CHILDREN UNDERNUTRITION AND ASSOCIATED FACTORS AMONG 6-23 MONTHS IN DILLA ZURIYA WOREDA, GEDEO ZONE, SOUTH ETHIOPIA.

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ABSTRACT

Background: The first 1,000 days of life is a critical window of opportunity for health and development of a child. Growth deficiencies begin during pregnancy and continue until 24 months of age since children are more susceptible to infections, highly sensitive to biological programming and totally dependent on others for nutrition, care and social interactions. In Ethiopia under-nutrition is responsible for 32% of under 5 children deaths. But many studies from Ethiopia did not considered maternal factors like level of autonomy and common mental disorders as predictors for child under-nutrition.

Objectives: To assess children undernutrition and associated factors among age 6-23 months in Dilla zuriya woreda, Gedeo zone, South Ethiopia.

Methods: A community based cross-sectional study involving 612 mother/child pair from Dilla zuriya woreda was conducted from February 25 to March 26/2015. A two-stage cluster sampling technique was employed. A pre-tested, semi-structured, interviewer administered questionnaire consisting of demographic and socio-economic characteristics, children and maternal factors and anthropometric measurement was used to gather data. WHO Anthro software version 2.0 to and SPSS software version 20 was used for analysis. A descriptive statistics chi-square, bivariate logistic regression and multivariable logistic regression were applied for the final analysis.

Result: 612 mothers having children age 6-23 months were participated making a response rate of 98.4%. Prevalence of wasting, stunting and underweight was found to be 14.1%, 31% and 13.1%, respectively. Maternal common mental disorder was positively associated with underweight. Mother's autonomy was inversely associated with wasting and underweight. Furthermore, child's age, father's occupation and wealth index were also made associated with underweight. Mother's age, child's age and mother's body mass index are associated factors with Wasting. In addition, Stunting is associated with breast feeding frequency within 24 hours, fever episode within 2 weeks & minimum meal frequency.

Conclusion: This study indicates that under nutrition to be a major health problem among children age 6-23 months in the study area. High level of maternal common mental disorder and level of autonomy were found to be an intermediate factor for a child undernutrition. Therefore, determinant risk factors need a multidisciplinary approach to develop preventive strategies towards child under nutrition.

Key words: Under nutrition, Wasting, Stunting, Underweight, Maternal common mental disorder and Maternal autonomy.

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ABBREVIATIONS

AIDS	Acquired immune deficiency syndrome
AOR	Adjusted odds ratio
BMI	Body mass index
CBN	Community Based Nutrition
CMD	Common mental disorders
COR	Crude odds ratio
DDS	Daietary Diversity score
DSS	Demographic surveillance site
EDHS	Ethiopian demographic survey
EOS	Enhanced Outreach Strategy
HADS	Hospital Anxiety and Depression Scale
HEP	Health Extension Program
HH	Household
HICs	High income countries
HIV	Human immune-deficiency virus
IRT	Integrated Refresher Training
IYCF	Infant and Young Child Feeding
LAMIC	Low and middle income countries
LR	Likelihood
MDG	Millennium development goal
MMF	Minimum meal frequency
PPD	Postpartum depression
SAM	Sever acute malnutrition
TSF	Targeted Supplementary Food

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CHAPTER ONE: INTRODUCTION

1.1 Background

Although rates of child malnutrition in many poor regions of the world have relatively declined in recent years, still it remains one of the most significant child health problems. Globally, in 2012 there was an estimate of, 162 million stunted under 5 children of which 36% lived in Africa, 99 million underweight of which 29% live in Africa and 51 million wasted of them 28% live in Africa (1). One in every five children in the developing world is malnourished, and poor nutrition is associated with half of all child deaths worldwide (2, 3).

The term malnutrition refers to both under nutrition and over nutrition. Under nutrition is the outcome of inadequate intake of nutrients. It includes being underweight for one's age, too short for one's age (stunted), dangerously thin (wasted), and deficient in vitamins and minerals (4). Over nutrition (obesity) is the outcome of excess intake of nutrients. Stunting and wasting are respectively associated with chronic malnutrition and current nutritional status. Underweight represents both chronic and acute malnutrition (5).

The importance of early childhood nutrition on development outcomes has gained international awareness. Strong evidence shows that nutritional failure can occur during pregnancy and in the first two years of life. It can lead to cognitive and physical deficits, and may cause similar deficits in future generations as malnourished mothers give birth to low birth weight infants. This contributes directly to the reduced earnings potential of individuals and damages national economic growth and competitiveness potential in a globalized world. Malnutrition also increases susceptibility and incidence of infections and is associated with diminished response to vaccines. (6,7).

Undernourished girls have a greater likelihood of becoming undernourished mothers who in turn have a greater chance of giving birth to low birth weight babies, perpetuating an intergenerational cycle. This cycle can be compounded further in young mothers, especially adolescent girls who begin childbearing before attaining adequate growth and development. Short intervals between pregnancies and having several children may accumulate or exacerbate nutrition deficits, passing these deficiencies on to the children (8).

Malnutrition in Ethiopia is the underlying cause of 32% of child deaths and thus failing to address this problem will also hold back progress towards reaching MDG 4 to reduce child mortality (9, 10). Malnutrition in children is one of the most serious public health problem in Ethiopia and the highest in the world. Eighty percent of the world's stunted children live in 14 countries; Ethiopia is the 7th with 44%. Stunting existed across households both poor and rich, indicating that economic growth and food security alone were not sufficient to reduce child stunting (8).

Malnutrition is a silent killer that is under reported, under addressed and, as a result, under prioritized (11). Therefore, Studies like this research to assess the prevalence and identifies factors associated with child undernutrition is worthwhile in measuring the impacts of different programs and strategies that has been implemented in Ethiopia.

1.2 Statement of the problem

Malnutrition has synergic effect on child mortality. One third of deaths of children under 5 are attributable to under-nutrition. Under-nutrition also puts children at far greater risk of death and severe illness due to common childhood infections, such as pneumonia, diarrhea, malaria, HIV/AIDS and measles. Children with severe acute malnutrition are nine times more likely to die than children who are well-nourished (8).

Evidences showed that child under-nutrition is responsible for 54% of the deaths of children under five years of age (nearly 11 million children) globally (12,13). Evidence from 54 low- and middle-income countries indicates that growth deficiencies begin during pregnancy and continue until about 24 months of age. Catch-up growth later in childhood is minimal – the damage caused is largely irreversible. Undernourished mothers have a greater chance of giving birth to low-birth-weight babies than adequately nourished mothers. An estimated 60 to 80% of neonatal deaths occur among low-birth-weight babies. In South Asia, more than 25% of children are born with low birth weight (8).

