

**UNDERNUTRITION AND ITS ASSOCIATION WITH INFANT AND
YOUNG CHILD FEEDING SUMMARY INDEX AMONG 6 TO 23 MONTHS
IN DEMBA GOFA DISTRICT, SOUTHERN ETHIOPIA**



BY:

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JIMMA, ETHIOPIA

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ABBREVIATIONS

| | |
|--------------------|---|
| ANC | Antenatal care |
| BMI | Body Mass Index |
| CFI | Child Feeding Index |
| COHA | Cost Of Hunger in Africa |
| EDHS | Ethiopian Demographic and Health Survey |
| ENA | Emergency Nutrition Assessment |
| ETB | Ethiopian Birr |
| FANTA | Food & Nutrition Technical Assistance |
| GDP | Gross Domestic Product |
| LAZ | Height for Age |
| HDA | Health Development Army |
| HIV | Human immunodeficiency Virus |
| IYCFI | Infant & young child Feeding Index |
| IFPRI | International Food Policy Research Institute |
| IYCF | Infant & Young Child Feeding |
| KPC | Knowledge, Practices & Coverage survey |
| LAZ | Length for Age Z score |
| SD | Standard Deviation |
| SNNPR | Southern, Nations & Nationalities People Region |
| SRS | Simple Random Sampling |
| WAZ | Weight for Age Z score |
| WHO | World Health Organization |
| WLZ | Weight for Length Z score |

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ABSTRACT

Back ground: Childhood malnutrition is a common nutritional problem in Ethiopia. Infant and Young child feeding practices remain a common problem in our country. Infant and young child practices are multidimensional and changes rapidly. The previously developed indicators could not be able to show the simultaneous effect of different dimension of complementary feeding and has focused on single practices over a narrow age range and has not addressed the impact of adequate or optimal infant and child feeding. Recently, infant and child feeding practices have received increasing attention and further been assessed with the use of a summary index as shown in several studies. However, most studies that assessed the feeding practices and their association with child nutrition and health outcome focused on one of the aspects of feeding in Ethiopia.

Objective: To assess nutritional status and its association with infant and young child feeding summary index among 6-23 months age children in Demba Gofa District, SNNPR, Ethiopia

Method: A community-based cross-sectional study design with multistage simple random sampling technique was conducted from March to May 2016 in Demba Gofa District, Southern Ethiopia. The data were collected from 696 randomly selected child-mother pairs. Weight and length of the children were measured and the nutritional status was assessed. Chi-square tests for trends and binary logistic regression for bivariate analysis and multiple logistic regression were used for multivariate analysis to identify the association between nutritional status and infant and child feeding index terciles.

Results: The analyses revealed that 43.8% (40.13-47.5), 15.8% (13.1-18.5) and 3.5% (2.1-4.8) 95% CI percent of children were stunted, underweight and wasted respectively. Two hundred eight (29.9%) infants and young children fell in the poor ICFI category and 276 (39.9%) were fell in to high feeding index category. After controlled for potential confounders, Low feeding index tercile was positively and significantly associated with stunting and underweight respectively whereas high feeding index tercile was negatively and significantly associated with stunting and underweight respectively as compared to medium feeding index tercile. Children who belonged to poor feeding practice 2.4 times (AOR = 2.4 (95 % CI: 1.39-4.2) more likely to be underweight whereas children who belonged to good child feeding practice 55% (AOR = 0.45 (95 % CI: 0.27-0.75) less likely to be stunted as compared to children who belonged to medium child feeding practices.

Conclusion: The prevalence of undernutrition particularly stunting was high and child feeding practices were not optimal. Decreasing of infant and child feeding index score and increasing of stunting, underweight and wasting prevalence when the age of children increased were observed in this study reflected that infant and child feeding practices were not age appropriate and low attention have been given when the age of children increased.

Recommendations: Health workers and health extension workers should educate mothers on complementary feeding by emphasizing the importance of increasing consistency and variety of food, increasing meal frequency when the age of child increased

Key words: Infant and young child feeding practices; infants and young children feeding summary index; nutritional status of under two years children.

1. INTRODUCTION

1.1 BACKGROUND INFORMATION

Globally, under nutrition is responsible for 45% of all under five child deaths, representing more than 3 million deaths per year. Roughly 165 and 52 million children among under 5 years of age were stunted and wasted respectively in 2011(1,2). In sub-Saharan Africa, 40% and 9% of children under 5 years of age are stunted and wasted respectively (3). According to the 2014 EDHS survey report, 40% of children under five are stunted, and 25% are underweight, 9% are wasted in Ethiopia. In SNNPR, the region where Gamo Gofa Zone found, among under five children 44.1% are stunted, 25.7% are underweight and 6.6% are wasted.(4)

Children who are poorly nourished in the first 2 years of life are at increased risk of mortality and impaired cognitive development, as well as diminished work capacity and chronic disease later in life(5). In this age range, they are considered to be the most vulnerable because of their higher requirements of energy- and nutrient- dense foods to support their growth and physical and mental development; therefore, proper care for children is an essential element needed for the healthy growth and development of a child(6,7).

Poor breastfeeding and complementary feeding practices, together with high rates of morbidity from infectious diseases are the prime proximate causes of malnutrition in under two years of life(8). Adequate nutrition through appropriate infant and young child feeding (IYCF) during infancy and early childhood is fundamental to the development of each child's full human potential. However, it is disheartening to note that the critical IYCF practices are faulty around the world. Globally, only 39% of infants are exclusively breast fed for the first six months; 76 per cent of infants continued to be breastfed at 1 year of age, while only 58 per cent continued through the recommended duration of up to two years. Only 60 per cent of children aged 6 to 8 months receive solid, semi-solid or soft foods, highlighting deficiencies in the timely introduction of complementary foods(3).

EDHS 2011 report showed that among children 6-23 months of age, even though there is high breastfeeding rate (98%), only 52% of children are exclusively breastfed within the first six months; 5% received four or more food groups, 26% of children ate foods rich in vitamin A and 49% were fed at least three times per day(9).The report showed that majority of children were not received adequate diet to the development of their full human potential.

Consequently, simple, valid, and reliable indicators are essential to track progress and guide investment to improve nutrition and health during the first two years of life(10). Infant and young child practices are multidimensional and change rapidly within short age intervals. Hence, measuring feeding practices of infants and young children greater than 6 months of age is complex (11,12)

Although the challenge has persisted, considerable progress has been made in defining standards and indicators for appropriate complementary feeding practices through the development of indicators for assessing infant and young child feeding practices(13). The previously developed indicators could not able to show the simultaneous effect of different dimension of complementary feeding and has focused on single practices over a narrow age range and has not addressed the impact of adequate or optimal infant and child feeding(14). Therefore developing an index which able to reflect both feeding behavior and diet quality in measuring feeding practices of infants greater than 6 months of age at a time is important(15).

Child feeding index (ICFI) is an explanatory attempt to summarize key infant and child feeding practices into single summary variable. It is based on an age-specific scoring system that gives points for positive practices(14–18).Recently, infant and child feeding practices have received increasing attention and further been assessed with the use of a summary index as shown in several studies (16–18). Most studies that assessed the feeding practices and their association with child nutrition and health outcome focused on one of the aspects of feeding in Ethiopia

Therefore, the objective of this study was to assess the prevalence of nutritional status and its association with infant and young child feeding summary index among 6-23 months age children in Demba Gofa District, SNNPR, Ethiopia.

1.2 STATEMENT OF THE PROBLEM

A high malnutrition rate, which is a reflection of poor feeding practices in developing countries among children under five has been consistently high due to low prevalence of exclusive breastfeeding and other inappropriate feeding practices. Lancet series 2013 suggest that under nutrition, underlies high deaths of children younger than 5 years annually worldwide. In Africa, among under five children, 35.6% are stunted, 17.7% are underweight and 8.5% are wasted in 2011(1).

However, the government of Ethiopia and other stakeholders implementing a number of strategies aimed at improving nutritional status and IYCF practices, child malnutrition is still high (40% of under five children were stunted)(4) and the aggregate data from the year 2005-2009 estimated that 28% of all child deaths were accounted by malnutrition in our country(19).

As the report of different studies, the prevalence of stunting is high also in the regions and districts in Ethiopia. 44% in SNNPR; 51.4% in Tigray; 22% in Addis Ababa; 52% in Amhara region in under 5 children (4). The magnitude of stunting varies significantly from woreda to woreda even in the same zone in southern Region. In Gamo Gofa Zone, among children, 18.7% were stunted in Kamba Woreda (20), 45.9% were stunted in Arbaminch Zuria Woreda(21).

The distribution of stunting prevalence is also different in specific age groups. Study done in Sodo Zuria woreda, southern Ethiopia showed that prevalence of stunting was 16.7 % for infants aged 6–8 months, 33.3 % for infants aged 9–11 months and 50 % for children 12-24 months(22). The finding of stunting prevalence in EDHS 2011 is also shows the same pattern of distribution as Sodo Zuria Woreda, 9.3% for infants aged 6-8 months; 21.4% for infants 9-11 months; 32% for children 12-17 months and 47.1% for children 18-23 months (9). In both studies, the nutritional status is getting worse when age increase. This imply that high attention should be given for young age children because stunting is associated not only with poor physical growth, but also affect cognitive abilities that are irreversible after two years of age (23,24)

The implication of child under nutrition that has not been corrected early is extended to the entire family and subsequent generation. Malnutrition specially stunting prevents proper brain development, which means children are less able to start school when they should, and less able to learn and perform. Adults who were

undernourished in childhood earn significantly less and contribute less to economic growth. Under nutrition also reduces Gross Domestic Product in every country across the globe(25).

According to the report of the Social and Economic Impact of Child Under nutrition study in Ethiopia, 67% of the working-age population in Ethiopia is currently stunted; associated with child under nutrition, Ethiopia lost Ethiopian birr (ETB) 55.5 billion in the year 2009, which is equivalent to 16.5% of GDP and 16% of all repetitions in primary school are associated with stunting. one of the key messages in the report was “eliminating stunting in Ethiopia is a necessary step for growth and transformation” (19).

However, The critical role of feeding practices and, especially, of optimal complementary feeding practices along with continued breastfeeding among children six months and onwards to reduce young child under-nutrition and mortality is well recognized (2,24), Sub optimal feeding practices and inadequate intake of complementary food and which were below the WHO recommendations have been widely documented in our country.

Nationally in 2011, only 4% of children 6-23 months received a minimum acceptable diet. Among 6-23 months of age, 23.3% in Kamba woreda, 25.5% in Arbaminch woreda met minimum dietary diversity. Among children 6-23 months old, 25.8% in Kamba Woreda, 45% in Sidama Woreda met the recommended minimum meal frequency (9,21,26,27). In the reports, majority of children were not met the WHO recommendations of minimum meal frequency and dietary diversity.

In the cross sectional study of child feeding practices assessment using summary index done among HIV exposed infants also revealed that only 36.6% of infants fell in the good feeding practices and the majority of infants feeding practices were sub optimal(28).

Despite some improved trends in the proportion of children stunted and underweight in the last 15 year in Ethiopia, the prevalence of stunting and improper child feeding practices are still high in the country. Therefore, current child feeding practices and nutritional status assessment is important for appropriate decision making on child nutritional interventions

2. LITERATURE REVIEW.

2.1 OVER VIEW OF NUTRITIONAL STATUS OF CHILDREN

Adequate nutrition through appropriate infant and young child feeding (IYCF) during infancy and early childhood is fundamental to the development of each child's full human potential (29). Children **who** are poorly nourished in the first 2 years of life are at increased risk of morbidity and mortality(5). Stunting and other forms of under nutrition are clearly a major contributing factor to child mortality, disease and disability. For example, a severely stunted child faces a four times higher risk of dying, and a severely wasted child is at a nine times higher risk (30). The broader understanding of the devastating consequences of under nutrition on morbidity and mortality is based on well-established evidence(25).

National 40% of stunted prevalence is not uniform in the regions of Ethiopia, 44.1% in SNNPR, 22.9% in Addis Ababa, 42.2% in Amhara, 38.2 % in Oromia, 45.7% in Tigrayetc. Wasting (too thin for height), which is a sign of acute malnutrition, is far less common, only 9%. 25% of Ethiopian children are underweight or too thin for their age(4). As we have seen in statement of problem section, stunting prevalence in Gamo Gofa Zone Woredas, vary from Woreda to Woreda and high prevalence is reported in the two Woredas.

Complementary feeding period is a period which stunting prevalence highly revealed which means that since 6 months to 23.9 months of children age. In general, when the age increases, the prevalence of stunting also increased. EDHS reports of 2014 shows that stunting prevalence is 9.3% for infants aged 6-8 months; 21.4% for infants 9-11 months; 32% for children 12-17 months and 47.1% for children 18-23 months (4). Study of Sodo Zuria woreda, Wolayta Zone, southern Ethiopia has similar finding with the EDHS, prevalence of stunting is 16.7 % for infants aged 6–8 months, 33.3 % for infants aged 9–11 months and 50 % for children 12-24 months(22).

2.2 CHILD FEEDING PRACTICES

Child feeding practices are multidimensional and they change rapidly within short age-intervals in the first years of life. Unlike exclusive breastfeeding, which can be summarized in a single indicator, the measurement of feeding practices in children aged 6 months and older involves assessing various dimensions of feeding

simultaneously. These dimensions include continued breastfeeding, appropriate timing of introduction of complementary foods, and optimum quantity and quality of the foods consumed (29). Appropriate feeding practices are essential for the nutrition, growth, development and survival of infants and young children. Results of studies on infant and child feeding have indicated that inappropriate feeding practices can have profound consequences for the growth, development, and survival of infants and children, particularly in developing countries (7,8,25,31).

Even though, the study population was not selected from the general population, the cross sectional study conducted on HIV exposed infants and children using summary of feeding index in our country, Sidama Zoze of Southern Ethiopia, child feeding practices were not optimal; only 36.6% infants fell in the high (good) ICFI category(28).

2.2.1 EXCLUSIVE BREASTFEEDING PRACTICES

The WHO and the UNICEF recommend that all mothers should breastfeed their children exclusively for the first 6 months and thereafter they should continue to breastfeed for 2 years or longer (32). Breastfeeding alone with no water provides the ideal nourishment for infants for the first six months of life as it provides all the nutrients, antibodies, hormones, immune factors and antioxidants an infant needs to thrive. It protects babies from diarrhoea and acute respiratory infections and stimulates their immune systems(32,33).

Adults who were breastfed as babies are less likely to be overweight/obese. Children and adolescents that have been breastfed perform better on intelligence tests. Breastfeeding also contributes to the health and well-being of mothers; it reduces the risk of ovarian and breast cancer and helps space pregnancies—exclusive breastfeeding of babies under 6 months has a hormonal effect which often induces a lack of menstruation. This is a natural (though not fail-safe) method of birth control known as the Lactation Amenorrhea Method (1).

However, exclusive breastfeeding practices are faulty around the world, with the literature suggesting that only 39% of infants are exclusively breast fed for the first six months (3). In Ethiopia, EDHS 2011 report shows that despite the universal breastfeeding rate (98%), only 52 per cent of children are exclusively breastfed within the first six months, among children 6-23 months (9).

Findings of recent studies in Southern Ethiopia, proportion of children exclusively breastfed within the first six months was 21% in Sodo Zuria, 60.4% in Arbaminch Zuria and 56% in Sidama district, Southern Ethiopia(21,22,27)

Infants not exclusively breast fed were more likely to be stunted than those exclusively breastfed in different studies. Study done on the impact of feeding practices on prevalence of under nutrition among 6-59 months aged children in Khartoum shows that Children who were breastfed for less than six months were 1.6 times more likely to be stunted than those breastfed long (34). The same finding was repeated in the study of Arbaminch Zuria Woreda (21).

2.2.2 COMPLEMENTARY FEEDING OF CHILDREN 6-23 MONTHS OF AGE

Appropriate complementary feeding provides key nutrients (e.g. iron and other micronutrients, essential fatty acids, protein, energy, etc.). Inadequate complementary feeding lacking in quality and quantity can restrict growth and jeopardize child survival and development(32). From six months onwards, when breast milk alone is no longer sufficient to meet all nutritional requirements. Nutritionally-adequate, safe, age-appropriate complementary feeding starting at six month is recommended with continuation of breastfeeding for two years or more (33,35).

Breast milk supplies higher quality nutrients and protective factors than complementary foods. It is therefore recommended that breastfeeding on demand continues with adequate complementary feeding up to 2 years or beyond(10,32,33). Based on the EDHS findings, the median duration of breastfeeding among less 2 years was 25 months; while the mean duration of exclusive breastfeeding was 4.2 months. Continued breastfeeding at 1 year was 96%, while continued breastfeeding at 2 years or beyond was 82%(9). As the report of studies conducted in different setting, the prevalence of continuing breastfeeding until 2 years were 95.8% in Arbaminch Zuria woreda and 86% in Sidama district, Southern Ethiopia(21,27).

However, Continued breastfeeding, which is universally considered a positive practice up to 24 months and beyond; it was positively associated with stunting in different studies in Ethiopia; study conducted in West Gojam showed that children who had been breastfed for 12-24 months were 2.2 times more likely to be stunted than children who had been breastfed less than one year(36). The two studies done on using EDHS data, continued breastfeeding, is also negatively associated with height for age (HAZ) for children aged 12-36 months in the 2000 data and 12-15 months in the 2005 data. It is postulated that the observed relationship between continued breast-

feeding and child size is due to reverse causality and is related to a mother's decision to continue to breastfeed vulnerable children without introducing appropriate foods(37,38).

Inappropriate timing of introduction of complementary foods deprives the infant of optimum nutrition, leading to under-nutrition, and increased mortality and morbidity(39). According to the new WHO IYCF indicators, the timeliness is assessed by whether infants aged 6 to 8 months are receiving solid, semi-solid or soft food irrespective of being breastfed or not(10). But globally only 60 per cent of children aged 6 to 8 months receive solid, semi-solid or soft foods, highlighting deficiencies in the timely introduction of complementary foods (3).When we see in Ethiopian context,49% in Ethiopia (National prevalence), 15.5%) % in Sidama district, Southern Ethiopia were introduced to solids, semi-solids or soft foods among infants 6-8 months of age in accordance with WHO recommendations(9,27).

