primary school 4.secondary school	

		5. above secondary	
111	What is your spouse's occupation?	1.Gov't employee 2. Merchant 3. Non-government employee 4. Daily laborer 5.Other(specify)_____	
112	What is your average monthly income?	1)_____Birr 2) I don't know	
113	How many 6-59 month children do you have currently?	_____ no. of children	
114	How many total family sizes in your HHs?	…….in number	
115	Do you have any support in care giving when at work?	(1) Yes (2) No	If no, skip to Q no_17
116	If yes, who?	(1) Older siblings (2) hired caregiver (3) grandmother	
119	Do you have electronics media in your house?	yes no Radio……..1 2 TV……1 2 Mobile phone……..1 2	

SECTION III: other mother related factor

1. Environmental factor

No	Question	Response	Remark
201	Does child wash hands before and after eating?	(1) Yes (2) No	
202	Does caregiver wash hands before and after eating?	(1) Yes (2) No	
203	Where do you fetch drinking water for your household?	(1) Private/Public stand pipe (2) Borehole (3) Unprotected well (4) River/stream	
204	Do you treat water before drinking?	(1) Yes (2) No	If no skip to Q no_ 25
205	If yes question no_ 23 how do you treat water before drinking?		

2. Health seeking behavior

No	Question	Response	Remark
301	Has the child received polio immunization?	(1) Yes (2) No	
302	Has the child received DPT immunization?	(1) Yes (2) No	
303	Has the child received measles immunization?	(1) Yes (2) No	

304	Has the child attended post natal the previous month?	(1) Yes (2) No	
305	Where do you treated when your child is sick?	(1) Traditional (2) Hospital/Clinic (3) Pharmacist	
306	What is the distance from your home to treatment center?	(1) Less than 2km (2) 2km- 4km (3) Above 4km	

3. Knowledge assessment question

307	Heard about importance of feeding diversified foods to a 6–23 month child	(1). Yes (2). No	
308	Complementary feeding should start at 6 months of child age	(1). Yes (2). No	
309	A6–23 month child should eat four or more food groups	(1). Yes (2). No	
310	Giving meat is advisable for 6–23 month child	(1). Yes (2). No	
311	One cause of childhood malnutrition is not having diversified foods	(1). Yes (2). No	
312	Didn’t feel hungry doesn’t mean that the nutritional need of a child is fulfilled	(1). Yes	

		(2). No	
314	One cause of childhood malnutrition is not starting complementary feeding at 6 months of child age	(1). Yes (2). No	
315	Feeding only animal products is not enough/adequate for 6–23 month child	(1). Yes (2). No	
316	A6–23 month child should feed organ meat, like liver, kidney A6–23 month child should feed egg	(1). Yes (2). No	

SECTION IV: child feeding measurement and related variable

Breastfeeding Practice

No	Question	Response	Remark
401	Has the child ever been breastfed?	(1)Yes (2) No	
402	How often do you breastfeed the child?	(1) On demand (2) At free time (3) 2-4 times a day (4) 5-8 times a day	
403	What type of feeding methods is/did she practicing/ practiced?	(1) Bottle feeding (2) Breastfeeding (3) Both	
404	Is the child still breastfeeding?	(1) Yes (2) No	

405	If no, when did you stop breastfeeding.....?		
406	Do you give your any fluid or soft food apart from breast milk?	(1) Yes (2) No	
407	If yes when did you start?	(1) Less than six months old (2) From six months old and above	

Complimentary practice

No	Question	Response	Remark
408	At what month you start complementary feeding……?	…… month old	
409	How many times do you feed the child with other food apart from breast milk in a day?	(1) 1 time (2) 2 times (3) 3 times (4) More than 3 times	
410	Do you normally give the child snack in between the main meals?	(1). Yes (2). No	
411	Do you give your child any infant formula?	(1). Yes (2). No	
412	Do you feed the child with a feeding bottle which has nipple?	(1). Yes (2). No	