The first 1,000 days of life, from the first day of pregnancy until the child is 24 months old, is a critical window of opportunity for health and development of a child since rapid physical and development occurs. Children in this period more susceptible to infections, has heightened sensitivity to biological programming and totally dependent on others for nutrition, care and

social interactions (8,14). Adolescent girls, pregnant women and young children in Ethiopia in particular are most vulnerable to inadequate care, inadequate access to health services and unsuitable feeding practices. For the developing fetus, its first battle is to survive the intrauterine environment (9). Therefore maternal behavior (which can be affected by illness condition like mental illness and autonomy on household income) towards proper child care is crucial determining factor of children growth.

But many studies from Ethiopia did not considered maternal factors like level of autonomy and common mental disorders (CMD) as predictors for child under-nutrition. Maternal mental health not only affects women's ability to cope but has ripple effects on the family due to the multiplicity of roles of mothers are expected to perform, including caring the children (15). In particular, in Chad, mothers' higher decision-making power surrounding child feeding is a significant predictor of improved height-for-age z-scores (16). Therefore mothers with greater autonomy may also benefit their child growth.

Nutritional status is influenced by three broad factors: food, health and care. Number of studies determined several factors were as predictors of child under nutrition. Household economic conditions such as wealth index, type of floor, latrine availability, source of safe water supply, having livestock and level of crowding (17-27). Maternal factors such as educational status, BMI, autonomy, Maternal CMD (17,22,24,28-44). Child health and feeding factors such as immunization status, duration of breast feeding, pre-lacteal feeding, initiation of breast feeding with in 1hr after giving birth (20-22,24,25,27,45-57).

Even though breastfeeding is nearly universal in Ethiopia but 52% of children less than 6 months old are exclusively breastfed. Complementary foods are not introduced in a timely fashion for all children and only 4% of children age 6-23months are fed appropriately, based on the recommended infant and young child feeding (IYCF) practices (17). Hence, poor nutrition in the first 1,000 days of a child's life can also lead to stunted growth, which is irreversible and associated with impaired cognitive ability and reduced school and work performance (8).

Malnutrition is one of the leading causes of morbidity and mortality in children under five years of age in Ethiopia. Ethiopia has witnessed encouraging progress in reducing malnutrition over the past decade. However, baseline levels of malnutrition remain so high that the country must

continue to make significant investments in nutrition (58). According to the 2011 and 2014 DHS of Ethiopia, the prevalence of nutritional indices reduced; underweight from 29 to 25%, stunting from 44 to 40%, and wasting from 10 to 9% (17, 59).

In 2008, the Government of Ethiopia launched a National Nutrition Program (NNP), combining nutrition services into one comprehensive strategy. The NNP shifted the previous focus on food aid and humanitarian assistance and increased attention on comprehensive direct nutrition interventions addressing the immediate and underlying causes of malnutrition, especially at community level (10).

A national nutrition strategy and program has also been developed and implemented by the Government of Ethiopia. The Health Sector Development Plan IV (2010/11-2014/15) strives to improve the nutritional status of mothers and children through the following program: Enhanced Outreach Strategy (EOS) with Targeted Supplementary Food (TSF) and Transitioning of EOS into HEP, Health Facility Nutrition Services, Community Based Nutrition (CBN), and Micronutrient Interventions and Essential Nutrition Actions/Integrated Infant and Young Feeding Counseling Services (60). There is an ongoing worldwide effort focused on the complete eradication of extreme poverty and hunger. However, the burden of under-nutrition is still a major public health problem especially in resource poor countries (2, 61).

However, there is limited evidence on litratures in Dilla zuriya district to identify factors association with child undernutrition. Therefore, this study would have a significant input to provide information about the gaps in the programs striving to improve child nutrition in the regional and national level.

CHAPTER TWO: LITERATURE REVIEW

Under-nutrition magnifies the effect of every disease, including measles and malaria. Geographically, more than 70 percent of malnourished children live in Asia, 26 percent in Africa and 4 percent in Latin America and the Caribbean. In many cases, their plight began even before birth with a malnourished mother. Under-nutrition among pregnant women in developing countries leads to 1 out of 6 infants born with low birth weight. This is not only a risk factor for neonatal deaths, but also causes learning disabilities, mental, retardation, poor health, blindness and premature death (18).

The geographic distribution of stunting across the 41 sub-Saharan countries that have at least 1 million residents with reliable national trend or recent cross-sectional data reveals interesting patterns. Two areas stand out as having high levels and stagnant or deteriorating trends: the Sahel (from Mali east to Chad) and southeastern Africa (from Rwanda and Zambia east to Mozambique and Madagascar). Stunting has remained relatively low in most of southern Africa (especially Namibia, Botswana, and South Africa). It has declined in the last 20 years (from 46 percent to 35 percent) in eastern Africa, demonstrated by improvement in Ethiopia, Uganda, and Tanzania, while it has worsened or stagnated in western Africa, the Sahel, and southeastern Africa (19).

A study done in Nepal, Kalali district showed that overall prevalence of stunting, underweight and wasting were 41.4%, 24.2% and 9.2% respectively (23). In Bangladesh among the children studied, 41%, 35% and 18% were stunted, underweight, and wasted (45). A study from Sri Lanka showed Prevalence of stunting, wasting and underweight in the sample was 17%, 17.1% and 21.3% respectively (46).

In Tanzania, prevalence rates of stunting, underweight and wasting were 43%, 22% and 3% (48). A study from Zambia showed that Prevalence of stunting among children 6–23 months was very high 44.5 percent (52).

In Ethiopia, A study from Guto Gida district, West Ethiopia revealed that 12.53% children age 6-23 months were wasted (42). A study done in Sidama zone showed that prevalence of stunting, wasting and underweight is 37.2%, 8.3% and 25.6%, respectively. Stunting was higher (43%) for

children aged 6-8 months than those 0 - 5 and 9 - 23 months, whereas the corresponding wasting was higher (9.6%) for 9 - 23 months old children than those 0-5 and 6 - 8 months of age. The highest proportion of underweight (Weight-for-age < -2SD) was for children in the category of 9 - 23 months (29%) (54). A study done in East Wollega zone showed that prevalence of underweight among under two children was 8.9% and stunting was 15.7% (56,57).

In Ethiopia, stunting prevalence decreased by 12 % (from 58 %to 51 %) between 2000 and 2005 and by an additional 14 % to 44 % between 2005 and 2011. The decline in the proportion of stunted children shows improvement in chronic malnutrition over the past eleven years. A similar pattern is also observed for the proportion of children underweight which dropped by 20% from 2000 to 2005 and 12 % from 2005 to 2011. The prevalence of wasting in has remained constant over the last 11 years (17).