The studies conducted in different setting showed that late starting of complementary food associated with increased incidence of stunting in India(40). In Ethiopia, West Gojam and Sidama Zone studies showed that children who started complementary food either before or after the recommended 6 month time, were more likely to be stunted(36,41). Cross sectional study conducted in Somali region also showed that introduction of complementary feeding at 6 months reduced odds for stunting (42).

Meal frequency is considered a proxy for energy intake from foods other than breast milk. The WHO recommended meal frequency is, initially 2-3 times a day for infants between 6-8 months old, increasing to 3-4 times daily between 9-11 months old and 12-23 months old with additional nutritious snacks offered 1-2 times per day, as desired(10,43). The practice of meal frequency among children is vary from area to area in our country, Ethiopia. In some studies currently done in our country, among children 6-23 months old, 25.8%in Kamba Woreda, Gamo Gofa Zone; 45% in Sidama; 82% in Shashemene (26,27,44) and 49% nationally met the recommended minimum meal frequency(9). The conclusions of these studies stated that the majority of infants and children were not received recommended minimum meal frequency.

Dietary diversity is essential to ensure that nutrient needs to be met, meals should include adequate quantities of meat, poultry, fish or eggs, as well as vitamin A-rich fruits and vegetables every day. A minimum of 4 out of the seven food groups is viewed as sufficient to meet the child's nutritional requirements(10,43). However, the practices are faulty in our country. EDHS 2011 showed that, among 6-23 months

children, only 5 per cent received four or more food groups. Among 6-8 months; 9-11 months; 12-17 months and 18-23 months old children, 1%, 2%, 6.2% and 7.6% respectively were fed the recommended dietary diversity(9).

In the two studies done in Gamo Gofa Zone Woredas, Kamba woreda and Arbaminch Zuria Woreda Southern Ethiopia, the proportion of children met minimum dietary diversity among 6-23 months of age were only 23.3% and 25.5% respectively(21,26). In the study of Ethiopia and Zambia demographic and health survey data analysis, among children 6-23 months of age, having adequate dietary diversity were positively associated with HAZ(38). The same finding was also observed in the study of Somali Region in 2015; dietary diversity score ≥ 4 was reduced odds for stunting(42).

In order to guarantee satisfaction of the child's nutritional needs, complementary foods must be: timely, adequate and innocuous. The food must also be offered with a technique, with the frequency and consistency that are adequate for the age, and must attend to the child's feelings of hunger and satiety (45).

Unhygienic preparation of foods can cause contamination. Food contact with unwashed hands can be a source of diarrhea pathogens (46). Complementary feeding may not promote optimum childhood growth if consuming contaminated foods result in repeated bouts of illness (47). In rural Bangladesh, children experienced significantly less diarrhea when caregivers washed at least one hand with soap before food preparation compared with children in households where caregivers did not wash hands(48). Because washing hands with soap before preparing food and before child feeding may reduce pathogen transmission, reduce illness, and could improve child growth(49).

2.2. 3 BOTTLE FEEDING PRACTICE

When bottle feeding is associated with unhygienic conditions and poor preparation of infant formula, it puts the infant at a great risk of illness, resulting in increased risk of mortality. Feeding an infant from a bottle with an artificial teat may also make it more difficult for the baby to learn to attach well at the breast and has been associated with earlier cessation of breastfeeding (50). If an infant can't feed directly from the breast, then the safest alternative is to feed expressed breast milk from a cup (51).

According to 2011 EDHS report, the prevalence of bottle feeding was 13.9%, 11.5%, 10.5% and 7.8% among 6-8 months, 9-11 months, 12-17 months and 18-23 months

age of infants and children respectively. Over all prevalence of bottle feeding among 0-23 months old infants and children was 12% (52). In this study pattern of bottle feeding practices high at initiation time complementary food and decreases when age increases.

Findings of recent studies done in Sidama district and Arbaminch Zuria, Southern region and Shashemene Woreda, Oromia Region of Ethiopia, 30.5%, 4.24% and 20.9% of children were bottle fed respectively (27,44,53). A study done on magnitude and determinants of stunting in children under-five years of age in food surplus region of Ethiopia: The case of West Gojam Zone, 2009 shows that stunting was higher among children who were bottle fed (50%) than those not bottle fed(36). In the study of Somali region also supported West Gojam finding; bottle feeding was associated with increased odds of stunting (42).

In general, the literatures shows that inappropriate child feeding practices are prevalent and remain as major public health problem in Ethiopia(4,9,21,22,26,27,36,41), as result of these, stunting among children is also high. Improving infant and young child feeding practices for children aged 6–23 months is therefore, critical for improved nutrition, health and development of children.

2.3 ASSOCIATION BETWEEN INFANT AND YOUNG CHILD FEEDING INDEX (IYCFI) AND NUTRITIONAL STATUS

The association between nutritional status and ICFI was tested in developing countries using cross-sectional (16,17,54) and longitudinal designs (55) in the general population, applying the summated index score created by M. Ruel. Even though the ICFI was applied to the developing world, its association with the nutritional status of children and young infants was different in each of the 8 countries assessed. In two countries (Madagascar and China, ICFI was associated with weight-for-age and weight- for-length/height after adjusting for potential confounders(55,56). Other studies conducted in Latin American countries, Ethiopia, Burkina Faso, and Cote d'Ivoire demonstrated a strong relationship between the index and Weight for age and length-for-age Z-scores (WAZ and LAZ)(16,17,57).

In other African countries and in Latin American countries, authors found that diet diversity, one of the components of ICFI, was highly associated with height for age Z-score. However, countries where no association was found between LAZ and ICFI did not demonstrate any association between dietary diversity and LAZ.

In contrast, results showed that the association found between ICFI and weight-for-height Z-score (WHZ) or weight-for-age Z-score (WAZ) were mainly driven by dietary diversity, non-use of bottle feeding, meal frequency(54), energy intake from complementary foods and dietary quality (55).

In the analysis of data from the Demographic and Health Surveys (DHS) for five Latin American countries, feeding practices were strongly and statistically significantly associated with child HAZ in most of the Latin American countries, especially after 12 months of age. The advantage in height experienced by 12–36-month-old children who were in the high compared to the low feeding practices tercile was approximately 0.5 Z-score. Whereas the association between feeding practices and child HAZ was generally weaker and less consistent among children in their first year of life, but it increased gradually with age. The author discussed this finding as the factor that may explain the greater effect of feeding practices on HAZ among older children is the clustering of positive practices in addition to other factors like socioeconomic status and maternal education (52).

The cross-sectional study done in India to assess child feeding practices using Composite Child Feeding Index in 2016 revealed that Per unit increase in standardized IYCF score was likely to reduce the prevalence of underweight, stunting and wasting by 2-3% after adjusting for other variables(58).

However, the child feeding practices and their association with nutritional status have been evaluated using summary index of child feeding practices in different countries. None of the previous research was done in our country, Ethiopia, focusing on the general population using this kind of methodology. Two exception(28,37)are studies conducted in Sidama zone, southern Ethiopia among HIV exposed infants and Ethiopian demographic and health survey 2000 data and explored the child feeding practices and their association with nutritional status using summary index.

To the researcher's knowledge, this study is the second applying, within the general population, among 6 to 23 months age children in our country.

2.4 FACTORS ASSOCIATED WITH NUTRITIONAL STATUS AND FEEDING PRACTICES OF INFANTS AND CHILDREN.

The factors associated with nutritional status and feeding practices of infants and children highlighted in different literature review were maternal characteristics, child characteristics, household characteristics and morbidity status of children.

In the studies done in Arbaminch Zuria and Kamba woreda, Gamo Gofa Zone, Southern Ethiopia, stunting was significantly associated with number of under-five children, lack of paternal education, male children, older mothers, mothers who have no formal education, mothers who work as daily workers and have private work activity and mothers who have no postnatal follow-up while underweight was significantly associated with lack of maternal and paternal education (20,21)

The other maternal factor which affects the nutritional status of children is nutritional status of mother. The mother's nutritional status has an inverse relationship with her child's level of stunting. According to the study findings of EDHS 2011 children of thin mothers (BMI <18.5) are more likely to be stunted than the children of overweight/obese (BMI \geq 25) mothers(9). The findings of the analysis of data from the 2005 Ethiopia Demographic and Health Survey (EDHS) and the 2007 Zambia Demographic Health Survey (ZDHS) also showed that better nutritional status of mother improves the nutritional status of children(38)

Childhood morbidity status, especially diarrhoea, has been reported in different studies to have a negative effect on growth of children, specifically on weight gain (59). Diarrhoea and other conditions such as fever affect both dietary intake and utilization, consequently affecting a child's nutritional status (60). Infection and malnutrition have always been intricately linked. Malnutrition is the primary cause of immunodeficiency worldwide(61). The association between malnutrition and diarrheal diseases, as for most infections, is bidirectional; that is, the nutritional state alters the host response to infection and infectious illness alters nutritional state(62).

The study done in Somali region of our country, Ethiopia revealed that diarrheal disease was associated with higher odds of wasting and underweight(42).

The other study done in Sidama Zone Southern Ethiopia showed that mothers older than 18 years during the birth of index child were 86% less likely to feed their child below minimum meal frequency than their younger counterparts. Birth interval less than two years, not receiving nutritional advice during pregnancy, mother did not follow ANC and maternal age \leq 18 years were important predictors of sub-optimal child feeding practices(41).

The studies done Shashemene Woreda , Oromia Region, and Dangila Town, North west Ethiopia also showed that being Government employee of husband, poorest socio-economic status , not attending ANC, and number of under five children were independent predictors of inappropriate IYCF practices status while mothers education, age of a child, birth order of

index child and media exposure were independent predictors of appropriate IYCF practices status(44,63).

2.5 CONCEPTUAL FRAMEWORK

The main purpose of this study is to assess nutritional status and its association with infant feeding practices summary index in the study area. The factors associated with nutritional status and infants and children feeding practices highlighted in the literature review were maternal characteristics (educational status of mother; age of mother; maternal occupation; exposure to nutrition information; utilization of maternal health services; BMI); child characteristics (age sex) and household characteristics (socioeconomic status, number of under five children in the house)(9,26,38,44,63) and factors associated with stunting other than feeding practices were BMI of mother, maternal education, age and sex of child, socioeconomic status of house hold, number of under five children in the household (9,21,36,38,41). However, most of the findings related to feeding practices were based on only a single indicator of feeding practices and explained their association with stunting status in infants and children in our country. There has been almost no community based research conducted using a composite feeding index to assess child feeding practices and nutritional status among 6 to 23 months of age. The conceptual framework used in this study is adapted from the composite child feeding index developed by Ruel M(16). The conceptual framework used in this study describes how each set of factors influences infant and child stunting status directly or through infant feeding practices among children.

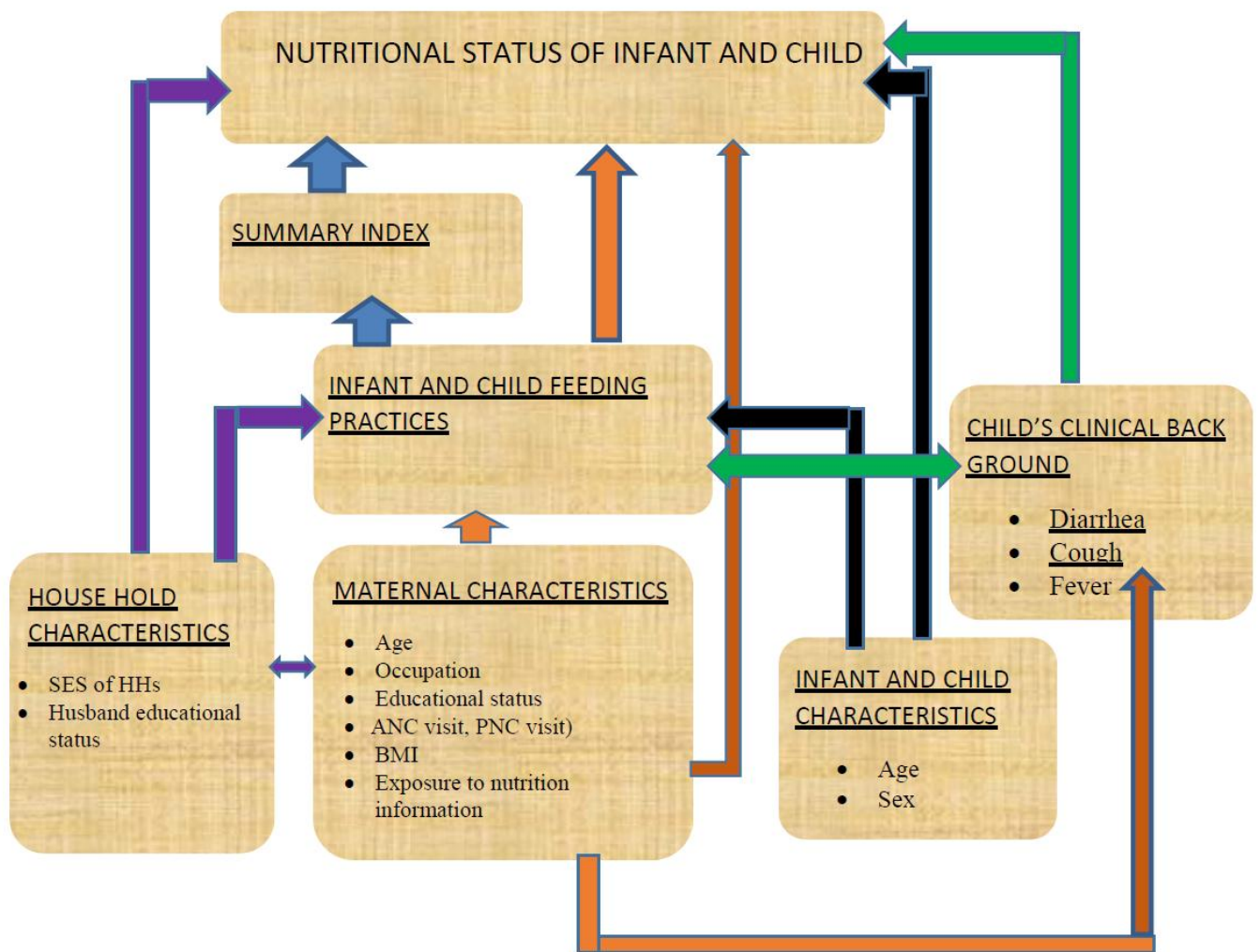


Figure 1. Conceptual framework of infant and child feeding index and its association to nutritional status adapted from Ruel & Menon 2002

Figure 1: Conceptual framework of infant and young child feeding index and its association to nutritional status of children

SIGNIFICANCE OF THE STUDY

In our country, many studies had reported that there are inappropriate infant and child feeding practices and high prevalence of under nutrition. Therefore, assessment of the current child feeding practices and nutritional status is very important to support policy and programming decisions at national, regional and district level.

Hence, the findings of this study would be invaluable input for the local government and other stakeholders to have detailed and concrete data on child feeding practices and nutritional status to draw appropriate intervention measures to improve and flourish the health of future generation.

Health worker, health extension workers and health development armies could identify the magnitude of the nutritional status of children and the practices of child feeding among mothers in their catchment area from this research. So that, they could strengthen and or promote child feeding practices among mothers in their counselling/health education session to minimize inappropriate child feeding practice and strengthen the good practices. Finally, the finding would also help as a reference for those who are interested in carrying out further research with this regard

3. OBJECTIVES OF THE STUDY

3.1 GENERAL OBJECTIVE:

- To assess nutritional status and its association with infant and young child feeding summary index among 6-23 months age children in Demba Gofa District, SNNPR, Ethiopia

3.2 SPECIFIC OBJECTIVES:

- To determine prevalence of under nutrition among Children
- To determine prevalence of infant and young child Feeding Practices
- To identify the association between nutritional Status and infant and young child Feeding summary index

4. METHODS

4.1 STUDY AREA AND PERIOD:

This study was conducted in Demba Gofa district as of March to May 2016. Demba Gofa district is located 250 km from Arbaminch city which is zonal town of Gamo Gofa Zone and 265km far from regional city of Hawassa, SNNPR. There are 38 rural kebeles in the district. According to Demba Gofa District Health Office report, the total population size of the district as projected to the year 2016 is 104167 of which 53125 is females and 51042 males. Sixteen thousand two hundred sixty (15.6%) are under five. Twenty four thousand two hundred seventy one (23.3%) are reproductive age group women. The estimated number of infants and young children (aged 6-23 months) from the whole of the District is 3656. In the district 4 health centre and 38 health post(64).

Agriculture is the major source of income for the district. The major crops produced include Sorghum, Maize, Teff, Wheat, Barley, Bean, Pea, Lentil and legumes, nut and Sweet potato and enset, a root crop in the banana family(65).

4.2 STUDY DESIGN:

A community based cross sectional study was conducted

4.3 SOURCE POPULATION:

All infant and young children aged 6 months to 23 and their mother in Demba Gofa district, Gamo Gofa zone.

4.4 STUDY POPULATION

All infant and young children aged 6 months to 23 and their mother in the selected kebeles of Demba Gofa district, Gamo Gofa zone.

4.5 SAMPLE POPULATION

All randomly selected infant and young children aged 6 months to 23 and their mother in the selected kebeles of Demba Gofa district, Gamo Gofa zone.

4.6 INCLUSION AND EXCLUSION CRITERION

4.6.1 INCLUSION CRITERIA

- Children 6-23 months of age with their mother.

4.6.2 EXCLUSION CRITERIA

- A child had serious malformation that could affect anthropometric measurements and feeding
- Infants and children who were severely ill
- Mothers who reported or obviously pregnant at the time of survey, because pregnancy affect BMI of mother

4.7 SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUE:

4.7.1 SAMPLE SIZE DETERMINATION:

Emergency Nutrition Assessment (ENA) for Smart sample-size calculator was used for sample size calculation by considering a population size of 3656 children 6 to 23 months of age in Demba Gofa district(64).The prevalence of stunting was used for sample size determination based on previously published research from Sodo Zuria woreda, Wolayta Zone, SNNPR. The prevalence of stunting in specific age group was 16.6% for infants aged 6-8 months ; 33.3% for infants aged 9-11 months and 50% for children aged 12-23 months (22). The largest 50% was used in the sample size calculation, a desired precision of 5% and a design effect of 2 was used, the sample size calculated was 695(66) . The final sample size including 5% non-respondent was 730 children mother pairs.