Dietary diversification

FOOD GROUP		**(413)** Have your child eaten this in the last 24 hours	
		Yes	**NO**
1.	Grains, cereal, maize, roots, and tubers		
2	legumes and nuts		
3.	Dairy products (milk, yogurt, and cheese);		

4.	Flesh foods (meat, fish, poultry, and liver/organ meats)		
5.	Eggs		
6	Vitamin A-rich fruits and vegetables		
7	Other vegetables and other fruits		

Food Security (414)

No	Question	Response	Remark
201	Do the members of your HH worried about not having enough food in the last 3 month?	(1) Yes (2) No	
202	Does your HH were faced difficulty to eat the kinds of foods he/she preferred in the last three month?	(1) Yes (2) No	
203	Do the members of your HH eat just a few kinds of food day after day?	(1) Yes (2) No	
204	Do the members of your HH eat food that he/she preferred not to eat?	(1) Yes (2) No	
205	Do the members of your HH eat a smaller meal than he/she felt was needed?	(1) Yes (2) No	
206	Does your HH eat fewer meals in a day?	(1) Yes (2) No	
207	Does your HH go to sleep at night hungry?	(1) Yes	

		(2) No	
208	Does your HH faced face no food at all in the last 3 month?	(1) Yes (2) No	

SECTION VI: ANTHROPOMETERY

	Variable measurement of Weight And Length Variable	Measurement
501	Weight of child (kg)	
502	Recumbent length(cm)	

8.4. Sidamu Afoo Translated Questioner

Fajjo xa'minanni qoola

Keere nootto/tta !

Su'ma'ya _____Yaamameemmo. Pharma College Hawaasi Cumpaasera jeefimarchu diri rosaanchootina Wondogenetete woradi giddo lamu diri woriidi qaaqquullira sagalate fayimana xaadanoricho xiinxallate taje gamba assi'ranni noommo. Tenne taje horonsi'nannihuno rosu hajora callaati. Ate ledo harancho yanna 20 (Lemuu dhiqeessi geeshsha calla hasaawa ha'sireemmoha ikkannna taje aakkinni baxxino qarri iillannoheri dino. Aattae/ttoe taje fojose woleho sayiinse reqecci diassinanni. Qoleno taje aatenni wo'munni wo'manno ikko mereeroho beeqa dihasi'reemma/mmo yiittaro/toro agurate qoossokki agarantinote. Ikkollanna, fajjokki ikkeenna hasiissanno taje aa lowo geeshsha galatisiissannohete.

Hasiissanno xa'mora tumo aatenni beeqqate sumuu yaatta"e/tto"e Ee-------Diyeemma/mmo------

Taje gamba assannohu Su'ma_____ Malaate _____ Barra _____

Harunsaanchu Su'ma_____ Malaate _____ Barra _____

Beeqqaanchu Su'ma _____ Malaate _____ Barra _____

Galateemmo !!!

Xa’mote qoola Siidamu afiinni

Gafa I: Dagate Ayiimma/Mayiimmanna Ofollo

A.K	Xa'mo	Dawaro/tumo	Hedo
101	Qaaqqikki diri me'eho?	--------- Agana	
102	Koo/Tee?	A. Labbaaho B. Meyaate	
103	Atera diro me”e ikkinohe?	…….. diro	
104	Teesso’ne mamaati?	Quchumaho Baadiyyete	
105	Adhamate gara?	Adhame noomma Diadhamoomma Galte’yawiinni baxxe noomma Galte’ya lubbote dino	
106	Amma’nokki maati?	Protestantete Orthodokisete Kaatoolikete Islaamaho Wole xawisi----------	
107	Ilamakki maati?	Sidaamaho Wolaytaho Amaaraho Guraagete	