2.1. Factors affecting Child nutritional status

2.1.1 Distal factors

Household economic condition

Studies have been showing household economic status as distal predictor for child's under-nutrition. A study done in India among under 5 children showed that Children belonging to lowest and middle HHs wealth index had a risk of 1.5 (CI=1.35-1.60) and 1.3 (CI=1.16-1.38) of being stunted as compared to children from highest wealth index (20) A similar inverse relationship is observed on EDHS report between the household wealth index and the stunting levels of children; that is, a higher proportion of children in the lowest household wealth quintile are stunted (49 %) than of children in the highest wealth quintile (30 %) (17).

A study done in Dollo Ado district, Somali region, Ethiopia on 6-59 month children showed that 42.3% of the children were wasted, 34.4% stunted and 47.7% were underweight. HH income, time spent to collect water and possession of livestock were predictors of wasting, source of safe water supply, having livestock and type of floor were found to be the predictors of stunting. And only having of livestock predicts underweight (21). Similarly in south region, cohort study conducted in the Butajira demographic surveillance site (DSS), showed that the prevalence of infant under-nutrition was high at 6 months (21.7% underweight, 26.7% stunted and 16.7% wasted) than at 12 months of age (21.2% underweight, 48.1% stunted, and 8.4% wasted). The

prevalence of under-nutrition was significantly higher amongst infants were living in a less hygienic environment and with high score on the poverty index (22). A study done in Nepal, Kalali district showed stunting and underweight were associated with household wealth ($p<0.05$) (23)

Parental Literacy and Occupation

Studies from developing nations revealed maternal literacy as one distal predictor of child under-nutrition. A study from India showed that the risk was 1.5 and 1.4 times more among children whose mothers were illiterate and those educated up to 8^{th} standards, as compared to children whose mothers were educated to the level of higher secondary and above. (20). In Nepal, underweight was also associated with education of caretaker ($p<0.05$) (23). Study from Bangladesh showed that undernourished children were more likely to have illiterate/less educated mother (24). Similarly, a study from Uganda indicated that being born to a mother with little or no formal education was associated with higher odds of being stunted (25).

The mother's level of education generally has an inverse relationship with stunting levels. For example, children of mothers with more than secondary education are the least likely to be stunted (19 %), while children whose mothers have no education are the most likely to be stunted (47 %) (17). Prevalence of undernutrition was significantly higher amongst infants who had non-literate parents (22).

Place of Residence

Children in rural areas are 1.5 times more likely to be stunted (46 %) than those in urban areas (32%) (17). Residing in rural areas was also associated with stunting and underweight at twelve months of age but not associated with infant under-nutrition at six months of age (22).

2.1.2 Intermediate Factors

Overcrowding

Overcrowding in the Household was one of the determining factors for the child's under-nutrition. A study from Malaysia indicated that households with four children and above were at higher odds of having malnourished children as compared to their counterparts (26). Similarly, children living in overcrowded families (family size ≥10) had a risk of 1.3 (CI=1.06-1.57) of

being wasted as compared to children with family size of ≤4 (19). According to study from Jimma, Ethiopia, for those children from family size 1-2, 64%, and those with family size > 4 was 75% less likely to be under-weight when compared with family size of between 2-3 (27).

Maternal Age

Prevalence of undernutrition was significantly higher amongst infants who had older parents (21).Similarly, undernourished children were more likely to have older (>30 years) mother (22).

Maternal BMI

The mother nutritional status was found to be a potential predictor of the child under-nutrition in many of the studies. Maternal under-weight is believed to increase the risk for low birth weight and intrauterine growth retardation (28).Undernourished children were more likely to have undernourished- (BMI ≤18.5 kg/m2) mother (AOR=1.26(1.01 - 1.57)) (24). The prevalence of under-nutrition was significantly higher amongst infants who were born from under-nourished mothers (22). The mother's nutritional status, as measured by her body mass index (BMI), also has an inverse relationship with her child's level of stunting. For example, children of thin mothers (BMI <18.5) are more likely to be stunted (47 percent) than the children of overweight/obese (BMI ≥25) mothers (26 percent) (17). Studies from India showed association of maternal BMI with the child undernutrition. An increase in 1 unit of maternal BMI was associated with a lower relative risk (RR) for childhood undernutrition (underweight RR: 0.957 [95% confidence interval [CI]:0.947–0.967]; stunting RR: 0.985 [95% CI: 0.977–0.993]; wasting RR: 0.941 [95% CI: 0.926–0.958]) (29). Similarly stunting is associated with mother's BMI (OR-2.553; 95%CI-1.33 - 4.9) (30).

Maternal CMD

As mothers largely constitute infants' social environments and mediate their experience of the external world, it is imperative to investigate the effects of CMD on mother-infant relations, and child growth and development. Even young infants are appreciably affected and highly sensitive to the quality of care they receive. Thus, the infant's interpersonal environment is likely to be affected by CMD symptoms such as depression, persistently low mood, social withdrawal, irritability, impaired concentration, hopelessness, guilt, and anxiety. Recent work has begun to elucidate the course of infant and child development associated with CMD.

Mental health is a public health issues since its magnitude of burden of mental ill. Studies conducted in HICs estimate a 10%-15% prevalence of mental disorder in women during perinatal period (perinatal period refers to period of pregnancy and up to one year after child birth) (15). Recent studies have found that in LMICs these problems are in the range of 10-41%, depending on the place and time of the perinatal period studied and the instruments employed (31).

A meta-analysis on 17 studies from developing countries, the pooled data showed a positive and moderate statistically significant relationship between maternal depression and underweight (OR: 1.5; 95% confidence interval, CI: 1.2–1.8) and, maternal depression and stunting (OR: 1.4; 95% CI: 1.2–1.7) (32). A study done among Infant showed that infants of mothers with depressive symptoms had a 2.17 higher odds of being stunted (95% CI: 1.24, 3.81; P=0.007) than did infants of mothers with few symptoms (45.3% compared with 27.6%) (33). A case-control study among children between 3 to 36 months of age showed that Maternal mental health affects the nutritional status of the children. The result revealed that maternal HADS score was significantly high >21 in 50% of cases whereas in controls it was 46% (O.R=0.85 (95%Cl=0.38-1.86) (34). Even though the findings of R.C Stewart et al, 2008 was limited on the cross-sectional study design but mean length-for-age z-score for infants of mothers with CMD (-1.50 SD 1.24) was significantly lower than for infants of mothers without CMD (-1.11 SD 1.12) Student's t-test: P=0.001. This association was confirmed in multivariate analysis (35). The reductions in the prevalence of maternal depression could lead to a reduction in child growth retardation of up to30% (36).