4.7.2 SAMPLING TECHNIQUE

A multistage random sampling technique was used to select Kebeles in the first stage and eligible children in the second stage. The total Kebeles of the district are 38, all are rural Kebele. Out of 38 Kebeles, 11 Kebeles were randomly selected for this study. These selected Kebeles are: Barea, Yela, Saziga, Karza, Zulize Tsila, Dombe, Suka, Zatda Dolla, GaylaChalbe, Tsala Bana and Yallo Aliza. Then the number of study participants was allocated for each kebele based on proportional to population size allocation methods.

Rapid censuses was conducted first to identify the target household using already existing 1 to 5 network leaders in each randomly selected Kebeles. Study units (mothers/caregiver–child pairs) were selected from each Kebele by lottery method. In one house hold, number of eligible child was more than one, one child was selected by lottery method of simple random sampling. Figure 2

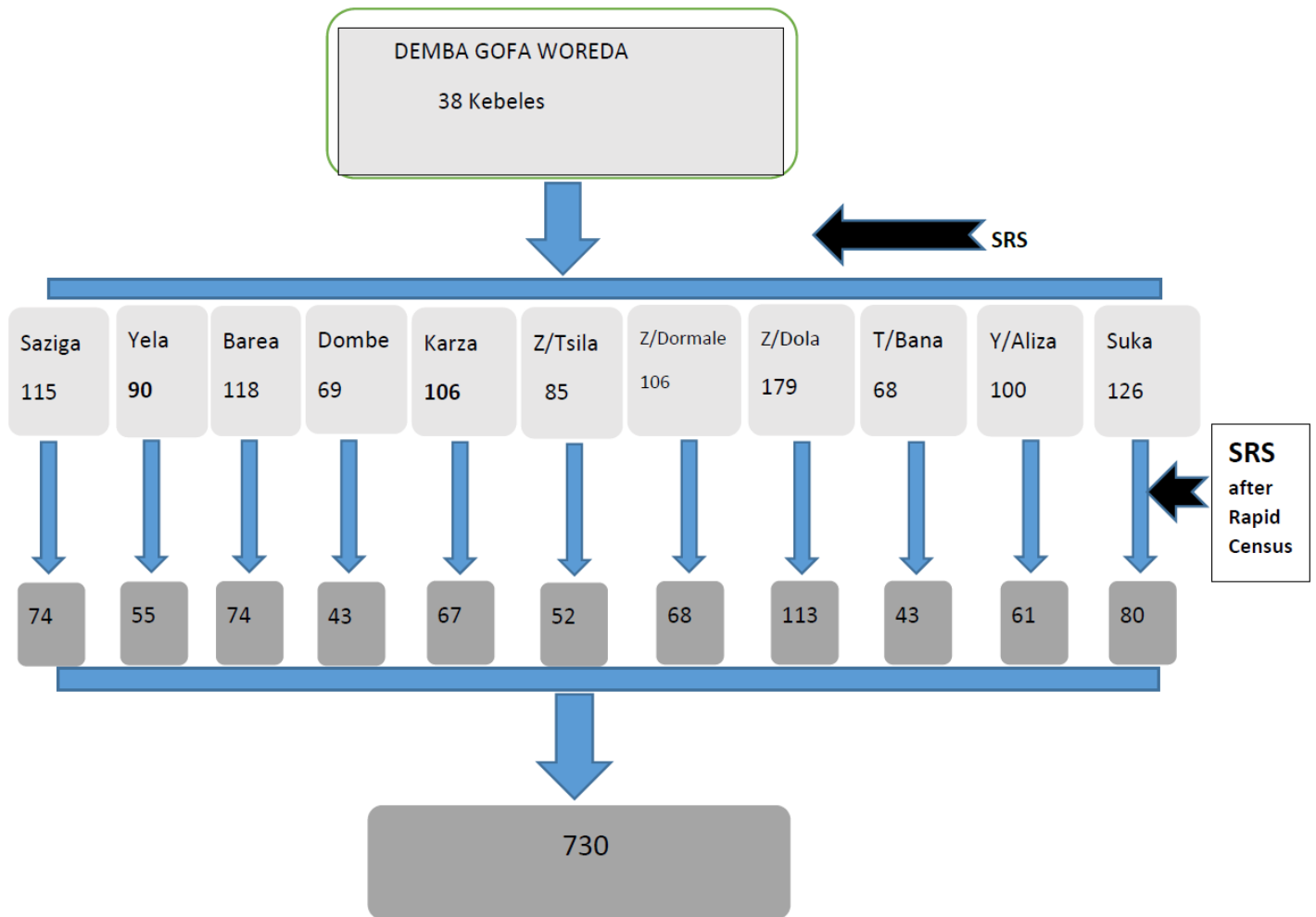


Figure 2. Schematic presentation of sampling procedure in Demba Gofa district, 2016

Figure 2: Schematic presentation of sampling procedure in Demba Gofa District, 2016

4.8 STUDY VARIABLE

4.8.1 DEPENDENT VARIABLE

- Nutritional status of children

4.8.2 INDEPENDENT VARIABLES

- Infant and young child feeding practices(dietary diversity, breast feeding status, meal frequency, avoiding bottle feeding, seven day food frequency score, hand washing practices)
- Infant and young child feeding index terciles

- Wealth index of the house hold, number of children in the household
- Child characteristics (age, sex and mothers' verbal report on episodes of diarrheal, cough and fever of child in the last two weeks)
- Maternal characteristics (age of mother; occupation of mother; educational status of mother; body mass index of mother (BMI), Antenatal and Post natal care visit, information on child feeding)

4.9 INFANT AND YOUNG CHILD FEEDING INDEX CREATION

IYCFI devised by Mary Arimond, Marie Ruel, and Purmina Menon of the International Food Policy Research Institute (IFPRI) and subsequently developed by IFPRI and the Food and Nutrition Technical Assistance (FANTA) project as a Knowledge-Practices Coverage KPC2000+ (67–69) was adapted to the local context to construct cross sectional child feeding index using the current feeding recommendations.

The infant and young child feeding index (ICFI) was included 7 components

The dietary diversity score include seven food groups which is adopted from the WHO indicators for assessing infant and young child feeding practices. Mothers were asked to report all food items and beverages given to the child during the previous day of the survey. Then, all food items and beverages consumed by the child were categorized into seven food groups as (1) grains, roots, and tubers, (2) legumes and nuts, (3) dairy products, (4) flesh foods, (5) eggs, (6) vitamin-A rich fruits and vegetables, and (7) other fruits and vegetables(10).

Each group was scored 1 point, if the group received by the child, if not received by the child scored 0 point and the total score of each child is 0 to 7. Scores were assigned to reflect the age specific distributions of infants in terciles (table 1).

The seven day quasi food frequency score was a modified food group frequency and measured as “How many days in the last seven days was given [food group]?” The number of days that a food group has consumed recorded for each child with a maximum of seven days.

The list of foods summed is the same as for the 24-hour diversity score, with the exception that grains have been combined with roots/tubers. In seven day food group frequency score, each food group was scored 0 if not given to the infant in the previous week, scored +1 if given one to three days, and +2 if given four or more days

in the previous week. These scores were then summed to give a possible range of 0 to 14. Based on this total score, a new score of 0-2 was assigned, reflecting the age-specific distribution. (Table 1)

The scoring of meal frequency was based on current feeding recommendations, according to which 6- to 8-months-old infants should receive complementary foods at least 2 to 3 times a day, 9- to 11-months-old infants at least 3 to 4 times a day, and 12- to 23-months-old children at least 3 to 4 times a day (67),(scoring system is shown on table 1)

Breast feeding and bottle use scoring: breastfeeding received a score of 2 for infants 6–12 months of age, a score of 1 for older children, and a score of 0 for non-breastfeeding children of any age. Avoidance of baby bottles was scored 1 (good practice), and their use received a score of 0 at any age because the practice is considered potentially harmful for all children.

Scoring for hand washing practices before cooking food and before feeding child: scoring system was to assign a score of 0 for a potentially harmful practice (**not washing hands**) and a score of 1 for a positive (**washing hands**) The list of variables and the scoring system used to create the child feeding index for the different age groups are presented in **Table 1**.

Table 1 Variables and scoring system used to create infant and young child feeding index for children aged 6-23 months, by age group

| Variables | 6 to 8months | 9 to 11 months | 12 to 23 months |
|--|---|--|---|
| Breast feeding | No = 0 Yes = 2 | No = 0 Yes = 2 | No = 0 Yes = 1 |
| Avoidance of bottle feeding | Yes = 1 No = 0 | Yes = 1 No = 0 | Yes = 1 No = 0 |
| Dietary diversity (past 24 hours) | Sum of: (grains, roots and tubers+ eggs +legumes and nuts + dairy products (milk, yogurt, cheese) + flesh foods (meat, fish, poultry and liver/organ meats) + vitamin A-rich fruits and vegetables +other fruits/veg (received, or did not receive each food/group). Scores is assigned reflecting the age-specific distributions observed (i.e., they reflect terciles). | | |
| | None of the foods/groups: Score = 0 One food/group: Score = 1 2 or more foods/groups: Score = 2 | None of the foods/groups: Score =0 One to two foods/groups: Score = 1 Three or more foods/groups: Score =2 | None of the foods/groups: Score = 0 Two to three foods/groups: Score = 1 Four or more foods/groups: Score = 2 |
| Frequency of feeding solids/semi solids (past 24 hours) | Not at all: Score = 0, Once: Score = 1 Two or more times: Score =2 | Not at all: Score = 0, Once or twice: Score = 1 Three or more times: Score = 2 | Not at all through once: Score = 0 Twice: Score = 1, Three times: Score = 2, Four times or more: Score =3 |
| Food frequency(past 7 days) | Each food group is scored as 0 if not given the previous week, +1 if given one to three days, and +2 if given four or more days. These scores are then summed to give a possible range of 0 to 14. As above, scores were assigned reflecting the age-specific distributions observed | | |
| | (no foods prev. week): Score = 0 One - two: Score = 1 Three or higher: Score = 2 | Zero through 1: Score = 0, Two through four: Score=1 Five or higher: Score = 2 | Zero through 3: Score = 0 Four through six: Score = 1 Seven or higher: Score = 2 |
| Wash hands with soap/ash before cooking food | Yes =1 No =0 | Yes =1 No =0 | Yes =1 No =0 |
| Wash hand with soap/ash before feeding the child | Yes =1 No =0 | Yes =1 No =0 | Yes =1 No =0 |
| Minimum/maximum | 0 / +11 | 0 / +11 | 0 / +11 |

4.10 DATA COLLECTION INSTRUMENT AND PROCEDURE

A pre-tested structured questionnaire was used to collect maternal characteristics, household characteristics, child characteristics and feeding practices of infant and child. Questionnaire adapted from KPC 2000+ model (67) was used to collect 24 hours recall and 7 day quasi food group frequency data of infant and child feeding practices. Questionnaire adapted from EDHS 2011(9) was used to collect socio demographic characteristics data. All the interviews and measurements were conducted at the residences of the study participants. Health professionals were recruited and trained for two days on data collection techniques. The data collection process was closely supervised and collected data were checked for completeness and inconsistencies in the field.

Birth date of infant and child was obtained from their immunization card and for those who didn't have this documents, the date was obtain from mother by verbal report.

4.10.1 ANTHROPOMETRIC MEASUREMENTS.

A recumbent length measurement was taken by trained nurses with their respective assistants (HDA) by using wooden measuring board precise to the nearest 0.1 cm. Two independent length measurements were taken, and the average was determined and was computed and expressed as z-scores by using WHO Anthro software and was classified according to the WHO Child Growth Standards (2007). The weight of infants and children was measured by Salter scale (spring balance) to the nearest 10g.

Mother's height and weight were measured twice. The weight was measured using electronic measuring scale (SECA) which is made from Frankfort, Germany and read to the nearest 0.1kg on bare foot and with the minimum possible light clothes and height was measured using a non-stretchable measuring tape standardized against a stadiometer then BMI was calculated.

4.10.2 WEALTH INDEX CREATION

For determination of socioeconomic status of household, wealth index was created from the variables adapted from EDHS 2011 household questionnaire using principal components analysis. These variables included house hold goods, farm animals, main source of drinking water; type of sanitation facility and main material of the floor and of the roof. Categorical variables to be used were transformed into separate dichotomous (0-1) indicators. These indicators and those that were continuous were then examined using a principal components analysis to produce a common factor score for each household. The correlation matrix for the variables contain 2 or more correlations of 0.30 or greater, variables sample adequacy greater or equal to 0.50 and the Bartlett test of sphericity is statistical significance

assumptions for principal component analysis were checked. Once the index was computed, wealth tertiles (from low to high) were obtained by assigning the household score to each household member.

4.11 OPERATIONAL DEFINITIONS AND DEFINITION OF TERMS

- **Child feeding index score:** A summary of 7 key feeding practices score that vary from a minimum of 0 to a maximum of 11 for infants and young children aged 6-23 months.
- **Child feeding practice status**
 - **Poor child feeding practice:** an infant and young child's summary feeding index score belonging to lower tertile of feeding index.
 - **Medium child feeding practice:** an infant and young child's summary feeding index score belonging to middle tertile of feeding index.
 - **Good child feeding practices:** an infant and young child's summary feeding index score belonging to higher tertile of feeding index.
- **Socio-economic status of house hold**
 - **Low socioeconomic status:** household which belonged to lower tertile of wealth index score.
 - **Medium socioeconomic status:** household which belonged to medium tertile of wealth index score.
 - **High socioeconomic status:** household which belonged to higher tertile of wealth index score.
- **Stunting:** length for age < -2 z-scores of the median WHO child growth standards.
- **Underweight:** weight for Age < -2 Z score of the median WHO child growth standards
- **Wasting:** weight for Length < -2 Z score of the median WHO child growth standards

4.12 DATA PROCESSING AND ANALYSIS

All data were checked for completeness, consistencies, coded and entered to Epidata 3.1 and were exported to SPSS version 20. WHO Anthro version 3.2.2.1 software was used for nutritional status analysis. The data were checked for outliers of Z-scores which were outside the WHO flags: WLZ -5 to 5; LAZ -6 to 6; and WAZ -6 to 5.

Descriptive statistics was computed for all continuous variables and frequency distribution was computed to evaluate the distribution of categorical variables.

To assess the association between infant and child feeding practices and nutritional status in bivariate analysis, chi-square test for trends and binary logistic regression were used.

The associations between the characteristics of the participants and the ICFI and also between the characteristics of the participant and the nutritional status of the child separately were tested to identify the potential confounders. For multivariate analysis, multiple logistic regression was used after adjusting for the confounders. Multicollinearity was checked by examining the standard errors for the b coefficients (a standard error larger than 2.0).

All tests was two-sided and $p < 0.05$ was considered for statistical significance. The internal consistency of the CFI components was measured by the Cronbach's α coefficient. The Cronbach's α value higher than 0.7 was generally considered to be satisfactory (70). The length for age (LAZ score), weight for Age (WAZ score) and weight for height (WHZ score) were computed and compared with reference data from World Health Organization growth chart.

4.13 DATA QUALITY CONTROL

Questionnaires was prepared first in English by the Investigator and then translated to Amharic by another individual who is native to Amharic and has an expert in translation. The questionnaire was translated back to English by another individual in order to maintain its consistency.

Data were collected by trained data collectors and pre testing of the instrument was made before the actual data collection. For this: investigator, supervisors and data collectors were a part in a pre-test of the survey questionnaire among 5% of the study subjects similar to the study population in Geze Gofa district kebele, which is adjacent to Demba Gofa district kebeles, and the necessary modifications and correction were made to standardize and ensure its validity.

The principal investigator and supervisors supervised the data collector on daily basis for completeness and consistence of the filled questionnaires.

4.14 ETHICAL CONSIDERATION

Ethical clearance was obtained from ethical committee of College of Public Health; Jimma University. A formal letter, written from the college of Public Health of Jimma University, was submitted to Demba Gofa district health office and the district administration office to obtain their co-operation. Then permission and support letter were written to each respective Keble's. The purpose of the study was explained to the study subjects. At the time of data collection, a verbal consent was taken from the participants to confirm whether they were willing to participate. Those not willing to participate were given the right to do so. Confidentiality of responses was also ensured throughout the research process.

4.15 DISSEMINATION PLAN

The findings of this study distributed to Gamo Gofa Zonal Health Department, Demba Gofa district health office and to other organizations working on related area. The findings may also be presented in different seminars, meetings and workshops. All effort will be made to publish the thesis in peer reviewed scientific journal

5. RESULTS

5.1 SAMPLE CHARACTERISTICS

From 730 sample size, 696 (95.34%) child-mother pair was participated in the study. The mean (\pm SD) age of mothers was 28.35 ± 4.4 years. Among study participants, 302(43.4%) can only read and write and majority of them 621(89.2%) were protestant. A large proportion of mothers 667(95.8%) were Gofa ethnic and 249(35.8%) mothers belonging to high wealth index(Table 2).

Table 2 Maternal and house hold characteristics of study participants in Demba Gofa district 2016

| Socio-demographic characteristics | Frequency(N=696) | percent |
|---------------------------------------|------------------|---------|
| Maternal age in years | | |
| 15-19 years | 11 | 1.6 |
| 20-24 years | 108 | 15.5 |
| 25-29 years | 247 | 35.5 |
| 30 and above years | 330 | 47.4 |
| Religion of mother | | |
| Protestant | 621 | 89.2 |
| Other religion of mother | 75 | 10.8 |
| Ethnicity of mother | | |
| Gofa ethnic | 667 | 95.8 |
| Other ethnics | 29 | 4.2 |
| Marital status of mother | | |
| Married | 689 | 99.0 |
| Divorced | 7 | 1.0 |
| Educational status of mother | | |
| Illiterate | 122 | 17.5 |
| Read and write | 302 | 43.4 |
| Primary and above level | 272 | 39.1 |
| Occupation of mother | | |
| House wife | 669 | 96.1 |
| Other occupations | 27 | 3.9 |
| Utilization of Health services | | |
| Mothers received ANC services | 546 | 78.4 |
| Mothers received PNC services | 535 | 76.9 |
| Wealth index status | | |
| Low SE status | 223 | 32 |
| Medium SE status | 224 | 32.2 |
| High SE status | 249 | 35.8 |

The mean (\pm SD) age of the children was 13.15 (\pm 5.27) months and 369(53%) were males. In the last 2 weeks, 57(8.2%) suffered from fever, 129(18.8%) from diarrhoea and 46(6.6%) from cough (Table 3).