		Wole xawisi----------	
108	Amannihu rosu deerri mageeshshiho?	Dirossino Borreessanna nabbawa dandiitanno Uminna layiinki doyiicho(1-8) Layiinki deerra(9-12) Layiinki dirimi ale	
109	Amate loosi dana?	1. Loosu noosete 2. Loosu dinoosete	
110	Amannihu rosu deerri mageeshshiho?	Dirossino Borreessanna nabbawa dandiitanno Uminna layiinki doyiicho(1-8) Layiinki deerra(9-12) Layiinki dirimi ale	
111	Galteki loosi dana?	1. Mootimmate losaasincho 2. Daddalaancho 3. Mootimmanniha ikkinokki looso 4. Barru loosaasincho 5. Wole(xawisi)_____	
112	Maatenniti aganu eo?	1._____Birr 2.danfoomo	
113	Xaa yannara meu qaaqquulli noo'ne?	_____ Kiirote	
114	Maatete galtino hayyo dani?	1. Mereerima maate	

		2. Hala’lado maate	
115	Loosu aana heeratta yannara qaaqqokki owaatannohu no?	1. Ee 2. Dino	
116	Ee ikkiro, ayeeti?	Roduuwi Mini giddo kaa’laancho Ahaahe	
119	Mine'ne radoone, telewiyiinenna nna mobayle noo'ne?	Ee Dino Radoone…….1 2 TV……...1 2 Mobayle …….1 2	

Gafa II: Woloota Amate ledo xadino

1. Qooxeesu Fayyimmate agaroshi rosichi xa’mo

a.k	Xa'mo	Dawaro/tumo	Hedo
201	Qaaqqikki/okki saga’late albaannina gedenoonni anga hayshidhano?	Ee Dihayshidhano	
212	Qaaqqokki awuuttannoti saga’late albaannina gedenoonni anga hayshidhano?	Ee Dihayshidhano	
222	Waa dirridhinannihu mamiinniitti?	Hallanshate xuruurinni (Banbunni) Baletenni Agarantinokki bu”e well Xashshunni	

223	Waa agate albaanni xagissine horonsidhinanni?	Ee Dee'ni	Deeni xa'mo 24 kubbi
224	Maayi garini xagisinani?	_____	

2. Fayyiimate owaante hasatto akata

A.k	Xa'mo	Dawaro/tumo	Hedo
301	Qaaqqikki/okki Laansheessanno dhibba gargaranno kittibaate qasi'rino/dhino?	Ee Deeni	
302	Qaaqqikki/okki onte dhibba gargaranno kittibaate qasi'rino/dhino?	Ee Deeni	
303	Qaaqqikki/okki Huffannate dhibba gargaranno kittibaate qasi'rino/dhino?	Ee Deeni	
304	Qaaqqikki/okki ilate gedensiidi towaanyo assinoonni?	Ee Deeni	
305	Qaaqqikki/okki xissamiro massatta?	Baadi xagganni xagisireemma Hospitaalenna Fayyimmate xaawa Xagichu mine	
306	Minikkinni fayyimmate uurrinsha mageeshsha xeertidhanno?	2km ajjanno 2km- 4km geesha	

		4km aleenni	

2. Knowledge assessment question

A.K	Xa'mo	Dawaro/tumo	Hedo
307	6-23 agani geesha ikanonsa qaquulira babaxitino dani sagale karsiise itisate horo daafira maciishite egenoota?	1. Ee 2. De'ni	
308	6-23 agani geesha ikanosi qaaqi/qo 4 dani sagale sagala noosi	1. Ee 2. De'ni	
309	6-23 agani geesha ikanonsa qaquulira maalu sagale aa danchumate kulannite	1. Ee 2. De'ni	
311	Qaaqulu sagalete gato mitu korkaati duuchu dani sagale karso sagala hoogate	1. Ee 2. De'ni	
312	Hudira hooga yaa hasiisano qaaqulu sagale wonsha yaa di'ikitino.	1. Ee 2. De'ni	
314	Mitu sagalete gato korkaati qaquuleho 6 agana ikanonsa woyite wole lexote sagale hanafsiisa hogate	1. Ee 2. De'ni	
315	Saadatewichini afinanni sagale cala itisa 6-23 agani geesha no qaaqulira ikado di'ikitino	1. Ee 2. De'ni	
316	6-23 agani geesha no qaaqulira quuphe itisa hasiisano	1. Ee 2. De'ni	