A study conducted among 2000 mothers and their children aged 6–18 months in four developing countries (India, Peru, Ethiopia and Vietnam) showed that there was a relation between high maternal CMD and poor child nutritional status in India and Vietnam. However, the findings from Peru and Ethiopia do not provide clear evidence for a similar association being present in non-Asian countries (37).

A literature review revealed that postpartum depression has salient but selective effects on mother-infant relationship, and child growth and development. The strongest effects of postpartum depression are on cognitive development such as language, and IQ. Meta-analyses support medium to large effect sizes of postpartum depression on mother-infant relations in the

first year postpartum. The odds are 5.4 times higher for 18-month old infants of postpartum depression mothers to display insecure attachment compared to infants of non-postpartum depression mothers. Postpartum depression may also lead to the early cessation of breastfeeding. With regard to emotional growth and development, studies support an early effect of PPD on infant affect, but do not support more longitudinal effects. (38).

A cohort study among babies of 250 mothers showed that maternal psychological morbidity was independently associated with low birth weight (OR 1.44, 95% CI 1.0–2.07). We conclude that maternal psychological morbidity has an adverse impact on fetal growth (39). In contrary a cohort study done in Butajira, Ethiopia showed that none of the findings showed statistically significant effect of CMD on nutritional status of infants (40).

Maternal autonomy

Recent literature suggests that women's autonomy may be one of the important social variables, responsible for influencing child nutritional status. The importance of studying women's autonomy and the effects that this variable has on women's lives is important. First of all, autonomy provides a measure of empowerment among women, which is an issue of basic human rights. In many societies women are constrained in their freedom of movement, their decision-making abilities, and their freedom of expression (43).

In particular, in Chad, mothers' higher decision-making power surrounding child feeding is a significant predictor of improved height-for-age z-scores (16). Therefore mothers with greater autonomy may also benefit in other ways that indirectly affect their child. A study done in India revealed that women with higher autonomy {indicated by access to money [odds ratio (OR) = 0.731; 95% confidence interval (CI) 0.546, 0.981] and freedom to choose to go to the market [OR = 0.593; 95% CI 0.376, 0.933]} were significantly less likely to have a stunted child, after controlling for household socio-economic status and mother's education. (44)

2.1.3 Proximal Factors

Sex of the Child

Previously studies revealed females have less attention than their counter parts, boys as a sex selection bias for different reasons, which in did pave risk for under-nutrition. In contrary many

of studies showed that being male is risk for under-nutrition. Male gender was associated with stunting at both time-points (6 and 12 months) and being underweight at six months (22). The Odds of being female child was 40% less likely to be stunted compared to male children but child's sex does show statistical association with wasting and underweight (27). The risk of stunting was 1.2 (CI=1.15-1.31) times higher among boys as compared to girls. (20). Being a male child was associated with higher odds of being stunted (25). Undernourished children were less likely to be female (24). In Bangladesh among the children studied, significant association was found between sex and stunting (45).

Age of the child

Increased age of the child was also found to have statistically significant association with wasting but not for underweight and stunting (25,27). In contrary to these findings a study from Sri Lanka showed wasting was significantly associated with increasing age of the child ($p<0.05$) (46). Predictors of underweight in children (6-23m) were child's age (OR-1.088; 95% CI-1.015-1.166) (30).

Birth Interval of the Child

A unmatched community based nested case -control study carried on children aged between 6-36 months showed that wasting was associated with narrow birth interval [AOR (95% CI) = 1.65 (1.23, 2.20)] (47).

Child Morbidity

Nearly half of all deaths in children under 5 are attributable to under-nutrition. This translates into the unnecessary loss of about 3 million young lives a year. Under-nutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and contributes to delayed recovery. In addition, the interaction between under-nutrition and infection can create a potentially lethal cycle of worsening illness and deteriorating nutritional status (48). Common childhood infections exert their influence in precipitating undernutrition, especially in borderline cases when they recur frequently (49). Poor nutrition in the first 1,000 days of a child's life can also lead to stunted growth, which is irreversible and associated with impaired cognitive ability and reduced school and work performance (48).

Undernourished children were more likely to have suffered from diarrhea in the previous two weeks (24). History of morbidity during preceding fortnight was associated with a 1.3 (CI=1.11-1.41) times higher risk of wasting (20). Similarly, children who were sick every month (AOR: 2.79, 95% CI: 1.06, 7.31) and had a history of worm infection (AOR: 3.48, 95% CI: 1.25, 9.70) were three times more likely to be malnourished as compared to their counterparts (26). History of fever and cough were associated with higher odds of being underweight (OR=2.4 and 3.0, respectively) (25).

Child Feeding Practice

Breast milk it has a relatively high fat content compared to most complementary foods, Its fat content may be critical for utilization of pro-vitamin A carotenoids in predominantly plant-based diets. Breast milk provides substantial amounts of certain micronutrients (50). Low frequency of breastfeeding also contributes to insufficient nutrient and energy intake in infants beyond 6 months of age (51).

A study from Jimma, south east Ethiopia showed that children of those mothers who stopped breast feeding at the time of survey were 2.7 times at higher risk of being wasted compared to children of those mothers still breast feeding. But being still on breast feeding doesn't showed statistical significance with wasting and stunting (27). Similarly, to whom initiation of breastfeeding was delayed it was found to be the risk factors for underweight at six months of age (22). A case-control study done among under 5 children that the cases were children admitted with SAM and the controls were children without malnutrition admitted for other medical problems showed that the risk for SAM was independently associated with lack of exclusive breast-feeding for the first six months of life (21).

A study from Zambia showed that child's IDDS were also significant predictors of stunting (AOR=1.101, 95%CI: 1.021, 1.186; $p<0.001$) (52). Similarly, a study from East Wollega, Oromiya region revealed that children among 6-23 months age were 12.53% wasted and it showed negative association between frequency of meal served for the child and stunting (47). Frequency of supplementary feeding not associated with stunting, underweight and wasting (27). The risk for SAM was independently associated with late initiation of complementary diet (OR=3.39, 95% CI 1.20–9.57) (53). Any of the above studies showed no significant association between feeding of colostrum, methods of feeding and pre-lacteal feeing, and under-nutrition.

A study done in Sidama zone showed that children who started complementary food either before or after the recommended 6 months' time, were 3.2 and 2.3 times more likely to be stunted (P=0.01), respectively (54). In Nepal, risks of stunting is also higher (OR= 3.615, CI= 1.140-11.458, p=0.002) in children who didn't get minimum times of meal in comparison to children who get minimum times of meal (55).