Table 3 Child characteristics of the study participants in Demba Gofa district, 2016

| Child characteristics | | Frequency(N=696) | percent |
|--|-------|------------------|---------|
| Sex of child | | | |
| Male | | 369 | 53.0 |
| Female | | 327 | 47.0 |
| Total | | 696 | 100.0 |
| Age category of child | | | |
| 6-8 Month | | 194 | 27.9 |
| 9-11 Month | | 147 | 21.1 |
| 12-23 Months | | 355 | 51.0 |
| Total | | 696 | 100.0 |
| Episodes of diarrhoea, fever and cough in 2 weeks before the survey | | | |
| Diarrhoea | No | 567 | 81.5 |
| | Yes | 129 | 18.5 |
| | Total | 696 | 100.0 |
| Fever | No | 639 | 91.8 |
| | Yes | 57 | 8.2 |
| | Total | 696 | 100.0 |
| Cough | No | 650 | 93.4 |
| | Yes | 46 | 6.6 |
| | Total | 696 | 100.0 |

5.2 NUTRITIONAL STATUS OF CHILDREN 6–23 MONTHS

Among the study population 43.8% (95% CI: 40.13-47.5)), 15.8% (95% CI: 13.1-18.5)) and 3.5% (95% CI: 2.1-4.8) respectively were stunted (<-2 LAZ Score), wasted (<-2 WHZ Score), and underweight (<-2 WAZ Score) respectively (**Table 4**). When we see infants and children age in relation to under nutrition, of the three age groups, the highest prevalence of stunting, underweight and wasting found in 12-23 months age group children and the lowest found in 6-8 months age group children (**Figure 3**).

Table 4 **Nutritional status among 6-23 months of age children in Demba Gofa district, 2016**

| Age category of child | Nutritional status | | | | | |
|-----------------------|--------------------|-----------------|-------------------|-----------------|----------------|-----------------|
| | Length for age | | Weight for length | | Weight for age | |
| | Stunted | LAZ \geq -2SD | Wasted | WHZ \geq -2SD | Underweight | WAZ \geq -2SD |
| 6-8 Month n=194 | 39(20.1) | 155(79.9%) | 1(0.5%) | 193(99.5%) | 2(1%) | 192(99%) |
| 9-11 Month n=147 | 47(32%) | 100(68%) | 2(1.4%) | 145(98.6%) | 34(23.1%) | 113(76.9%) |
| 12-23 Months n=355 | 219(61.7%) | 136(38.3%) | 21(6%) | 334(94%) | 74(21%) | 281(79%) |
| Total N=696 | 305(43.8%) | 391(56.2%) | 24(3.4%) | 672(96.6%) | 110(15.8%) | 586(84.2%) |

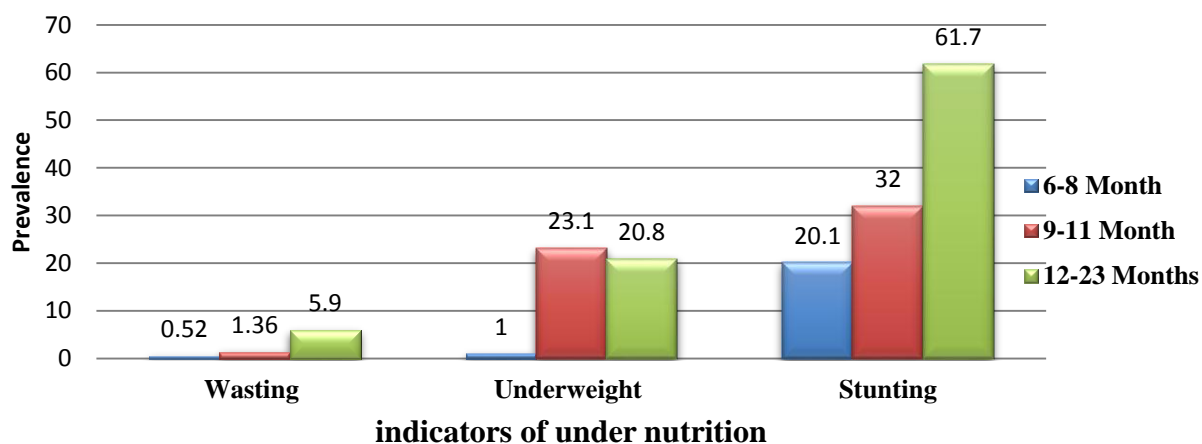


Figure 3: Infants and young children age in relation to undernutrition in Demba Gofa District, 2016

Mean Z score (mean \pm SD) of LAZ, WAZ and WHZ indices was $-1.68(\pm 1.07)$, $-0.69(\pm 1.1)$ and $0.25(\pm 1.2)$ respectively for all age groups. The distribution pattern of all three indicators mean Z score of LAZ, WAZ and WHZ across the age groups were declining when age increase (**Figure 4**).

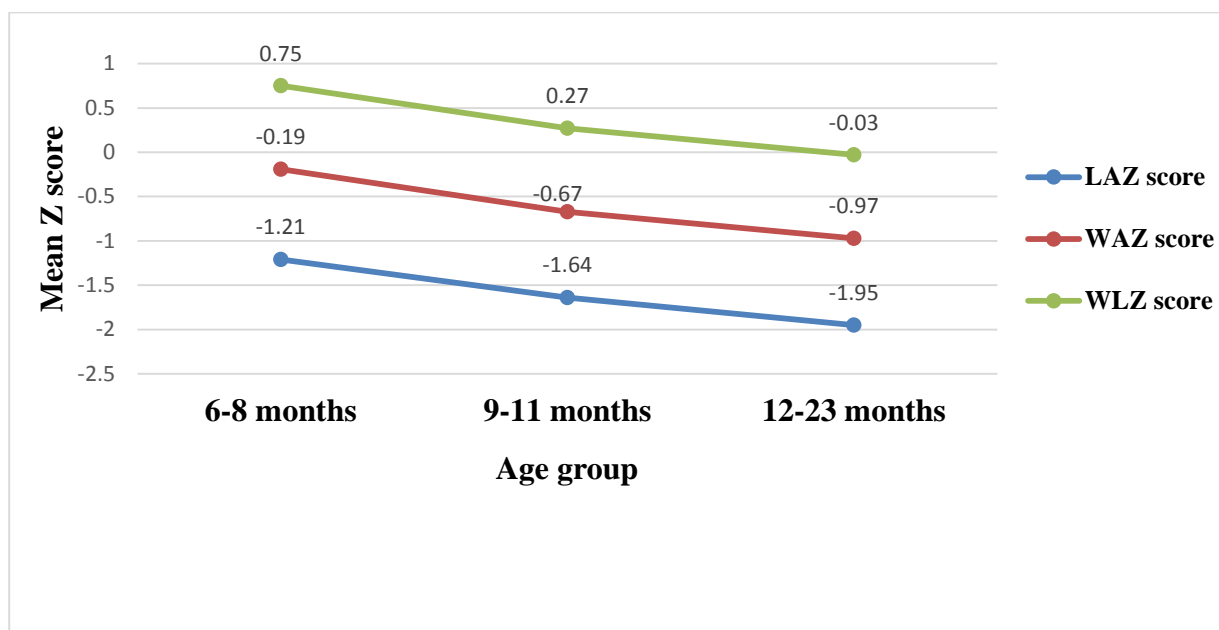


Figure 4: Distribution pattern of LAZ, WAZ and WHZ mean Z score among children by age groups in Demba Gofa District, 2016

5.3 INFANT AND YOUNG CHILD FEEDING PRACTICES IN DEMBA GOFA DISTRICT

In Demba Gofa district breastfeeding is universal practices. However, only 443(63.6%) mothers still breast-fed at the time of interview in all age groups. About 219(31.5 %) mothers used bottles with nipples for feeding milk and other liquids.

Among all children, 97(13.9%) children were not introduced complementary food. Forty four (22.6%) among 6-8 months age group infants, 37(25%) among 9-11 months age group infants and 16(4.5%) among 12-23 month age children were not introduced complementary food.

Proportion of infants and children obtained the highest score for the number of meal frequency that they ate in the last 24hrs were 148(76.3%), 79(53.7%) and 183(51.5%) among 6-8 months age, 9-11 months age and 12-23 months age group respectively and 140(72.2%), 64(43.5%) and 84(23.7%) among 6-8 months age, 9-11 months age and 12-23 months age group respectively for the number of food groups that they received in the last 24hrs. In both meal frequency and dietary diversity score, the highest proportion was observed in 6-8 months age group.

The individual combined food-frequency score for the past seven days ranged from 0 to 12, but it was theoretically ranged from 0-14. The mean \pm SD food frequency score was 4.7(\pm 2.4) for all infants and children. The highest mean \pm SD observed in 12-23 months age group (5.2 \pm 2.2)) and lowest observed in 6-8 months age group (4.09 \pm 2.48) (**Table 5**).

The food group received by the majority of children was grains, roots and tubers and the food group received by no one child was flesh foods (meat, fish, poultry and liver/organ meats) food groups in the last 24 hours and 7 days during the survey **Figure 5**.

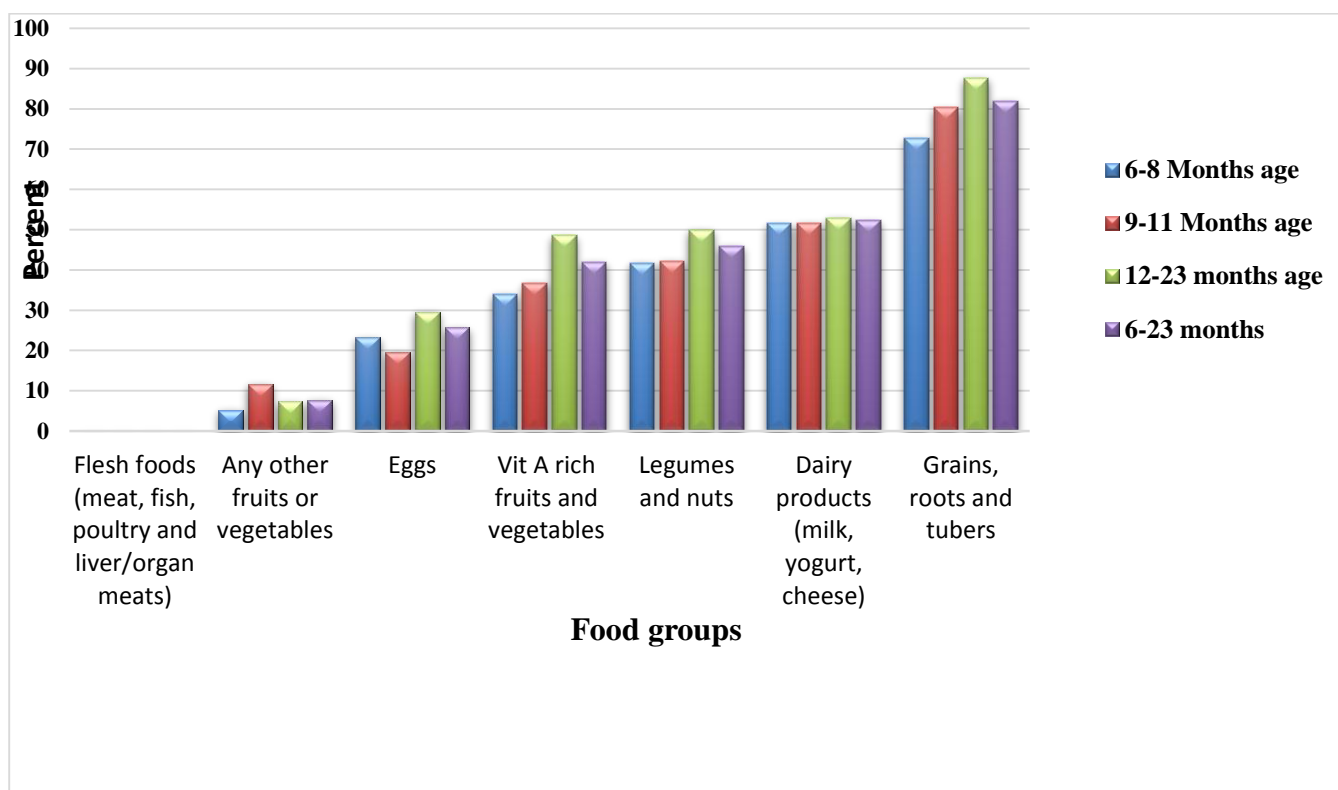


Figure 5: Food groups given to children in the last 24 hours at survey time in Demba Gofa District, 2016

The prevalence of hand washing with soap or ash before preparing food and before feeding child was 64.7% and 38.9% respectively in all mothers. In this study, not washing hands before preparing food and before feeding child were significantly associated with diarrheal disease ($p < 0.001$).

5.3.1 DISTRIBUTION OF INFANT AND CHILD FEEDING INDEX

The ICFI scores varied from the minimum 0 to the maximum 10 in this sample (but a theoretical maximum was 11). The mean (\pm SD) ICFI score of all children in the study was 6.14 ± 2.5 . The mean \pm SD ICFI scores ranged from a low value of $5.48 \pm (2.54)$ in 9-11 months old infants to a comparatively-higher value of 6.53 ± 2.5 in 6-8 months old infants (Table 5), which were almost half of the maximum possible score of 10, indicating a major gap in the child feeding practices. The ICFI can be used for determining the gap between the practices being followed and the optimal practices and, hence, can be used as a screening tool at the community level. The ICFI scores were divided into low (score ≤ 4), medium (score 5-7), and high (score 8-10) terciles. Among all infants and young children, 208(29.9%), 212(30.5%) and 276(39.6%) fell into the low, medium and high category of child feeding index respectively (**Figure 6**).

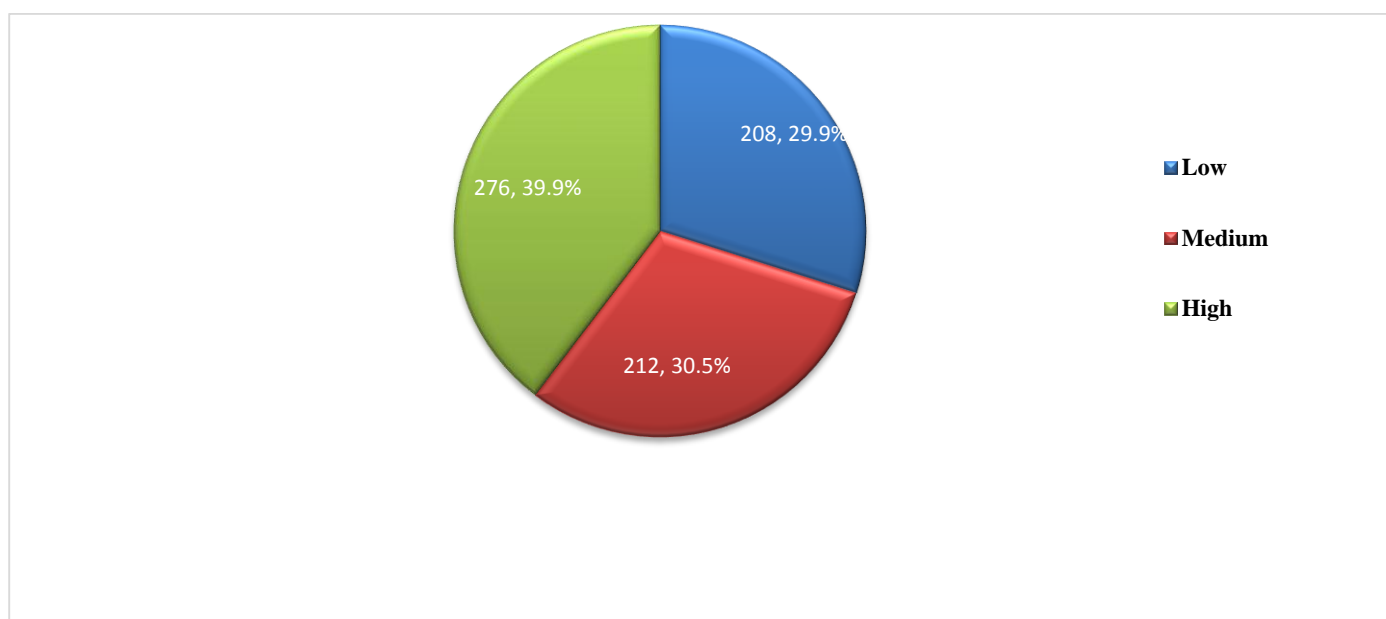


Figure 6: Distribution of children by their feeding index terciles in Demba Gofa District, 2016

When we see the distribution of children by their feeding terciles in relation to age group, the highest proportion of infants and children fell in to high feeding index tercile was found in the younger age infants (6-8 months age) (**Figure 7**).The proportion of infants and children fell in to high child feeding index tercile among all age group as well as in each age group was below 50%.