Gafa IV: Qaaqulu sagalate bikana woloota xaadino xa'mo

Unuuna qansirate rosicho

A.K	Xa'mo	Dawaro/tumo	Hedo
401	Xaa yannara qansatta qaaqqi noohe?	Ee Dee'ni	
402	Qaaqqoho unuuna qansattara albaanni la"aato aattani?	Ee Dee'ni	
403	Qaaqqu ilami yannara unuuna mageeshi yanna keeshite qansitta?	Ilamihunni 1 saate giddo Ilamihunni mittu barri giddo(1-24saate) Ilamihunni layinki barra(>24saate) Ilamihunni sayikki barra Diqaagamanno"e	
404	Qaaqqoho unuuna mamoote qansatta?	Hasiri yannara Fooliishshote yannara Barrunni 2te 4 geeshsha Barrunni 5te 8 geeshsha	
405	Qaaqqikkira unuunu ado ma garinni qansatta?	Kubbaayyunni Unuuna qansatenni Lamenka	
406	Xaa geeshsha qaaqqikki unuuna saga'lanni noohe?	Ee	

		Dee’ni	
407	Dee’ni ikkiro, unuuna mamoote agurino.....?		
408	Unuunu ado agurranna wolere la”aatanno?	Ee Dee’ni	
409	Ee ikkiro la’aato mamoote hanafino?	6 agana ikkasira albaanni 6 agana ikkisi gedensaanni	

Ledote sagale aate rosicho

A.K	Xa'mo	Dawaro/tumo	Baxitino hedo
501	Qaaqqikkira/qokkira ledote sagale meekki aganira hanafootta……?	…… agana	
502	Ledote sagale barrunni me”e higge itisatta?	1 hige 2 hige 3 hige 3 nna hakkuyi aleenni	
503	Hurbaatu yanna iillita geesha mereeronko la’aatisatta?	Ee Dee’ni	
504	Wole qixxaabbino sagale itisattani?	Ee Dee’ni	
505	Qaaqqikkira xuunxotenni sagale itisattani?	Ee Dee’ni	

Gafa VI: Sagalete dananna geeshsha (24 saa,tenna 7 barri giddo)

Sagalete dana		**(413)** Be'ro woy 24 saate kawa aantete xawinsooni sagale saga'lino?	
		Ee	Dee'ni
1.	Gumma, rumushshonna daro intanni sagale		
2	Baaqeela, atara woy missira lawinore		
3.	Ado labino sagale		
4.	Maalu sagale (sadate maala, asa, lukuwu maala)		
5.	Quuphe		
6	Waytamini A amaddino darotenna gummate sagale		
7	Wollota daro intanni sagale		

Ikado sagale afira agarantinota ikasse afate xamo

kiiro	xa'mo	Dawaro	hedo
1	Sai sasu again gido maateki sagalete anje xadano'e yite dadilootino barri no?	1. Ee 2. De'ni	
2	Maateki sa'i sasu agani gido sagala hasidhino sagale sagala hogate qari	1. Ee 2. De'ni	

	xaadinose?		
3	Maateki baruni bara sa'u kiiro itano sagale dani ajani dayiono?	1. Ee 2. De'ni	
4	Maateki itate hasidhinoki sagale itate qarri xadinose?	1. Ee 2. De'ni	
5	Maateki sagala hasiisanohehuni woro sagalate qarri xaadinose?	1. Ee 2. De'ni	
6	Maateki hudidhe hedo sagale ituki galte egentino?	1. Ee 2. De'ni	
7	Sai sasu aateki sagale co'onta hoge egentino?	1. Ee 2. De'ni	

Qelpheephote bikka

	Qelpheephonna hojja bikkinanni bikkaasine	1kki bikka
701	Qaaqqu qelpheepho (kg)	
702	Qaaqqu hojja (cm)	