A study done in East Wollega zone showed that age of the child, birth weight, advice on IYCF from health information after delivery, frequency of breastfeeding and vitamin A-rich fruits and vegetables were found as associated factors with underweight among rural children. Women who had frequency of breastfeeding of less than 8 times per 24 hours were 2.5 times more likely to be malnourished (underweight) than those who had more than or equal to 8 times (AOR=2.52; 95%CI=1.03, 6.16) (56). In similar area, stunting was associated with illiterate mothers (AOR = 3.84; 95% CI 1.49-9.91) and nonexclusive breast feeding (AOR = 2.12; 95% CI 1.19-7.79) (57).

2.2 Conceptual Framework

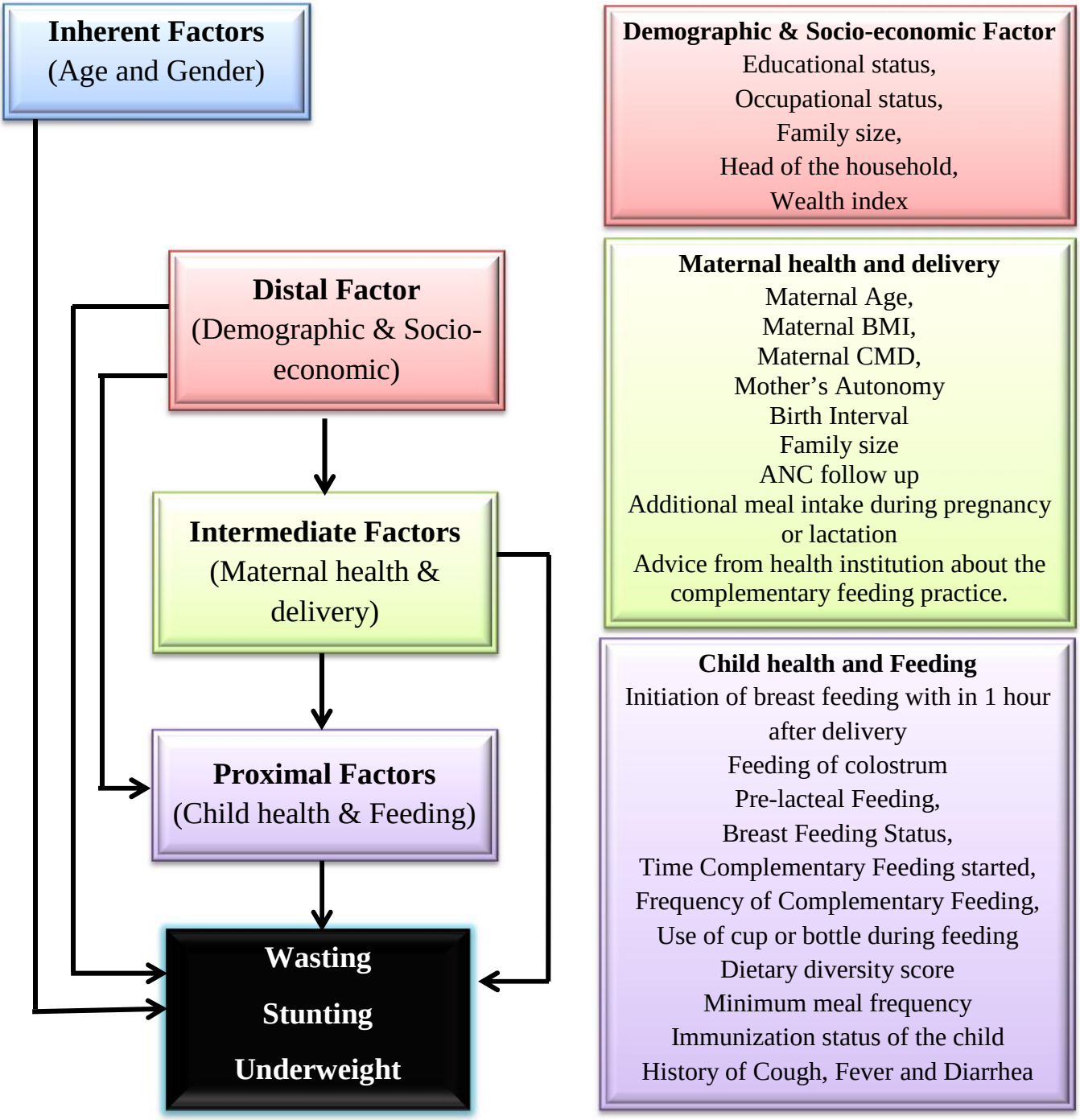

Figure 1 : Conceptual framework for undernutrition in children age 6-23 months. (Adapted from Lesiapeto MS et al, 2010 and H. Wamani et al, 2006)

2.3 Significance of the study

Child nutritional indicators are used to assess the quality of available health services as well as the general health condition of the entire population. Similarly, childhood nutritional status also determines the health and disease conditions of the children in their future life.

Nutritional status of children is a proxy indicator for the first MGD addressing poverty and hunger, assessing the entire population health status and one of the major predictors of child survival.

This study aims to assess child nutritional status and associated factors in Dilla zuriya district, South Ethiopia.

The findings of this study will serve as source of information for district health office to develop action plan and will benefit different stakeholders like, public health practitioners, program planners, and decision makers for further utilization.

Interested researchers in the area can use the information generated from the study as a baseline.

CHAPTER THREE: OBJECTIVES

3.1 General Objective:

- To assess children undernutrition and associated factors among 6-23 months in Dilla zuriya woreda, Gedeo zone, south Ethiopia, 2015.

3.2 Specific objectives:

- To determine the prevalence of children under-nutrition among age 6-23 months in the woreda.
- To identify factors associated with children under-nutrition among age 6-23 months in the woreda.

CHAPTER FOUR: METHOD AND MATERIALS

4.1 Study area and period

The study was conducted in Dilla zuriya woreda, which is located 3Kms to the south of the Dilla town, 90Kms from regional capital Hawassa and 363Km from Addis Ababa. Dilla zuriya is one of the 8 woredas in Gedeo zone of SNNPR. The woreda covers an area of 109.99 Km^2 in 1300-2600ms above sea levels. Annual mean temperature ranges in 12.6-22.5^oC and 900-1800ml of rainfall. The woreda has 17 kebeles. There is one main road which connects the woreda with zonal and regional towns. (62). Based on projection from 2007 population & Housing census report, (63) the total population in 2014/15 is estimated to be 122,337, among these 60,924 (49.8%) are males & 61,413 (50.2%) are females. There are 6950 children aged 6-23 month. Ninety nine percent (99.8%) are Gedeo and dominated by protestant religion followers then proceeded by orthodox Christians. Most of the people depend on traditional subsistence agriculture for living. Mainly they produce coffee, enset & maize. Concerning health facility distribution, there are 5 Governmental Health centers, 27 Health posts and 2 rural drug vendors (62).