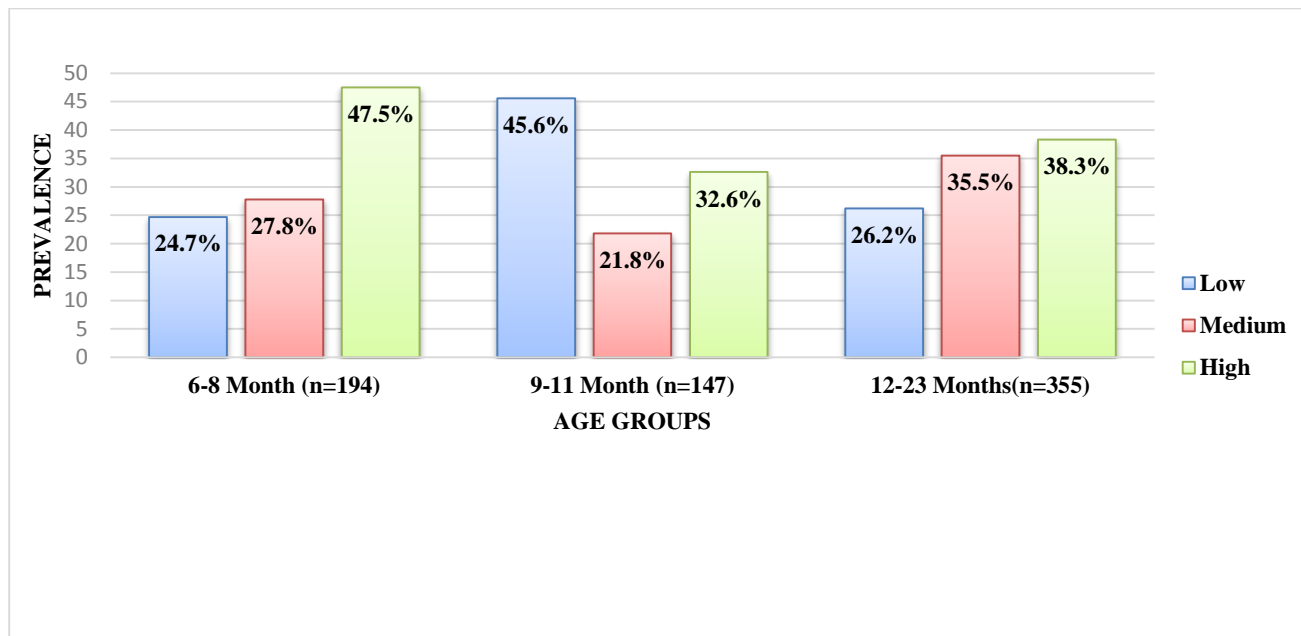


Figure 7: Distribution of children by their feeding index terciles in relation to age groups in Demba Gofa District, 2016

The mean score of micronutrient and energy source components of child feeding index were also examined. The mean age specific score of 7 days food frequency, dietary diversity, and meal frequency for 6-8 months age group was 1.6/2, 1.57/2 and 1.54/2 respectively. All the three mean score were satisfactory and resulting to a considerably improved child feeding index. Whereas at age 9-11 months the mean score of 7 day food frequency, dietary diversity and meal frequency were not satisfactory (1.3/2, 1.36/2 and 1.29/2 respectively), leading to a relatively low child feeding index. The same was true at age 12-23 month as at age 9-11 months except meal frequency score, $\frac{1}{2}$ for 7 days food frequency score, 1.13 for dietary diversity score, 2.26/3 for meal frequency score. For all age groups mean value of avoiding bottle feeding was satisfactory, 0.7/1 for 6-8 months, 0.65/1 for 9-11 months, and 0.67/1 for 12-23 months. 6-8 months age meal value of avoiding bottle feeding was still high comparing with other age groups (**Figure 8**).

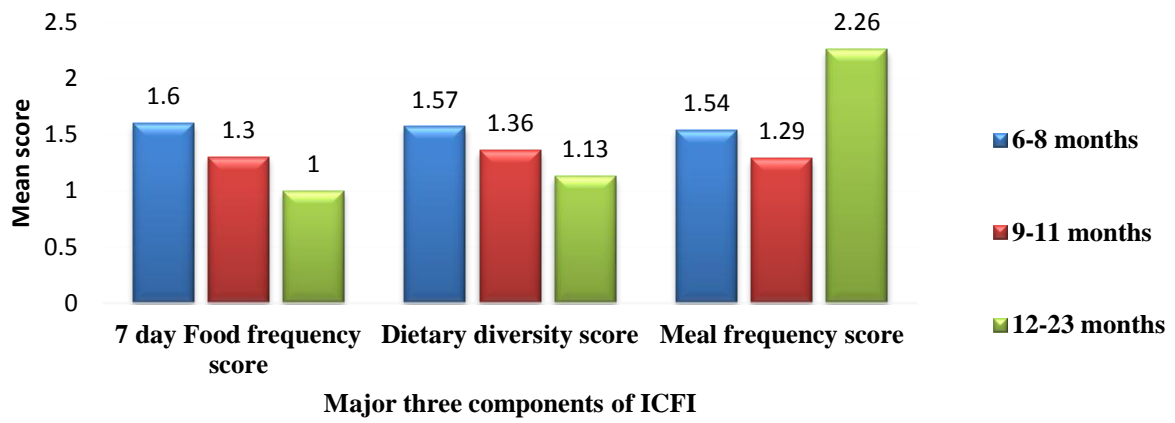


Figure 8: Mean score of age specific 7 days food frequency, 24hours DDS and meal frequency score by age groups

Table 5 Results of Key child feeding practices/ indicators in Demba Gofa district, 2016

| Feeding practices | | All age (N=696) | Age category of child | | |
|---|---------------------|------------------------|-------------------------|--------------------------|----------------------------|
| | | | 6-8 Month (n=194) | 9-11 Month (n=147) | 12-23 Months (n=355) |
| Number of children received Legumes and nuts in the last 24 hours | | 320(46%) | 81(41.8%) | 62(42.2%) | 177(49.9%) |
| Number of children received any other fruits or vegetables in the last 24 hours | | 53(7.6%) | 10(5.2%) | 17(11.6%) | 26(7.3%) |
| Number of children received Egg in the last 24 hours | | 179(25.7) | 45(23.2%) | 29(19.7%) | 105(29.6%) |
| Number of children received flesh foods (meat, fish, poultry and liver/organ meats) eaten in the last 24hrs | | 0(0%) | 0(0%) | 0(0%) | 0(0%) |
| Number of children avoided Bottle feeding | | 477(68.5) | 143(73.7%) | 96(65.3%) | 238(67.1%) |
| Number of children still breastfeeding | | 443(63.6) | 151(77.8%) | 88(59.8%) | 204(57.5%) |
| Number of children received dairy products (milk, yogurt cheese) in the last 24 hours | | 364(52.3) | 100(51.5%) | 76(51.7%) | 188(52.9%) |
| Number of children received grains, rooter and tuber in the last 24 hours | | 570(81.9) | 141(72.7%) | 118(80.3%) | 311(87.6%) |
| Number of children received Vitamin A rich fruits and vegetables in the last 24 hours | | 292(42%) | 66(34%) | 54(36.7%) | 172(48.5%) |
| Mean of dietary diversity score | No of food groups | 2.55 | 2.29 | 2.41 | 2.75 |
| Children not introduced Complementary food | No of food children | 97 (13.9%) | 44 (22.6%) | 37 (25.1%) | 16(4.5%) |
| Proportion of infants and children obtained the highest score for the number of meal frequency | No of meal | | >=2 meals | >= 3 meals | >=4 meals |
| | Percent | 410(58.9) | 148(76.3%) | 79(53.7%) | 183(51.5%) |
| Proportion of infants and children obtained the highest score for the number of dietary diversity score | No of food groups | | ≥2 food groups | ≥3 food groups | ≥4 food groups |
| | Percent | 288(41.4) | 140(72.2%) | 64(43.5) | 84(23.7%) |
| Hand washing with soap/ash before preparing food | Yes | 450(64.7) | 130(67%) | 78(53%) | 242(68.2%) |
| Hand washing with soap/ash before feeding the child | Yes | 271(38.9) | 79(40.7%) | 51(34.7%) | 141(39.7%) |
| Mean of Meal frequency in the last 24 hours | Meal number | 3.2 | 2.9 | 2.78 | 3.5 |
| Mean of seven days food frequency score(not age specific score) | Mean(±SD) | 4.7(±2.4) | 4.09(±2.48). | 4.3(±2.61) | 5.2(±2.2)) |
| Mean of child feeding index | Mean(±SD) | 6.14(±2.5) | 6.53(±2.5) | 5.48(±2.5) | 6.19 (±2.5) |

5.3.2.1 INTERNAL CONSISTENCY OF INFANT AND CHILD INDEX

The Cronbach's α coefficient was used to estimate internal consistency of the index. For all age groups, when all 7 (seven) items of the index were included, the value of the Cronbach's α coefficient was 0.584, which was below acceptable range (<0.70). But, removing breast feeding from the index increased the Cronbach's α coefficient to the acceptable range (0.705). The correlation of current breast feeding with the total summary index was also very weak (table 5). Therefore, to create composite variable of child feeding practices, current breastfeeding score was removed from the index creation. Without current breast feeding score, the Cronbach's α coefficient of this study was good for the three age groups. For 6-8 months of age 0.744 (95% CI: 0.684-0.797); for 9-11 months of age 0.778 (95% CI: 0.717-0.829); for 12-23 months of age 0.738 (95% CI: 0.693-0.778).

The ICFI showed positive and strong correlation with seven day food group frequency, 24 hour meal frequency score, and 24 hour food diversity score (**Table 6**).

Table 6 Internal consistency of IYCFI and its correlation with IYCFI components among infants and children Demba Gofa District in, South Ethiopia, 2016

| Components of ICFI | All (N=696) | | 6-8 Months(n=194) | | 9-11 Months (n=147) | | 12-23 months(n=355) | |
|---|--|--|---|----------------------------------|--|----------------------------------|--|----------------------------------|
| | correlation of each component with IYCFI | Cronbach's α value when all items included= 0.584 | Cronbach's α value when all items included= 0.58 | | Cronbach's α value when all items included= 0.562 | | Cronbach's α value when all items included= 0.694 | |
| | | Cronbach's Alpha if Item Deleted | correlation of each component with IYCFI | Cronbach's Alpha if Item Deleted | correlation of each component with IYCFI | Cronbach's Alpha if Item Deleted | Correlation of each component with IYCFI | Cronbach's Alpha if Item Deleted |
| Age specific score of hand washing before feeding child | .525 | .531 | .336 | .584 | .635 | .470 | .583 | .645 |
| Age specific score of hand washing before cooking food | .666 | .508 | .587 | .523 | .730 | .478 | .674 | .631 |
| Age specific score of avoiding bottle feeding | .390 | .564 | .319 | .582 | .292 | .551 | .462 | .681 |
| Age specific Meal frequency score | .751 | .563 | .865 | .371 | .806 | .443 | .805 | .631 |
| Age specific dietary diversity score | .712 | .462 | .872 | .378 | .788 | .430 | .640 | .648 |
| Age specific 7 days food frequency score | .754 | .432 | .802 | .436 | .825 | .389 | .770 | .616 |
| Age specific Breast feeding score | -.096 | .705 | -.204 | .744 | -.233 | .778 | .020 | .738 |

5.4 THE ASSOCIATION BETWEEN NUTRITIONAL STATUS AND INFANT AND YOUNG CHILD FEEDING INDEX TERCILES

The analyses of chi-square test for trends between feeding index terciles and stunting, underweight and wasting were done. The association between child feeding index terciles and stunting, underweight and wasting were significant ($P < 0.001$). The **figure 9** shows relationship between the prevalence of Stunting, Underweight, and Wasting, and the IYCFI terciles for the children. The feeding index terciles are relates more consistently to outcomes in the three nutritional status indicators.

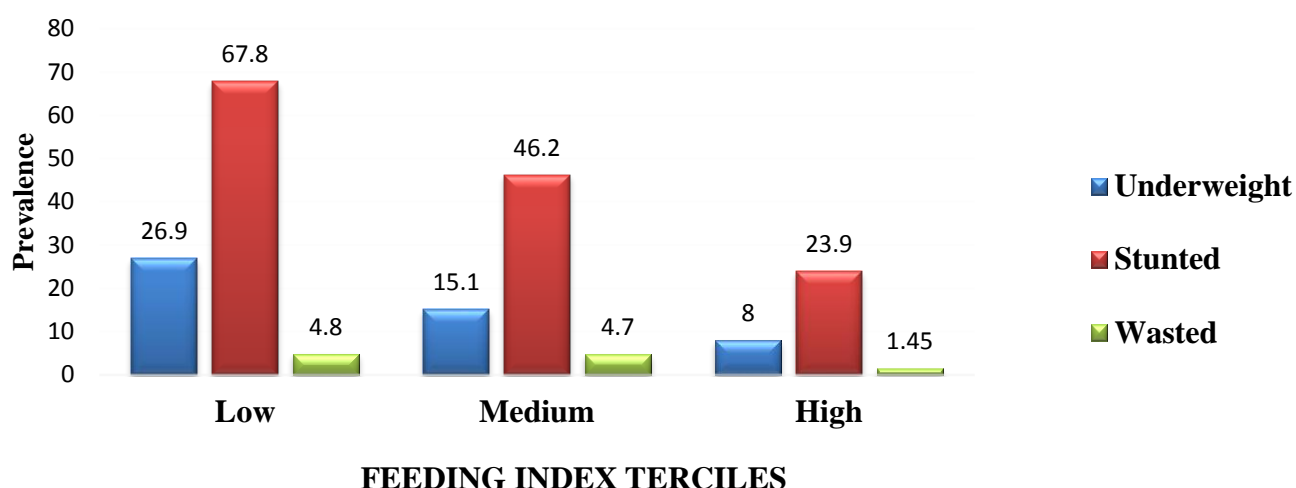


Figure 9: The relationship between underweight, stunting and wasting prevalence and IYCFI terciles in Demba Gofa District, 2016

The association of high child feeding index tercile and low child feeding index tercile with stunting, underweight and wasting respectively examined by multiple logistic regression.

After controlled for potential confounders, Low feeding index tercile was positively and significantly associated with stunting and underweight respectively whereas high feeding index tercile was negatively and significantly associated with stunting and underweight respectively as compared to medium feeding index tercile. There was no any association between wasting and infant and child feeding index tercile (**Table 7-9**).

However, many factors in bivariate analysis were significantly associated with under-nutrition, few were significantly associated with under nutrition in multivariate analysis. Mothers did not attend any formal school and being older age child were positively and significantly associated with stunting whereas mothers who had more frequent visiting of PNC clinic was significantly reduce the odds of stunting. Being male child, older age child (12-23 months age) and high number of under five children in the house were significantly associated with underweight. Diarrhoea and high number of under five children in the house were positively and significantly associated with wasting (**Table 7-9**).

Table 7 Bivariate and multivariate logistic regression model predicting the likelihood of being stunting among children

| Independent Variables | | Yes | No | COR | AOR(95% C.I. for AOR) | P. value |
|--|--|-----|-----|-------|-----------------------|-----------|
| Age category of child | 6-8 Month (Reference) | 39 | 155 | 1 | 1 | |
| | 9-11 Month | 47 | 100 | 1.9* | 1.2(0.6-2.2) | 0.659 |
| | 12-23 Months | 219 | 136 | 6.4* | 10.5(6.0-18.3) | < 0.000.1 |
| Ethnicity of mother | Other ethnic (Reference) | 8 | 21 | 1 | 1 | |
| | Gofa ethnic | 297 | 370 | 2.1 | 0.99(0.34-2.9) | 0.996 |
| Religion of mother | Other religion (Reference) | 28 | 47 | 1 | 1 | |
| | Protestant | 277 | 344 | 1.4 | 1.1(0.53-2.26) | 0.798 |
| Maternal age | ≥20 years (Reference) | 271 | 364 | 1 | 1 | |
| | maternal age 15-19 years | 34 | 27 | 1.7 | 0.72(0.33-1.5) | 0.397 |
| house wife | Other occupation (Reference) | 5 | 22 | 1 | 1 | |
| | House wife | 300 | 369 | 3.6* | 3.1(0.9-10.9) | 0.080 |
| Educational status of husband | Illiterate | 22 | 19 | 1.97 | 7.6(3.02-19.2) | < 0.000.1 |
| | Read and write | 133 | 117 | 1.9 | 1.7(1.039-2.8) | 0.035* |
| | Primary School and above (Reference) | 150 | 255 | 1 | 1 | |
| Educational status of Mother | Illiterate | 67 | 55 | 2.1 | 1(0.514-1.9) | 0.999 |
| | Read and write | 138 | 164 | 1.45 | 1.7(0.99-2.9) | 0.051 |
| | Primary School and above (Reference) | 100 | 172 | 1 | 1 | |
| The child still breastfeeding | No | 128 | 125 | 1.54* | 1.5(0.99-2.4) | 0.055 |
| | Yes (Reference) | 177 | 266 | 1 | 1 | |
| Child Feeding Index terciles | Low child feeding index | 141 | 67 | 2.4* | 3.3(1.9-5.8) | < 0.000.1 |
| | Average child feeding index (Reference) | 98 | 114 | 1 | 1 | |
| | Good child feeding | 66 | 210 | 0.4* | 0.45(0.27-0.75) | 0.002* |
| Number of < 5 years children in the house (mean±SD) (1.74±0.5) | | 305 | 391 | 1.2 | 0.76(0.49-1.2) | 0.219 |
| Number of PNC visit (mean±SD) (1.85±1.2) | | 305 | 391 | 0.4* | 0.38(0.31-0.47) | < 0.000.1 |
| *significant at 0.05 | | | | | | |

Table 8. Bivariate and multivariate logistic regression model predicting the likelihood of being underweight among children

| | | Underweight | | | | |
|--|--|-------------|-----|------|-----------------------|-----------|
| | | Yes | No | COR | AOR(95% C.I. for AOR) | P. value |
| Child Feeding Index terciles | Low child feeding index | 56 | 152 | 2.1* | 2.4(1.39-4.2) | 0.002* |
| | Average child feeding index (Reference) | 32 | 180 | 1 | | |
| | Good child feeding | 22 | 254 | 0.5* | 0.42(0.23-0.78) | 0.006* |
| Educational status of Mother | Illiterate | 10 | 112 | 0.85 | 0.57(0.25-1.3) | 0.167 |
| | Read and write | 74 | 228 | 3.1 | 2.6(1.5-4.4) | 0.001* |
| | Primary School and above (Reference) | 26 | 246 | 1 | 1 | |
| Age of child | 6-11 month age (Reference) | 36 | 305 | 1 | 1 | |
| | 12-23 month age | 74 | 281 | 2.2* | 2.04(1.26-3.3) | 0.004* |
| Sex of child | Male | 71 | 298 | 1.8 | 1.63(1.01-2.6) | 0.042* |
| | Female (Reference) | 39 | 288 | 1 | 1 | |
| Number of < 5 children in the house (mean±SD) (1.74±0.5) | | 110 | 586 | 4.8* | 3.6(2.03-6.4) | < 0.000.1 |
| Number of PNC visits (mean±SD) | | 110 | 586 | 0.8* | 0.95(0.78-1.2) | 0.598 |
| *significant at 0.05 | | | | | | |

Table 9. Bivariate and multivariate logistic regression model predicting the likelihood of being wasting among children

| | | Wasting | | | | |
|--|--|---------|-----|-------|-----------------------|---------|
| | | Yes | No | COR | AOR(95% C.I. for AOR) | P.value |
| Child Feeding Index terciles | Low child feeding index | 10 | 198 | 1.02 | 0.44(0.15-1.3) | .141 |
| | Average child feeding index (Reference) | 10 | 202 | | 1 | |
| | Good child feeding | 4 | 272 | 0.29* | 0.4(0.12-1.3) | .119 |
| Diarrheal attack in the last 2 weeks | No (Reference) | 12 | 555 | | 1 | |
| | Yes | 12 | 117 | 4.7* | 3.4(1.2-9.9) | .024* |
| Number of < 5 children in the house (mean±SD) (1.74±0.5) | | 24 | 672 | 2.74* | 2.45(1.06-5.6) | .036* |
| Number of ANC visits (mean±SD) (2.5±1.5) | | 24 | 672 | 0.76* | 0.99(0.7-1.36) | .961 |
| Age of child in a month (mean±SD) (13.2±5.3) | | 24 | 672 | 1.1* | 1.06(0.98-1.15) | .168 |
| Age of mother in a year (mean±SD) (28.4±4.4) | | 24 | 672 | 0.9* | 0.86(0.77-0.96) | .009* |
| *significant at 0.05 | | | | | | |

6. DISCUSSION

This study has assessed nutritional status; infants and young children feeding practices using a summary index among 6-23 months age children and examined the association between nutritional status and IYCF summary index.