The study was conducted from February 25–March 26, 2015.

4.2 Study design

Community based cross sectional study design.

4.3 Populations

4.3.1 Source population

Mothers who have children aged 6-23 months living in Dilla zuriya woreda in the study period.

4.3.2 Study population

Selected mothers who have children aged 6-23 months living in Dilla zuriya woreda who fulfills the eligibility criteria.

4.4 Eligibility Criteria

4.4.1 Inclusion criteria

1. Mothers who have children age 6-23 months living in Dilla zuriya woreda.
2. Mothers who volunteer to participate in the study.
3. Mothers and their children who are resided in the area for at least 6 and above months before the study begin.

4.4.2 Exclusion criteria

1. Children with obvious physical deformity.
2. Mothers who are unable to respond due to any serious illness.

4.5 Sample size and Sampling technique

4.5.1 Sample size determination

The sample size was determined based on previously published research from the same region which showed a prevalence of stunting was 43% for infants aged 6-8 months (58). Considering the fact that the proportion closer to 50% will give the largest sample size then 43% was taken as P.

The sample size was determined by using single population proportion formula considering the following parameters:

P=43%

Z-score at 95% confidence interval = 1.96

d= Acceptable margin of error (precision of measurement) = 5%

The Non-response rate=10%

The formula for calculating the sample size (n) is

Effect size of 1.5 was used minimize bias arising from not using simple random sampling technique.

$$n = \left[\frac{Z^2 P(1-P)}{d^2}\right] DEFF$$

$$= \left\lfloor \frac{[(1.96)^2 * 0.43(1-0.43)]}{(0.05)^2} \right\rfloor * 1.5$$

= [376.6] *1.5

=565

By considering non response rate 10% (57) the final sample size was **622** (children age 6-23 month living with their mother).

4.5.2 Sampling technique/procedure

Five kebeles were randomly selected from the list of 17 kebeles. The samples were then distributed in the selected kebeles by proportion to population size and then selected by simple random sampling using lists of children with their mothers from family folder of the kebele health post as sampling frame. In the case that for households having two children in the target age group, the youngest child taken as index child. According to Dilla Zuriya District Health Office report, the estimated number of infants and young children aged 6-23 months in the selected 5 kebeles is 1689. The total number of children in each selected kebeles (K1-Chichu=367, K2-Sisota=291, K3-Gola=368, K4-Andida=312, and K5-Tumticha=351. A two-stage cluster sampling procedure was employed to select the required mother/child pair.

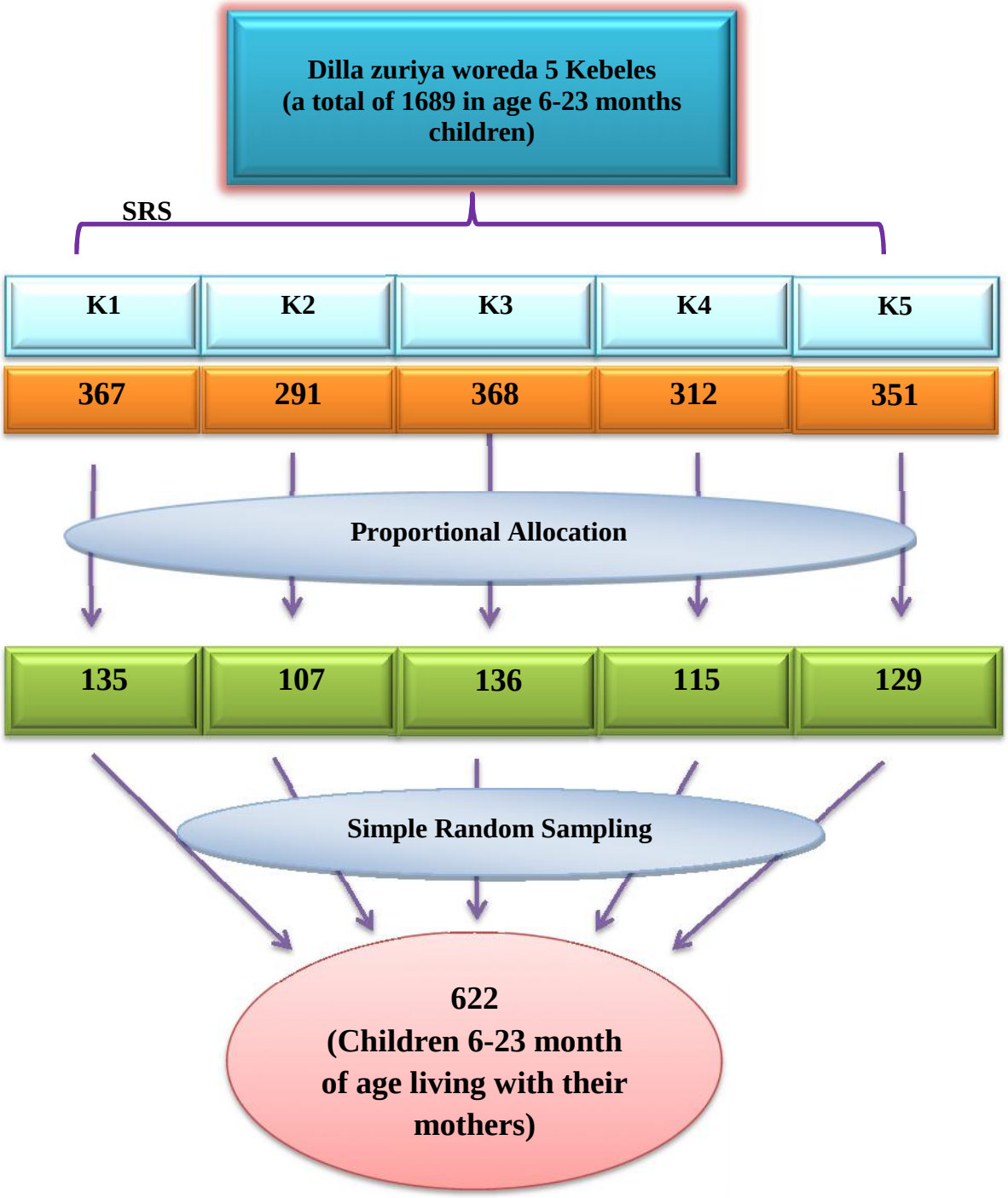

Figure 2: Schematic representation of sampling procedure for undernutrition in children age 6-23 months in Dilla zuriya woreda, 2015.

4.6 Variables

4.6.1 Dependent variables

- ✓ Child undernutrition: The three nutritional indicators were used (chronic, acute and combined):
  - ➢ Stunting
  - ➢ Wasting
  - ➢ Underweight

4.6.2 Independent variables

- ✓ Demographic and Socio- Economic characteristics
  - Age of the mother
  - Educational status,
  - Occupational status,
  - Family size,
  - Head of the household,
  - Household Wealth Index
- ✓ Maternal:
  - Maternal CMD
  - Mother's BMI
  - Mother's Autonomy
  - ANC follow up
  - Additional meal intake during pregnancy or lactation
  - Advice from health institution about the complementary feeding practice.
- ✓ Child:
  - Gender of the child
  - Age of the child
  - Birth Interval
  - Child immunization status
  - History of illness of the child with in the last 2 weeks for: - diarrhea, fever and cough.

- Child feeding practice: - initiation of breast feeding with in 1 hour after delivery, Feeding of colostrum, history of any pre-lacteal feeding, Breast feeding status, frequency of Breast feeding, time complementary feeding started, frequency of complementary feeding, bottle feeding, Dietary diversity score and Minimum meal frequency.

4.7 Operational definitions and Definition of terms

- **Undernutrition:** refers to proportion of children age 6-23 who are wasted, stunted and underweight at <−2SD from the median value of the reference population.
- **Minimum Dietary Diversity**: - refers to a score of children age 6–23 months who received four and above foods items of the eight food groups within the last 24 hours (64).

    1. Grains, roots and tubers
    2. Legumes and nuts
    3. Dairy products
    4. Flesh foods
    5. Egg
    6. Vitamin A-rich fruits and vegetables
    7. Other fruits and vegetables
    8. Fats and oils

- **Minimum meal frequency:** refers to a score of breastfed and non-breastfed children age 6–23 months who received solid, semi-solid, or soft foods the minimum number of times or more.

    For breastfed children; the minimum number of times varies with age (2 times if 6–8 months and 3 times if 9–23 months) during the previous day. For those who do not breastfed children; the minimum number of meal is 4 and above during the previous day (64).

- **High Maternal CMD:** refers to proportion of mothers showing 6 and above symptoms of depression, anxiety and somatic manifestations of distress with in the last 30 days according to SRQ_{20} scale (65).
- **Maternal undernutrition:** refers to proportion of mothers whose BMI is less than 18.5 kg/m2.
- **Low level of Maternal autonomy:** refers to proportion of mothers who had a sum value less than the median value for the following four composite variables:

- decides on large purchases
- decides on household purchase for daily needs
- decides if you need to visits your family, friends or relatives
- decides on your own health

- **Wealth index:** a proxy measure of the household's economic status of the respondents calculated from the information on household possessions and the score created by factor analysis (principal component analysis).

4.8 Data collection procedure and Instrument

Structured questionnaire in the Gedeogna language (local Language of Gedeo people) was administered to mothers by interviewer. The questionnaire was developed first in English and then it translated to Gedeogna and back translated to English to check its conceptual equivalence by different individuals who can speak both languages. The questionnaire consists of questions including demographic and socio-economic characteristics, children and maternal factors and anthropometric measurements.

The anthropometric measurements: Children's and mother's body weight and length (Height) was measured using the standard procedure. To avoid variability/inter examiner error among the data collectors, anthropometric measurement was taken by the principal investigator. The scales are lightweight electronic SECA scales with digital screen. The scale allows weighing of very young children through an automatic mother-child adjustment that eliminates the mother's weight while she was standing on the scale with her baby. Weight scale was calibrated to zero before taking every measurement. Weight

of the children was recorded using the scale to the nearest 10 grams (g). And Length was measured using clip board and recorded to the nearest 0.1centimeters (cm). Weight of the mothers was recorded using the scale to the nearest 0.1kilograms (Kg). And Height was measured using stadiometer and recorded to the nearest 0.1centimeters (cm).

The WHO Child Growth Standards replace the previously used reference standards of the U.S. National Center for Health Statistics, accepted by the U.S. Centers for Disease Control and Prevention. So it can be used to assess children all over the world, regardless of ethnicity, social and economic influences, and feeding practices. The interpretation and transformation of these indicators is for determining the prevalence of weight deficiency, stunting and wasting. Thus it helps for classifying the children according to their degree of under nutrition (14).

Five clinical nurses who know the culture and language of the community was recruited as data collectors with the kebele health extension worker as a guider and the principal investigator to collect anthropometric data of mothers and their children. Data collectors were trained on data collection tool & its procedures for 2 days by principal investigator.

4.9 Data processing and analysis

Data was entered into EpiData 3.1 statistical software and then data was exported to SPSS version-20 and WHO Anthro software package version 2.0 for further analysis.

Child's anthropometric measurements: was converted into length for age (LAZ), weight for length (WLZ), and weight for age (WAZ) z-scores of the WHO child growth standards. And mother's anthropometric measurements were converted to BMI. Since use of standardized scores of weight and length (height) rather than raw measurements makes local and international comparisons easier, growth measurements of children were standardized to generate z-scores. The child's anthropometry scores was dichotomized at a cut-off of -2SD. Children who fall into the "low" range (<-2SD from the median value of the reference population on normalized distribution (Z score value) for the above three

indices was considered as stunted, wasted or underweight, respectively. Mothers having BMI <18.5 kg/m2 was considered as undernourished.

Maternal CMD: Each of the 20 items of SRQ was scored 0 or 1. A score of 1 if symptom was present during the past month and a score of 0 if symptom absent. The sum was obtained by adding the responses given for each question. The score of maternal CMD was dichotomized at a cut-off of 6. Those mothers with score of ≥6 was labeled as "with CMD" and score of <6 as "with low level of CMD".

To obtain a summary measure of women's autonomy in household decision making, each autonomy indicator was coded as a (0, 1) binary variable where category 0 represents a low level of decision making on that particular variable (where decisions were made by husband alone and other people) and category 1 represents a relatively high level of decision making (where decisions were made by either woman alone or woman and husband jointly). The sum of women's autonomy in decision making measure was obtained by adding the responses given for each variable. The median value was used to categorize a woman either in low level of decision making or relatively in high level of decision making. Accordingly, the sum value less than the median was categorized as low level of decision making and the value greater than or equal to the median score were categorized as high level of decision making and coded (0,1) respectively.

Children's dietary diversity score: It was calculated by asking mothers to report the eight food groups consumed by children over the past 24 hours. A score of "1" for those who consumed the food item and a score of "0" for those who did not consume the food item. Then the score was dichotomized into two binary variables as ≥ 4 (those children with acceptable minimum dietary diversity) and <4 (those children with low dietary diversity).