The prevalence of stunting (43.8%) was high in the sample as compared to national prevalence (40%) and nearly equal to SNNPR's prevalence (44.1%). But underweight and wasting prevalence (15.8% and 3.45%) respectively were low as compared to the national and SNNPR. The distribution of all three indicators of under nutrition were getting worse when age increase. Which were similar findings as the previous studies in our country(4,22).

To assess child feeding practices by summary index of key infant and child feeding practices (composite variable), internal consistency of seven items (components) was checked. For all age groups, when all 7 (seven) items of the index were included in the reliability analysis, the value of the Cronbach's α coefficient was 0.584. Which was below acceptable range (≤ 0.70)(71). But removing current breast feeding from the reliability analysis increased the Cronbach's α coefficient to the acceptable range, which was 0.705. The correlation of current breast feeding with the total summary index for all age groups as well as for each age group was also very weak and negative (**table 6**). Therefore, as mentioned earlier in the result part, to create child feeding index, current breast feeding score was removed from the index creation and treated as another independent variable in the model. This indicated that breast feeding had weak and negative correlation with other complementary dimensions. This again implicate breast feeding practice displace other complementary feeding practices. This finding is consistent with the study done in rural Senegal that omitting breast feeding component from the index increase value to 0.82(72). In the current study, the internal consistency of IYCFI was good for all aged children; however, it was relatively low for older age group (12-23 months of children. This finding is consistence with the finding from rural Burkina Faso which showed that the internal consistency was good for the youngest infants (6–11 months) ($\alpha = 0.79$) and lower among children aged 12–23 months (Cronbach's $\alpha = 0.63$)(17). The correlation of dietary diversity, meal frequency and 7 days food frequency were strong and positive for 6-8months and 9-11 months age infants, whereas for 12-23 months age children only meal frequency and 7 days food frequency were strongly and positively correlated, dietary diversity was moderately correlated for this age group. This means that the number of food groups given to a child was not increasing while the age of children increase.

The mean IYCFI score for 6-8 months age-group (6.53) was the highest as compared to other age groups whereas mean IYCFI score for 9--11 months old infants (5.48) was the lowest scores. In general, for all age groups, mean child feeding index score is not satisfactory because it is almost half of the maximum value of ten (10) (**table 5**). This indicates more gaps in the child feeding practices among all age groups. Decreasing of IYCFI score when age increase in the present study is not consistent with the findings of the study done in rural India which reported child-feeding index score increase with age increase(14). The reason of inconsistency might be, majority of 6-8 months age children introduced complementary food as compared to the Indian infants. Only nine infants started complementary food at 6 months of their age. In this study, however, majority of infants started complementary food; it was not adequate when the age of children increase. Black et al. reported that even with optimum breastfeeding, children will become stunted if they do not receive an adequate quantity and quality of complementary foods after six months of age(24). Our findings are in line with the report by Black et al. The micronutrient and energy source components of the index, i.e. seven days food frequency, dietary diversity and meal frequency mean score for 9-11 month and 12-23 months age groups were relatively poor whereas the stunting, underweight and wasting prevalence were high among them.

The distribution of children by their feeding index terciles for the children was 29.9% of children fell in to poor infant and child feeding practice while 39.9% of them were fell in to good infant and child feeding practice (**figure 6**). The result reflected that feeding practices of the majority mothers were not optimal for the children. The analysis of feeding index terciles in relation to age groups showed that most of the infants 92(47.5%) in the youngest age group (6–8 months) were found in the good infant and child feeding practice and 93(26.2%) of children among the oldest age group (12-23 months age) were found in the poor infant and child feeding practice (**figure 7**). This high prevalence of poor feeding practices for 9-11 months and 12-23 months age group may be attributed to the high prevalence of under-nutrition in these age groups. The result of multiple logistic regression analysis of this study also showed that being older age (12-23 months) was significantly associated with stunting and underweight ($P < 0.001$).

In sum, in the current study, even though breast feeding practice removed from the index creation because of its internal inconsistency with other components, the younger children (6-8 months) were more likely to be fed better than the older ones (12-23 months), and this may be because they are perceived to be very vulnerable or weak and therefore in need of more attention compared to older children who may be regarded as strong enough to feed on the adult diet and according to adult meal frequency.

In the sampled children of this study, the complementary feeding practices which were identified to be undesirable were bottle feeding practice, no introduction of complementary feeding for few

children in each age group, and no feeding of flesh food group (meat, poultry, and organ meats) to their children. These undesirable feeding practices also contributed to the low mean score of infant and child feeding index.

In this study, the association between feeding index terciles and stunting and underweight by multivariate logistic regression analysis after adjusting the potential confounders showed that poor infant and young child feeding practice was positively and good infant and young child feeding practice was negatively associated with both stunting and underweight as compared to medium infant and young child feeding practices (**Table 7- 8**). There was no any association between wasting feeding index terciles in this study (**Table 9**). Wasting prevalence was very low in this study; it might be the reason for no association with IYCFI. Studies in Ethiopia, Latin America and Burkina Faso reported that infant and child feeding index was a predictor of HAZ and WAZ score(11,16,17,28). The studies done in India, Garg et al. reported association between child feeding index score and under nutrition(14) whereas Srivastava et al. failed to find so(12). The result of current study showed that children belonged to poor feeding practice 2.4 times more likely to be underweighted as compared to children belonged to medium feeding practice whereas children belonged to good child feeding practice 55% less likely to be stunted as compared to children belonged to medium child feeding practices. This indicated that better feeding practices improve the nutritional status of children. This finding is similar with the study done in West Bengal, India, the finding on that study was Per unit increase in standardized IYCF score, under nutrition by all three indicators was likely to be reduced by 2-3% and the association was significant after adjustment for the potential confounders(58).The finding of this study contradicts the findings of a study in urban settings of Ethiopia(37) where the composite index was unable to show an impact on nutritional status in the multivariate model.

However, many factors in bivariate analysis were significantly associated with under-nutrition; few were significantly associated with under nutrition in multivariate analysis.

The result of the present study indicated that child's age is determinant factors of stunting in the study area. The finding of this study showed that the risk of stunting increases with age. Children in the age group 12-23 months were at significantly higher risk of stunting compared with children in the youngest age category (≤ 8 months). This result is consistent with other studies in Ethiopia(4,9,36). This needs attention since particularly stunting is associated not only with poor physical growth but also affects cognitive abilities that are irreversible after 2 years of age. For nutritional interventions also, children younger than 24 months of age responded much more rapidly to the improvement than older children. After a child reaches 2 years of age, it is very difficult to reverse stunting that has occurred earlier(23).

Mothers did not attend any formal school was positively and significantly associated with stunting as compared to mothers attended formal education whereas mothers who had more frequent visit of PNC clinic was significantly reduce the odds of being stunting. This result is consistent with the studies done in Arbaminch and Kamba Woreda Southern Ethiopia(20,21).

Being male child, older age child (12-23 months age) and high number of underfive children in the house were significantly associated with underweight.

In this study, a high prevalence of wasting was observed among children who had diarrhea in the two weeks before the survey as compared to children who had no diarrhea and its incidence is positively associated with wasting. This result is consistent with the studies done in West Gojam Zone and Somali region of our country, Ethiopia(36,42). High number of underfive children in the house were also positively and significantly associated with wasting as compared to low number of children.

In general, a number of interrelated maternal, child and household characteristics and morbidities of diarrhea, cough and fever were known to be associated with feeding practices and nutritional status of 6-23 months age children. Significant negative association of good infant and child feeding practice and significant positive association of poor infant and young child practice with undernutrition particularly stunting and underweight among 6-23 months age children after adjusting for other related factors highlighted its crucial role in child nutrition.

7. STRENGTH OF THE STUDY

It was a community-based assessment with almost 95.34% response rate and aimed at assessing nutritional status of infants and young children and mothers real IYCF practices while visiting in their own natural environment.

8. LIMITATION OF THE STUDY

During the study, we collected information on the feeding practices of children for the last 24 hours and for the previous one week. This might be influenced by some recall bias.

The study employed a cross-sectional study design which could not establish a cause and effect relationship between the dependent and independent variables.

9. CONCLUSION

The prevalence of malnutrition particularly stunting was high among 6-23 months age children and also optimal feeding practices, as estimated by ICFI, were not satisfactory (only 39.9%) among the study participants. This means that only 4 out of every ten children in our study received good feeding.

The advantage of composite index was that it was age-specific and could capture multiple key dimensions of IYCF practices considering possible combined influence. The present study might add to the evidence in favour of implementing IYCF practices for reducing undernutrition among young children in the context of our country.

In the current study, children who belonged to poor child feeding practices were significantly stunted and underweight as compared to children who belonged to medium child feeding practice whereas children belonged to good child feeding practices has better nutritional status as compared to children belonged to medium child feeding practices.

Decreasing of ICFI score and increasing of stunting, underweight and wasting prevalence when the age of children increased in this study reflected that infant and child feeding practices were not age appropriate and low attention have been given when the age of children increased.

10. RECOMMENDATION

This study showed that better feeding practice significantly reduced the occurrence of undernutrition among children. Therefore, improving feeding practices is crucial to tackle the markedly increasing malnutrition rate when the age of children increased.

- Decision makers and program implementers had better evaluate the implementation of nutrition guidelines that are being implemented at grass root level.
- Demba Gofa District health office and other stakeholders should strengthen Behavior Change Communication (BCC) on complementary feeding practices
- Health workers and health extension workers should educate mothers on complementary feeding by emphasizing the importance of increasing consistency and variety of food, increasing meal frequency when the of age child increase

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12. APPENDIX

12.1 QUESTIONNAIRES

JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH

SURVEY QUESTIONNAIRE TO ASSESS CHILD FEEDING PRACTICES USING SUMMARY INDEX AND ITS ASSOCIATION WITH STUNTING STATUS AMONG CHILDREN 6 TO 23 MONTHS OF AGE IN DEMBA GOFA DISTRICT, SNNPR, ETHIOPIA.

POST-GRADUATE IN HUMAN NUTRITION (MSC)

Study Title: Read for the study participants

Introduction and Purpose of the study

Consent Form

My name is _____ I am interviewing mothers who have child 6 month up to 23 months age to assess the practice of child feeding. The objective of this study is to assess child feeding practices among mothers and nutritional status among children in Demba Gofa district. I am going to ask you some questions that are very important for the programmers in infant and young child feeding service to plan improved intervention. Your name will not be written in this form and the information you give is kept confidential. If you do not want to answer, all or some of the questions you do have the right to do so. However, your willingness and support to answer all of the questions would be appreciated.

Would you participate in responding to questions in this questionnaire?

Yes _____ No _____

If No, acknowledge the respondent and proceed to the next respondent

Name and signature of interviewer who sought consent _____ **date** _____

GENERAL INSTRUCTIONS (asking questions and recording answers)

All questions in this paper are based upon maternal recall. It is very important that you ask each question exactly as it is written on the questionnaires. In addition to the questions, the rare statements that are appear in all bolded capital letters, indicating that they are interviewer instructions and should not be read aloud to the mother.

House number _____ Keble _____

Part 1: Socio-demographic characteristics

| S. N o | Socio-demographic variables. | Response format |
|--------------|--|---|
| Q 10 1 | Age of mother (completed in years) | Age in years _____ |
| Q 10 2 | Number of member of persons living in the house hold | |
| Q 10 3 | Religion | Protestant.....1 Orthodox2 Muslim.....3 Catholic.....4 Others(specify) |
| Q 10 4 | Ethnicity | Gofa1 Gamo.....2 Amhara.....3 Kembata.....4 Oyda5 Wolaita.....6 Others(specify) _____ |

| | | |
|--------------|--|---|
| Q 10 5 | Marital status | Married....1 Single...2 Divorced.3 Widowed--- . 4 |
| Q 10 6 | What is the highest grade you completed? | Illiterate_____1 Read and write _____ 2 Primary level(1-6)_____ 3 Secondary level(9- 12)_____ 4 Collage level and above_____5 |
| Q10 7 | Current occupational status? | Farmer.....1, Government employee.....2 Non-governmental employee.....3, Private sector_____4 Business women_____ 5, House wife_____6 Daily laborer_____ 7 House maid _____8 Student_____9 Other(Specify)_____ |
| Q 10 8 | What is your husband's educational status? ONLY IF HER RESPONSE FOR Q 104 IS MARRIED | Illiterate_____ 1,Read and write_____ 2 Primary level(1-8)_____ 3, Secondary level(9-12)_____ 4 Collage level and above_____5 |
| 10 | What is the main source of drinking water for | River-----1, Borehole-----2 Piped water-----3, Protected spring-----4 Unprotected spring--5 Protected dug well----6, |

| | | | | |
|---------|---|--|---|----------------------|
| 9 | members of your household? | Unprotected dug well--- 7 Other(specify)----- | | |
| 11 0 | Do your household have toilet facility | No-----0 Yes-----1 | | |
| 11 1 | If yes, what kind of toilet facility | Pit latrine with slab ---1, Pit latrine without slab---2 VIP latrine---3 Flush or pour flush toilet---4 Other----- | | |
| 11 2 | Does your household have: | If Yes = 1. If No =0 | | |
| | A non-mobile telephone? | A watch/clock? | A non-mobile telephone? ----- | A watch/clock? ----- |
| | A chair? | A radio? | A chair? ----- | -- |
| | A bed with cotton/sponge/spring mattress? | A television? | A bed with cotton/sponge/spring mattress? ----- | A radio? ----- |
| | A refrigerator? | A mobile telephone? A table? | A refrigerator? ----- | A television? ----- |
| | A kerosene lamp/pressure lamp? | | A kerosene lamp/pressure lamp? -- | A mobile telephone? |
| | | | - | - |
| | | | | A table? ----- |

| | | |
|---------|---|---|
| 11 3 | How many rooms in this household are used for sleeping? | Number of rooms |
| 11 4 | Does any member of this household own any agricultural land? | YES 1 NO 2 |
| 11 5 | How many (LOCAL UNITS) of agricultural land do members of this household own? LOCAL UNITS (SPECIFY)----- | LOCAL UNITS number----- DON'T KNOW----- |
| 11 6 | Main material of the roof. RECORD OBSERVATION | Thatch/leaf/mud---1 Rustic mat/Plastic sheets---2 Corrugated iron /metal-----3 |
| 11 7 | Main material of the floor. RECORD OBSERVATION | Earth/sand or Dung-----0 Palm/Bamboo-----1 Cement-----2 Ceramic tiles-----3 |
| 11 8 | Does this household own any livestock, herds, other farm animals, or poultry? | YES 1 No-----2 |

| | | |
|-----------------|---|--|
| <p>11 9</p> | <p>If yes, how many of the following animals does this household own?</p> <p>Milk cows, oxen or bulls? Camels?</p> <p>Horses, donkeys, or mules? Goats?</p> <p>Sheep? Chickens?</p> <p>Beehives?</p> | <p><u>WRITE NUMBER</u></p> <p>Milk cows, oxen or bulls----- Horses, donkeys, or mules-----</p> <p>Goats----- Sheep----- Chickens--</p> <p>-----</p> <p>Beehives-----</p> |
|-----------------|---|--|

| Part 2. Maternity characteristics | | |
|--|--|--|
| S.Nº | Questions and filters | Response coding categories |
| | Now I would like to ask you some questions about your maternity experiences. | |
| Q201 | How many children of age below and 59 months do you have now? | Number of children _____ |
| Q202 | How many children of age 6 months to 23.9 months do you have now? | Number of children _____ |
| | IF THERE IS ONLY ONE CHILD, ASK MOTHER THE FOLLOWING QUESTIONS ABOUT (NAME OF CHILD). IF MORE THAN ONE CHILD, SELECT ONE CHILD USING LOTTERY METHOD OF SIMPLE RANDOM SAMPLING AND ASK MOTHER THE FOLLOWING QUESTIONS ABOUT ONLY THE SELECTED CHID | |
| Q203 | If more than one child, What was birth interval b/n [NAME]? | Second-----1 Third -----2 Fourth-----3 Fifth and above----- |
| Q204 | Birth date of [NAME] | |

| | | | |
|------|--|--|--|
| | <p>USE IMMUNIZATION CARD TO OBTAIN BIRTH DATE, IF NO IMMUNIZATION CARD, WRITE THE DATE GIVEN BY THE MOTHER. IF THE ACTUAL DATE OF BIRTH IS UNKNOWN, GUIDE THE MOTHER TO RECALL THE DATE, USE THE LOCAL CALENDAR WITH COMMON LOCAL EVENTS (GENA, TIMIKET, FASIKA ETC...)AND RECORD BIRTH DATE CONSIDERING THE 15TH OF THE NAMED MONTH AS BIRTH DATE OF [NAME]</p> | <p>Birth date_____</p> | |
| Q205 | Sex of [NAME] | Male_____1 Female_____ 2 | |
| Q206 | Has (NAME) had diarrhoea in the last 2 weeks? | YES1 NO 0 | |
| Q207 | Has (NAME) had Fever in the last 2 weeks? | YES1 NO 0 | |
| Q208 | Has (NAME) had cough in the last 2 weeks? | YES1 NO 0 | |
| Q209 | Have you attended Antenatal clinic in any health facility while you were at pregnancy of [NAME]? | Yes_____ 1 No_____ 2 | |
| Q210 | If the answer of Q-204 is yes, how many times have you attended the Antenatal clinic in that specific health facility? | One time---1 Two times----2 Three times----3 Four and above times-----4 | |

| | | | |
|------|--|--|--|
| Q211 | If the answer of Q-206 is yes, have you got any health information or counselling during antenatal follow up | Yes1 No.....0 | |
| Q212 | If yes Q 208, What kind of health information or counselling you have got during antenatal follow up? | Exclusive breast feeding---1 Continuing breast feeding---2 Complementary feeding-----3 About pregnancy care --4 Other (specify) -----5 | |
| Q213 | Following [NAME] delivery, have you attend postnatal clinic in any health facility? | Yes_____1 No_____ 2 | |
| Q214 | If yes Q 212, how many times have you attended postnatal clinic | One time---1 Two times-----2 Three times-----3 Four and above times-----4 | |
| Q215 | Have you ever been informed/advised about breastfeeding while you were at pregnancy of [NAME] or in the period after delivery of [NAME]? | Y-----1 No.....2 Don't know.....99 | |
| Q216 | Have you ever been informed/advised about complementary feeding while you were at pregnancy of [NAME] or in the period after delivery of [NAME]? | Yes.....1 No.....2 Don't know.....99 | |

| PART 3. INFANT AND YOUNG CHILD FEEDING PRACTICES | | (THE QUESTIONS ARE STILL ABOUT THE SELECTED CHILD) | |
|---|---|--|--|
| S.Nº | QUESTIONS AND FILTERS | CODING CATEGORIES | |
| Q301 | Did you ever breastfeed (NAME)? | YES1 | NO..... 0 |
| Q302 | If yes Q 301, How long after birth did you first put (NAME) to the breast? | HOURS 1 __ __ | Days 2 __ __ |
| Q303 | In the first three days after delivery, was (NAME) given anything to drink other than breast milk? | YES1 | NO0 DON'T KNOW..... |
| Q304 | If yes Q 303 What was (NAME) given to drink? Anything else? DO NOT READ THE LIST RECORD ALL MENTIONED BY CIRCLING LETTER FOR EACH ONE MENTION | Milk (other than breast milk)..... 1 Sugar or glucose water.....3 Sugar-salt-water solution..... 5 Infant formula..... 7 Honey.....9 | Plain water.....2 Gripe water.....4 Fruit juice..... 6 Tea / infusions.....8 Other (specify)99 |
| Q305 | Are you still breastfeeding (NAME)? | Yes.....1 | No.....0 |
| Q306 | If Q No 305, No For how many months did you breastfeed (NAME)? | MONTHS __ __ | |

| | | | |
|--|---|--|---|
| Q307 | Did (NAME) drink anything from a bottle with a nipple yesterday or last night? | YES.....1 NO.....0 DON'T KNOW.....99 | |
| Q308 | <p>Now I would like to ask you about liquids or foods (NAME) had until his 5.9 months of age</p> <p>Did (NAME) drink/eat</p> <p>READ THE LIST OF LIQUIDS (A THROUGH E, STARTING WITH "BREAST MILK").</p> | <p>If yes = 1, No =0, Unknown =99</p> <p>Breast milk? -----</p> <p>Cow milk-----</p> <p>Plain water? -----</p> <p>Commercially produced infant formula? -----</p> <p>Any fortified, commercially available infant and young child food? -----</p> <p>Any (other) porridge or gruel? -----</p> | |
| <p>Now I would like to ask you about (other) liquids or foods that (NAME) may have had yesterday during the day or at night and how often have had in the last 7 days. I am interested in whether your child had the item even if it was combined with other foods</p> | | | |
| Q309 | Did (NAME) drink/eat? | liquids or foods that (NAME) may have had yesterday during the day or at night | How often have (NAME) eaten the following FOODS in the last 7 days? |

| | | Received | Not Received | 0 day | 1 days | 2 days | 3 days | 4 days | 5 day | 6 day | 7 days |
|--|--|----------|--------------|-------|--------|--------|--------|--------|-------|-------|--------|
| | Milk such as tinned, powdered, or fresh animal milk? ----- A | | | | | | | | | | |
| | Tea or coffee?-----B | | | | | | | | | | |
| | Plain water-----C | | | | | | | | | | |
| | Soup?-----D | | | | | | | | | | |
| | Infant formula such as Plan?-----E | | | | | | | | | | |
| | Any other liquids?-----F | | | | | | | | | | |
| | Injera, bread, rice, noodles, or other foods made from grains, such as, teff, oats, maize, barley, wheat, sorghum, millet or other grains?---G | | | | | | | | | | |
| | Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside?-----H | | | | | | | | | | |
| | White potatoes, white yams, bulla, kocho cassava, or any other foods made from roots?-----I | | | | | | | | | | |
| | Any dark green, leafy vegetables like kale, spinach, or amaranth leaves?-----J | | | | | | | | | | |
| | Ripe mangoes, papayas?----K | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Any other fruits or vegetables?---L | | | | | | | | | | | | | | | | | | | | |
| Liver, kidney, heart or other organ meats?-----M | | | | | | | | | | | | | | | | | | | | |
| Any meat, such as beef, pork, lamb, goat, chicken, or duck?-- --N | | | | | | | | | | | | | | | | | | | | |
| Eggs?----O | | | | | | | | | | | | | | | | | | | | |
| Fresh or dried fish or shellfish?-----P | | | | | | | | | | | | | | | | | | | | |
| Any foods made from beans, peas, lentils, or nuts?-----Q | | | | | | | | | | | | | | | | | | | | |
| Cheese, yogurt, or other milk products?----R | | | | | | | | | | | | | | | | | | | | |
| Any oil, fats, or butter, or foods made with any of these?----- S | | | | | | | | | | | | | | | | | | | | |
| Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits? -----T | | | | | | | | | | | | | | | | | | | | |
| Any commercially fortified baby food, like Fafa, Hilina, Cerilak, Cerifam, Mother Choice?----U | | | | | | | | | | | | | | | | | | | | |
| Any other solid, semi-solid, or soft food?-----V | | | | | | | | | | | | | | | | | | | | |

| | | |
|-------------|--|-------------------------------------|
| <p>Q310</p> | <p>How many times did (NAME) eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night?</p> <ul style="list-style-type: none"> • ADAPT THIS QUESTION TO USE LOCAL WORDS FOR THE SEMI-SOLID FOODS THAT ARE GIVEN. INCLUDE MASHED OR PUREED FOOD, ALONG WITH PORRIDGES, PAPS, THICK GRUELS STEWS, ETC. SOLID FOODS – E. G., FAMILY FOODS, BANANAS, MANGOES, POTATOES, BREAD– SHOULD ALSO BE INCLUDED. • WE WANT TO FIND OUT HOW MANY TIMES THE CHILD ATE ENOUGH TO BE FULL. SMALL SNACKS AND SMALL FEEDS SUCH AS ONE OR TWO BITES OF MOTHER’S OR SISTER’S FOOD SHOULD NOT BE COUNTED. • LIQUIDS DO NOT COUNT FOR THIS QUESTION. DO NOT INCLUDE THIN SOUPS OR BROTH, WATERY GRUELS, OR ANY OTHER LIQUID. <p>USE PROBING QUESTIONS TO HELP THE RESPONDENT REMEMBER ALL THE TIMES THE CHILD ATE YESTERDAY</p> | <p>NUMBER OF TIMES ... __ </p> |
| | | |

| | | |
|------|--|------------------------|
| Q311 | In the last 24 hours, did you wash your hands with soap/ash before preparing the above food for [NAME]? | Yes -----1 No-----0 |
| Q312 | In the last 24 hours, did you wash your hands with soap/ash before feeding [NAME]? | Yes -----1 No-----0 |

| SECTION 4 Anthropometric measurement. | | | | |
|---------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Infant/child's measurement | Length (cm) | | Weight | |
| | 1 st measurement | 2 nd measurement | 1 st measurement | 2 nd measurement |
| | | | | |

| Mother's measurement | Height | | Weight | |
|----------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | 1 st measurement | 2 nd measurement | 1 st measurement | 2 nd measurement |
| | | | | |

END OF INTERVIEW THANK YOU FOR YOUR TIME

Amharic version of the questionnaire

በጅማ ዩኒቨርሲቲ

ሀብረተሰብ ጤና ኮሌጅ

በደቡብ ብሔር ብሔረሰቦችና ህዝቦች ክልላዊ መንግስት በጋሞ ጎፋ ዞን በደምባ ጎፋ ወረዳ የሚኖሩ ከስድስት ወር እስከ ሁለት ዓመት ድረስ ያሉ ሕጻናት አመጋገብ ተግባራትና ይህ አመጋገብ ተግባራት ከሕጻናት ሥርዓተ ምግብ ሁኔታ ጋር ያለውን ተዛማጅነት ለማወቅ እናቶችን ለመጠየቅ የተዘጋጀ መጠይቅ

የመጠይቅ ተሳታፊዎች የስም ማረጋገጫ ቅጽ

መግቢያ እና የጥናቱ ዓላማ

ጤና ይስጥልኝ፤ እኔ----- እባላለሁ። እዚህ የመጣሁት በጅማ ዩኒቨርሲቲ አማካይነት ከስድስት ወር እስከ ሁለት ዓመት ድረስ ያሉ ሕጻናት የያዙ አናቶችን ቃሌ መጠየቅ ለማድረግ፤ የህጻኑን/ህጻኗን ክብደት እና የእናትን ክብደትም ጭምር ለመለካት ነው። እናቶች ላይ ስለህጻናት አመጋገብ ተግባራትና የሕጻናት ሥርዓተ ምግብ ሁኔታ ጥናት ስለሚደረግ አናቶችን ቃሌ መጠየቅ ለማድረግና፤ የህጻኑን/ህጻኗን ክብደት እና የእናትን ክብደትም ጭምር ለመለካት ነው። የጥናቱ ዋና ዓላማ የእናቶችን ስለህጻናት አመጋገብ ተግባራትና የሕጻናት ሥርዓተ ምግብ ሁኔታ ለማወቅ ነው። ይህን ጥናት ለማስኬድ የሚያስፈልጉ መረጃዎችን ለማግኘት ቀላልና ግልጽ ጥያቄዎችን ልጠይቅዎትና የህጻኑን/ህጻኗን ክብደት እና የእርስዎን ክብደትም ጭምር ለመለካት እፈልጋለሁ። እርስዎ የሚሰጡን መረጃ በህጻናት አመጋገብ ሥርዓት ላይ ለሚሰሩ መንግስታዊ ዋና መንግስታዊ ላለሆኑ ደርጅቶች በህጻናት አመጋገብ ሥርዓት ላይ ያሉ ችግሮችን ለመፍታት ጠቀሜታዊ የላይነት ነው። በመጠይቅ ወቅት ስም መናገር አይመጠበቅዎትም፤ በሚሰጡት መረጃም ምንም ዓይነት ችግር እንደማይደርስብዎት እና ምስጢር እንደምጠብቅልዎት ላረጋግጥልዎት እወዳለሁ። ሁሉንም መጠይቆች መመለስ አይጠበቅብዎትም ነገር ግን የእርስዎ መሳተፍ ለስራችን አስፈላጊ ስለሆነ እንዲሁም ያሉትን የአመጋገብ ችግሮች ለማወቅ እና አስፈላጊውን ጠቃሚ ሀሳብ ለመስጠት ስለሚጠቅሙን የእርስዎን መሳተፍ በጥብቅ እንፈልገዋለን።

ስለዚህ ጥያቄዎችን ለመመለስ፤ የህጻኑን/ህጻኗን ክብደት ለማስለካት እና የእርስዎን ክብደት ለመለካት ተስማምተዋል?

አዎን ተስማምቶታለሁ----- አልተስማማኩም-----

ፈቃደኛ ከሆኑ፡ ለሚሰጡን ጥናታዊ መልስ ክልብ እና መሰጠጥ?

ፈቃደኛ ካልሆኑ፡ አመሰግናለሁ ወደ ሌላ ተሳታፊ ቤት ይህዱ

የጠያቂው ስም----- ፊርማ----- ቀን-----

መጠየቅና አመጋገብ አጠቃላይ መመሪያ

የህጻኑ/ የህጻኗ አመጋገብ ተግባር መጠይቆች የእናትዬዎ 24(ሀያአራት) ሰዓት እና የሰባት ቀናት ተግባር **ማስታወስን** መሠረት ያደረገ ስለሆነ እያንዳንዱ ጥያቄ በትክክል በመጠይቁ ላይ በተጻፈው መሠረት መከናወን አለበት። አንዳንድ ቃላቶች ወይም ዐርፈተ ነገሮች ደመቅ ወይም ጎላ ተብለው የተጻፉት የጠያቂው መመሪያዎች ናቸው። ስለሆነ እነዚህ ፅሁፎች ድምፅ ከፍ ወይም እናት እንድትሰማ ተደርጎ መነበብ የለባቸውም። ሁሉም መልሶች ግልፅ በሆነና በተሰጣቸው ቦታ መመዘገብ አለባቸው።

ቀበሌ----- የቤት ቁጥር-----

ክፍል አንድ፡# ማህበራዊና ኢኮኖሚያዊ ሁኔታዎች

| ተ.ቁ | ዝርዝር መጠይቆች | መልስመስጫቦታ | ምርመራ |
|-----|---------------------|---|------|
| 101 | ዕድሜዎ ስንት ነዉ? (በዓመት) | ዕድሜ----- | |
| 102 | የቤተሰብ ብዛት ስንት ነዉ? | ብዛት----- | |
| 103 | ሐይማኖትዎ ምንድ ነዉ? | ፕሮተስታንት----- 1. ኦርቶዶክስ-----2 ሙስሊም-----3 ካቶሊክ-----4 ሌላ(ይገለፅ)-----99 | |
| 104 | ብሔርዎ ምንድ ነዉ? | ጎፋ-----1 ጋሞ-----2 አማራ-----3 ካምባታ-----4 አይዳ-----5 ወላይታ-----6 ሌላ(ይገለፅ)--99 | |
| 105 | ጋብቻ ሁኔታ? | ያገባች-----1 ያላገባች-----2 የተፋታች-----3 ባል በሞት የተላየባት-----4 ሌላ(ይገለፅ)--99 | |
| 106 | ትምህርት ደረጃ ስንት ነዉ? | ምንም ያልተማረች-----1 ማንበብና መጻፍ-----2 የመጀመሪያ ደረጃ(1-8)-----3 የሁለተኛ ደረጃ(9-12)-----4 ኮሌጅ እና ከዚያ በላይ-----5 | |
| 107 | የስራ ሁኔታ? | ግብርና-----1 የመንግስት ሠራተኛ-----2 መንግስታዊ ያልሆነ ድርጅት ሠራተኛ----- 3 የግለሰብ ድርጅት ሠራተኛ-----4 ገቢ የሚያስገኝ የግል ስራ-----5 የቤት እመቤት-----6 የቀን ሠራተኛ-----7 የሰዉ ቤት ሠራተኛ-----8 ተማሪ-----9 ሌላ(ይገለፅ)---99 | |

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| 108 | የባል የትምህርት ሁኔታ? ለጥያቄቁ. 104 መልስያገባችከሆነ | ምንም ያልተማረ-----1 ማንበብና መጻፍ-----2 የመጀመሪያ ደረጃ(1-8)-----3 የሁለተኛደረጃ(9-12)-----4 ኮሌጅ እና ከዚያ በላይ-----5 | |
| 109 | የመጠጥወሃበዋናነትከየትያገኛሉ? | ወንዝ----1 ከቦኖ----2 ደንብ---3 ከተጠበቀ ምንጭ--4 ካልተጠበቀ ምንጭ---5 ከተጠበቀ ጉድጓድ ወሃ-----6 ከልተጠበቀ ጉድጓድ ወሃ----7 ሌላ(ይገለፅ)---8 | |
| 110 | መፀዳጃ ቤት አላችሁ? | አለ----1 የለም----2 | |
| 111 | ለጥያቄቁ. 104 መልስአለከሆነ መፀዳጃ ቤቱ ምን ዓይነት ነው? | ቀዳደዉ በስላብ የተሸፈነ ባህላዊ መፀዳጃ ቤት -----1 ቀዳደዉ በስላብ ያልተሸፈነ ባህላዊ መፀዳጃ ቤት--2 ሽታ አልባ መፀዳጃ ቤት-----3 ዘመናዊ በወሃ ታጥቦ የሚሄድ-----4 ሌላ(ይገለፅ)---5 | |
| 112 | በመኖሪያ ቤታችሁ እሌክትሪክ አለ? ወንበር አለ? ስፖንጅ/ስፕሪንግ ፍራሽ አልጋ አለ? ፍሪጅ አለ? ፋኖስ/ማሾ አለ? የእጅ/ግድግዳ ሰዓት አለ? ሬድዮ አለ? ቴሌቪዥን አለ? ሞባይል ስልክ አለ? ጤረጴዛ አለ? እሌክትሪክ ምጣድ አለ? | እሌክትሪክ አለ?----- ወንበር አለ? ----- ስፖንጅ/ስፕሪንግ ፍራሽ አልጋ አለ?----- ፍሪጅ አለ?----- ፋኖስ/ማሾ አለ?----- የእጅ/ግድግዳ ሰዓት አለ?----- ሬድዮ አለ?----- ቴሌቪዥን አለ?----- ሞባይል ስልክ አለ?----- ጤረጴዛ አለ?----- እሌክትሪክ ምጣድ አለ?----- | |
| 113 | ቤታችሁ ዉስጥ ስንት መኝታ | ብዛት----- | |

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|-----|--|---|--|
| | ክፍሎች አሉ? | | |
| 114 | የእርሻ ማሳ አላችሁ? | አለ-----1 የለም-----2 | |
| 115 | ለጥያቄቁ 114 መልስ አለ ከሆነ የእርሻ ማሳ ካለ ስፋቱ ምን ያህል ነው? (በአካባቢ መለኪያ ወይም የይዘት ማረጋገጫ ደብተር ይታይ) | ስፋት----- | |
| 116 | የመኖሪያ ቤታቸው ጣሪያ | ሳር-----1 ፕላስቲክ-----2 ቆርቆሮ-----3 ሌላ(ይገለፅ)--99 | |
| 117 | የመኖሪያ ቤታቸው ወለል ሁኔታ | አፈር-----1 እንጨት(ጣዉላ)-----2 ስምንቶ-----3 ሴራሚክ-----4 ሌላ(ይገለፅ)--99 | |
| 118 | የእርሻ ከብቶች፣ የጋማ ከብቶች፣ ዶሮዎች፣ ላሞች የእናንተ የሆኑ እቤታችሁ አሉ? | አለ-----1 የለም-----2 | |
| 119 | ለጥያቄቁ 118 መልስ አለ ከሆነ ስንት አላችሁ? | ላምና በሬ ብዛት-----አህያ፣ፈረስ እና በቅሎ ብዛት----- ፍየል ብዛት----- በግ ብዛት----- ዶሮዎች-ብዛት----- ከንብ ጋር ያሉ የንብ ቀፎዎች ብዛት----- | |

ክፍል ሁለት እናትነት ተግባራት

| ተ.ቁ | ዝርዝር መጠይቆች | መልስ መስጫ ቦታ | |
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| | አሁን ከእርግዝናና ወሊድ በአጠቃላይ የእናትነት ልማዶችን እጠይቃለሁ | | |
| 201 | ከ 5 ዓመት በታች አሁን ስንት ልጆች አለዎት? | የልጆች ብዛት----- | |
| 202 | 6 ወርና እና ከዚያ በላይ የሆኑ ነገርግን ከሁለት ዓመት በታች የሆኑ አሁን ስንት ልጆች አለዎት? | የልጆች-ብዛት----- | |
| | <p>እናትዬ 6ወር እና ከዚያ በላይ ነገርግን ከሁለት ዓመት እና ከዚያ በታች የሆነ ህፃን አንድ ብቻ ከሆነ በቀጥታ ከዚህ በታች ያሉት መጠይቆችን እናትን ስለያንን ህፃን ጋር በተያያዘ ጉዳይ መጠይቅ መጀመር።</p> <p>እናት 6ወር እና ከዚያ በላይ ነገርግን ከሁለት ዓመት እና ከዚያ በታች የሆነ ህፃን ከአንድ በላይ ከሆነ በእጣ አንድ ህፃን በመምረጥ ከዚህ በታች ያሉት መጠይቆችን እናትን በእጣ የወጣውን ህፃን ጋር በተያያዘ ጉዳይ ብቻ መጠይቅ መጀመር።</p> | | |
| 203 | የህፃን (በዕጣዩ ወጣው ልጅ ስም) ስንተኛ ልጅዎትነው | <p>አንደኛ-----1 ሁለተኛ-----2</p> <p>ሦስተኛ-----3 አራተኛ-----4</p> <p>ከዚያ በላይ-----</p> | |
| 204 | ህፃኑ የተወለደበት ቀን ለመመዘን የክትባት ካርድ ይጠቀሙ። የክትባት ካርድ ከሌለ እናት በትክክል የሚታወቅ ከሆነ እናት የምትለውን ቀን መመዘን። እናት በትክክል የሚታወቅ ከሆነ የአካባቢውን ባህላዊ የቀን አቆጣጠር ለምሳሌ ገና፣ፋሲካ ወዘተ...በመጠቀም እናትን በመጠየቅ | ህፃኑ የተወለደበት ቀን----- | |

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| | የተባለውን ወር 15ኛቀን(የ30 ቀን ግመሽ) የልደት ቀኑን መመዘገብ | | |
| 205 | የህፃኑ (ስም) ስያ | ወንድ-----1 ሴት-----2 | |
| 206 | የህፃኑን(ስም) ባለፈው ሁለት ሳምንታት ውስጥ ተቅማጥ ታሞ ነበር? | አዎን-----1 አልታመመም-----2 | |
| 207 | የህፃኑን(ስም) ባለፈው ሁለት ሳምንታት ውስጥ ተኩሳት ታሞ ነበር? | አዎን-----1 አልታመመም-----2 | |
| 208 | የህፃኑን(ስም) ባለፈው ሁለት ሳምንታት ውስጥ ሳል ታሞ ነበር? | አዎን-----1 አልታመመም-----2 | |
| 209 | ህፃን (ስም) እርግዝና ወቅት የቅድሜ ወሊድ ምርመራ በጤና ድርጅት ተከታትለሽ ነበር? | አዎን-----1 አልተከታተልኩም-----2 | |
| 210 | ተ.ቁ 205 አዎን ከሆነ ስንት ጊዜ ከትትል አድርገዋል? | አንድ ጊዜ-----1 ሁለት ጊዜ-----2 ሦስት ጊዜ-----3 አራት ጊዜ እና ከዚያ በላይ-----4 | |
| 211 | በጤና ድርጅት ከትትል በሚያደርጉበት ወቅት የጤና ትምህርት ወይም ምክር አግኝተዋል ነበር? | አዎን-----1 አላገኘሁም-----2 አላወቅም/አላስታወስም----- | |
| 212 | ተ.ቁ 207 አዎን ከሆነ ምንን በተመለከተ የጤና ትምህርት ተሰጥተዎት ነበር? | ለመጀመሪያ ልዩ የጤና ወተት ብቻ ለህፃኑ መስጠት እንዳለብኝ-----1 ከፊርማ በኋላም የጤና ወተት ለህፃኑ መስጠት እንዳለብኝ-----2 ከፊርማ ወር ጀምሮ ለህፃኑ ተጨማሪ ምግብ መስጠት እንዳለብኝ-----3 በእርግዝና ወቅት መደረግ ያለባቸው ጥንቃቄዎች እና ምርመራዎች-----4 ሌላ (ይገለፅ)----- | |

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| 213 | ህፃን (ስም) ከወለዱ በኋላ የድህረ ወሊድ ምርመራ በጤና ድርጅት ተከታትለዎ ነበር? | አዎን-----1 አልተከታተልኩም-----2 | |
| 214 | ተ.ቁ 211 መልስ አዎን ከሆነ ስንት ጊዜ ክትትል አድርገዋል? | አንድ ጊዜ-----1 ሁለት ጊዜ-----2 ሦስት ጊዜ-----3 አራት ጊዜ እና ከዚያ በላይ----- 4 | |
| 215 | የቅድሚያ ወሊድ ወይም የድህረ ወሊድ ምርመራ በጤና ድርጅት ክትትል በሚያደርጉበት ወቅት ስለጡት ማጥባት ትምህርት ወይም ምክር ተሰጥተዎት ነበር? | አዎን-----1 አልተሰጠኝም-----2 አላወቅም/አላስታወስም-----99 | |
| 216 | የቅድሚያ ወሊድ ወይም የድህረ ወሊድ ምርመራ በጤና ድርጅት ክትትል በሚያደርጉበት ወቅት ለህፃኑ ተጨማሪ ምግብ ስለመስጠት ትምህርት ወይም ምክር ተሰጥተዎት ነበር? | አዎን-----1 አልተሰጠኝም-----2 አላወቅም/አላስታወስም-----99 | |

ክፍል ሦስት ስለህፃናት አመጋገብ ተግባራት

| ተ · ቁ | ዝርዝር መጠይቆች | መልስ መስጫ ቦታ |
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| 3 0 1 | ህፃኑ ከተወለደ ጀምሮ ጡት ጠብቶ ያወቃል? | አዎን-----1 አየያወቅም-----0 |
| 3 0 2 | ለተ.ቁ 301 መልስ አዎን ከሆነ ከወለድዎ በኋላ ለመጀመሪያ ጊዜ ምን ያህል ቆይተዉ ለህፃን(ስም) ጡት ሰጡ? | ሰዓት----- ወር----- |

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| 3 0 3 | እንደወለዱ መጀመሪያ ሦስት ቀናት ውስጥ ለህፃን(ስም) ከጡት ወተት ሌላ የሚጠጣ ነገር ተሰጥቶት ነበር? | አዎን-----1 አልተሰጠም-----2 |
| 3 0 4 | ለተ.ቀ 303 መልስአዎንከሆነ ህፃን(ስም) የጠጣው ምንምን ነበር? እናት ትናገር እንጅ ዝርዝር አይነብብ። እናት ስትናገር በተዘረዘሩት ውስጥ ካለ ይከብብ ከሌላ ይጻፍ | የኩብት ወተት-----1 ንፁህ ውሀ-----2 ወሃ በስኳር የተበጠበጠ-----3 ለሆድ ቁርጠት የሚሰጥ ወሃ-----4 በስኳርናበጨወየተበጠበጠወሃ-----5 ፍራፍሬ ጭማቂ-----6 የተገዛ የህፃናት ወተት-----7 ሻይ-----8 ማር-----9 ሌላ(ይገለፅ)----- |
| 3 0 5 | እስከ አሁን ጡት እያጠቡ ነዉ? | አዎን-----1 እያጠባሁ አይደለም-----0 |
| 3 0 6 | ለተ.ቀ 305 መልስ እያጠባሁ አይደለም ከሆነ ህፃን(ስም) ለስንት ወር ነዉ ጡት የጠባዉ? | የወር ብዛት----- |
| 3 0 7 | ትናንት ከዚህ ሰዓት ጀምሮ (በ24 ሰዓት ውስጥ) ህፃን(ስም) ጡጦ አጥብተዉ ነበር? | አዎን-----1 ጡጦ አልሰጠሁም-----0 |
| 3 0 8 | አሁን የሚጠይቀዎት ህፃን (ስም) ዕድሜዉ አምስተኛ ወር መጨረሻ (5ወር ከ 29 ቀን) ድረስ የሰጡትን ፈሳሽ ወይም ምግብይሆናል ህፃን(ስም) የተዘረዘሩት ፈሳሾች/ምግቦችን ጠጥቷል/በልቷል? | A. A. የጡት ወተት B. B. የላም ወተት C. C. ንፁህ ወሃ D. D. የተገዛ የህፃናት ወተት E. E. ሌላ የፋብርካ ምግቦች |

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|---|---|--|--------------------|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | <p>ለእናት ከA እስከ G ድረስየተዘረዘሩትይነቡብ</p> <p>ህፃንየወሰደውሁሉምይከቡብ (ከአንድበላይሊሆንይችላል)</p> | <p>F. F. ገንፎ ወይም ሙቅ</p> <p>G. G. ሌላ(ይገለፅ)-----</p> | | | | | | | | | |
| <p>አሁን የሚጠይቀዎት ህፃን (ስም) ትናንት ከዚህ ሰዓት ጀምሮ (በ24 ሰዓት ውስጥ) የወሰደበት/የወሰደችበት ምግቦችን ወይም ፈሳሾችን እና ባለፉት 7(ስዓት) ቀናት ውስጥ የተዘረዘሩት ምግቦችን ወይም ፈሳሾችን ስንት ቀን እንደወሰደበት/እንደወሰደችበት ይሆናል</p> | | | | | | | | | | | |
| | <p>የምግብ ዝርዝር</p> | <p>ህፃን(ስም) ትናንት ከዚህ ሰዓት ጀምሮ (በ24 ሰዓት ውስጥ)</p> | | <p>ባለፉት 7 (ስዓት) ቀናት ውስጥ ህፃን(ስም) የወሰደበት ቀን/ቀናት ብዛት በወሰደበት ቀን/ቀናት ብዛት ስር (X) ምልክት ይደረግ</p> | | | | | | | |
| | | <p>ወ ስ ደ ል</p> | <p>አ ል ወ ስ ደ ም</p> | <p>ም ? ም አ ል ወ ስ ደ ም</p> | <p>1 ቀ ?</p> | <p>2 ቀ ?</p> | <p>3 ቀ ?</p> | <p>4 ቀ ?</p> | <p>5 ቀ ?</p> | <p>6 ቀ ?</p> | <p>7 ቀ ?</p> |
| 3 | የታሸገ ወተት፣የዱቀት ወተት፣ትኩስ የከብት ወተት | | | | | | | | | | |
| 0 | ሻይ ወይም ቡና | | | | | | | | | | |
| 9 | ንፁህ ውሃ | | | | | | | | | | |
| | ሾርባ | | | | | | | | | | |
| | የህፃናት ፎርምላ | | | | | | | | | | |

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| ሌሎች ፈሳሾች የተሰጠ ካለ | | | | | | | | | | | | |
| እንጀራ፣ ዳቦ፣ ፓስፖርት፣ ስፔሻል እና ሌሎች ከጤፍ፣ ከአጃ፣ ከብቁሎ፣ ከሰንደ፣ ከጉብስ፣ ከማሽላ ወዘተ ጥራጥሬ የተሠሩ ምግቦች | | | | | | | | | | | | |
| ዱባ፣ ካሮት፣ ወስጡ ብጫ የሆነ ስኳር ድንች | | | | | | | | | | | | |
| ወስጡ ነጭ የሆነ ስኳር ድንች፣ ጎደሬ፣ ቆጮ፣ ቡላ፣ እንጨት ቦዩ፣ ሐረግ ቦዩ እና ወዘተ ሥራ ሥር የተሠሩ ምግቦች | | | | | | | | | | | | |
| የአበሻ ጎመን እና ሌሎች አሬንጋዴ ቅጠላቅጠል የሆኑ የጓሮ አትክልት | | | | | | | | | | | | |
| የበሰለ ማንጎ፣ ፓፓያ | | | | | | | | | | | | |
| ሌሎች ፍራፍሬ እና የጓሮ አትክልት | | | | | | | | | | | | |
| ጉብት፣ ኩላሊት፣ ልብ ወይም ሌሎች የእንስሳት ብልት ክፍሎች | | | | | | | | | | | | |
| የበሬ፣ የፍየል፣ የበግ፣ የዶሮ፣ የዳክዬ ሥጋ | | | | | | | | | | | | |
| እንቁላል | | | | | | | | | | | | |
| የግሣ ሥጋ | | | | | | | | | | | | |
| ባቄላ፣ አተር፣ አደንጓሬ፣ ሽምብራ፣ ምስር፣ ለውዝ | | | | | | | | | | | | |
| አይብ፣ እርጎ ወይም ሌሎች የወተት ወጤቶች | | | | | | | | | | | | |
| ዘይት፣ ቅቤ፣ ሌሎች ቅባቶች ወይም ከነዚህ ጋር የተሠሩ ሌሎች ምግቦች | | | | | | | | | | | | |
| ኬክ፣ ቼኮሌት፣ ኬረሜላ ወይም ሌሎች ከስኳር የተሠሩ ጣፋጭ ምግቦች | | | | | | | | | | | | |
| ሌሎች በፋብርካ ተቀይጠዉ የተሠሩ የህፃናት ምግቦች ለምሳሌ ፋፋ፣ ህሊና፣ ማዘርቾይስ | | | | | | | | | | | | |
| ከተጠቀሱት ሌላ የአዋቂ ሰዎች ወይም ለሰለስ ተደርጎ የተሠራ ምግብ | | | | | | | | | | | | |

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| <p>310</p> | <p>ህፃን (ስም) ትናንት ከዚህ ሰዓት ጀምሮ (በ24 ሰዓት ውስጥ) ስንት ጊዜ ወፈር (ጠንካር) ያለ ወይም ለስለስ ያለ ምግብ ወስዷል/በልቷል?</p> <p><u>ለስለስ ያለ ምግብ ስህተት</u></p> <p>➤ ገንፎ፣ ወፍራም አጥሚት፣ የተፈጨ ድንች፣ ጎደሬ፣ ሐረግ ቦዩ ወዘተ.....</p> <p><u>ወፈር/ጠንካር/ ያለ ስህተት</u></p> <p>➤ የቤተሰብ ምግብ፣ ማንኛውም ዝቅጠር ድንች፣ ድብ-ልብ-ል ድንች፣ ዳቦ፣ ቁጥጥ ወዘተ....</p> <p>ስንት ጊዜ ተብሎ የሚቆጠረው ህፃኑ እስኪጠግብ (እስኪባቃው) ድረስ የበላውንነው እንጅ እናት ወይም እህት ወይም አባት እየበላች ወይም እየበላ ትንሽ በእጅ የሰጠው አይቆጠርም</p> <p>ሌላው ሸርባ፣ ቆይታ አጥሚት ወይም ሙቅ፣ ሻይ እና ሌሎች ፈሳሽ ምግቦች አይቆጠሩም</p> | <p>የበላባት ብዛት-----</p> |
| <p>311</p> | <p>ትናንት ከዚህ ሰዓት ጀምሮ (በ24 ሰዓት ውስጥ) ለህፃን (ስም) ምግብ ከመስራትዎ በፊት እጅ በሳሙና ወይም በአመድ ታጥበው ነበር?</p> | <p>አዎ----1 አልታጠብኩም---0</p> |
| <p>312</p> | <p>ትናንት ከዚህ ሰዓት ጀምሮ (በ24 ሰዓት ውስጥ) ህፃን (ስም) ምግብ ከመመገብዎ በፊት እጅ በሳሙና ወይም በአመድ ታጥበው ነበር?</p> | <p>አዎ----1 አልታጠብኩም---0</p> |

ክፍል አራት የክብደት እና የቁሜት/ርዝመት መለካት

| የሀገር ቁሜት እና ክብደት | ቁሜት | | ክብደት | |
|------------------|------------|----------|------------|----------|
| | የመጀመሪያ ልኬት | ሁለተኛ ልኬት | የመጀመሪያ ምዘና | ሁለተኛ ምዘና |
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| የእናንተ ቁሜት እና ክብደት | ቁሜት | | ክብደት | |
|-------------------|------------|----------|------------|----------|
| | የመጀመሪያ ልኬት | ሁለተኛ ልኬት | የመጀመሪያ ምዘና | ሁለተኛ ምዘና |
| | | | | |

ጨርሻለሁ፡ ጊዜ ሰጥተዉ ከአኔ ጋር ስለቆዩ ከልብ አመሰግናለሁ።