Wealth index: Selected indicator variables (like household assets, having live stocks, ownership of agricultural land, having bank account, housing condition and sanitation conditions) were used to measure wealth index of the households through principal component analysis (PCA) on SPSS to reduce a bunch of variables to independent linear components. PCA was done by checking assumptions. PCA with variable elimination

was repeated until all of the requirements going to be fulfilled. In the final analysis, only the first of the factors produced was used to represent wealth index. This is due to the fact that the first principal component accounts for the largest possible variance across the specified variables loaded on it.

Descriptive analysis such as frequencies, proportions, and means was done. Binary logistic regressions and Chi square test (X^2) of proportion used to determine adequacy of cells and measure the strength of association between independent and dependent variables using odds ratios at p value $\leq$0.25 and 95% of confidence intervals. Multiple variable logistic regression analysis of adjusted odds ratio was conducted to identify factors associated with child nutritional status and P value $\leq$0.05 was considered as significant after adjustment for potential confounders using step-wise backward LR method. Then output was presented using figure, tables and graphs. Finally, the result findings were compared with available findings in different literatures.

4.10 Data quality management

Quality of data was assured through validated questionnaire to assess level of CMD in mothers, DDS in children and mothers autonmy. Pre-test was done in 5% of the samples (33 children with their mothers) in Shigedo kebele (none selected kebeles) to maintain data quality control for the consistency and flow of the questionnaire. Proper training for data collectors was given to avoid hypothetical bias, proper categorization and coding of questionnaires. Anthropometric data of mothers and their children was taken by the principal investigator to avoid inter-observer bias. The survey was supervised by principal investigator, hence, collected data was rechecked for completeness and accuracy, and correction was made at the spot.

4.11 Ethical consideration

Ethical clearance was obtained from ethical review board of Jimma University and Permission letter from district Health office. Each kebele was informed before conducting the research. Permission letter and ethical clearance was given to each of the respective Kebeles in the study area. Verbal and written consent was obtained from the

respondents and confidentiality was assured for any information provided and by omitting their personal identifications. So that the instrument and procedures was not cause any harm to the respondents. The right of the respondent to withdraw from the interview or not to participate was respected. Health extension workers were informed about mothers and children with visible sever-wasting for further diagnosis and treatment in therapeutic feeding programs.

4.12 Dissemination and communication of the findings

The results of this study will be presented and submitted to department of Population and family health of Jimma University. After having approval from the Department, it will be communicated to concerned bodies through reports. The findings will also be disseminated to different organizations like Regional health bureau and stakeholders or partners who works' on programs to improve the child nutritional status in the woreda. The findings will also be presented in various workshops and conferences and also attempts will be made to publish the research article in scientific journals.

CHAPTER FIVE: RESULTS

Demographic and Socio-economic Conditions of respondents

Out of 622 samples 612 mothers having children age 6-23 months were participated making a response rate of 98.4%. The maximum age of mothers participated in this study was 43 years and minimum was 18 years with a mean (±SD) age of 29.18 (±5.45) years. And majority 210 (34.3%) of them were within the age group of 25-29 years. Six hundred two (98.4%) were married and 10 (1.6&) were widowed. Five hundred twenty five (85.8%) were Gedeo, 35 (5.7%) were Sidama, 12 (2%) were Oromo and 40 (6.5%) were others. Five hundred eighty seven (95.9%) were protestant. The study revealed that about half of the mothers 333(54.4%) were literate. Greater proportion of mothers 547 (89.4%) were house wives, 32 (5.2%) were daily laborers, 19 (3.1%) were merchants and 16 (2.3%) were others.

Four hundred ninety five (82.2%) fathers were literate. Of them 400 (66.4%) were farmers, 79 (13.1%) were daily laborers, 68 (11.3%) were merchants and 55 (9.2%) were others. Four hundred fifteen (67.8%) households have household members' ≥5. Five hundred forty three (88.7%) were headed by male. Half of the households 306 (50%) were in the middle wealth index category and 153(25%) in low, and 153(25%) in high wealth index with reliability test of 0.736 (Table 1).

Table 1: Key Demographic and Socio-Economic Characteristics of study households in Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Variable (n=612)	Category	Frequency	Percent
Mothers age in years	25-29	210	34.3
	15-19	19	3.1
	20-24	103	16.8
	30-34	145	23.7
	>=35	135	22.1
Marital status	married	602	98.4
	widowed	10	1.6
Ethnicity	Gedeo	525	85.8
	Sidama	35	5.7
	Amhara	10	1.6
	Oromo	12	2.0
	Gurage	4	0.7
	Others	26	4.2
Religion	Orthodox	19	3.1
	protestant	587	95.9
	Muslim	4	0.7
	Catholic	2	0.3
Mother Education	illiterate	279	45.6
	Literate	333	54.4
Mother Occupation	House wife	547	89.4
	Farmer	10	1.6
	Merchant	19	3.1
	Daily laborer	32	5.2
	Gov't employee	4	0.7
Father Education	Illiterate	107	17.5
	literate	495	80.9
Father occupation	farmer	400	66.4
	merchant	68	11.3
	daily laborer	79	13.2
	Gov't employee	47	7.8
	others	8	1.3
Family size	<5 HH members	197	32.2
	>=5 HH members	415	67.8
HH head	only my husband	543	88.7
	Both jointly	59	9.6
	I myself	10	1.6
Wealth index	low	153	25.0
	Middle	306	50.0
	High	153	25.0

Selected Children characteristic:

Three hundred thirty nine (55.4%) of children are in age group of 12-23months with mean (SD) age of 13.52(±5.8) months. Three hundred twenty seven (53.4%) male and 285(46.6%) female children age 6-23 months were included. Majority 501(81.9%) mothers reported that index child have birth interval of 2 years and above. Three hundred eighty (62.1%) of children were fully immunized and 23(3.8%) of children were not immunized. Regarding common child hood illnesses, mothers reported that cough (132(21.6%)), fever (241(39.4%)) had and 225(36.8%) had diarrhea within 2 weeks prior to data collection (Table 2).

Table 2: Selected Children characteristic in Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Variable (n=612)	Frequency	Percent
Child age in months		
6-11	273	44.6
12-23	339	55.4
Sex		
Male	327	53.4
Female	285	46.6
Birth interval		
>=23 months	501	81.9
<23 months	111	18.1
Immunization status		
fully immunized	380	62.1
partially immunized	209	34.2
not immunized	23	3.8
Child history of Cough within 2 weeks		
No	480	78.4
Yes	132	21.6
Child history of Fever within 2 weeks		
No	371	60.6
Yes	241	39.4
Child history of Diarrhea within 2 weeks		
No	387	63.2
Yes	225	36.8

Selected child Feeding Practice:

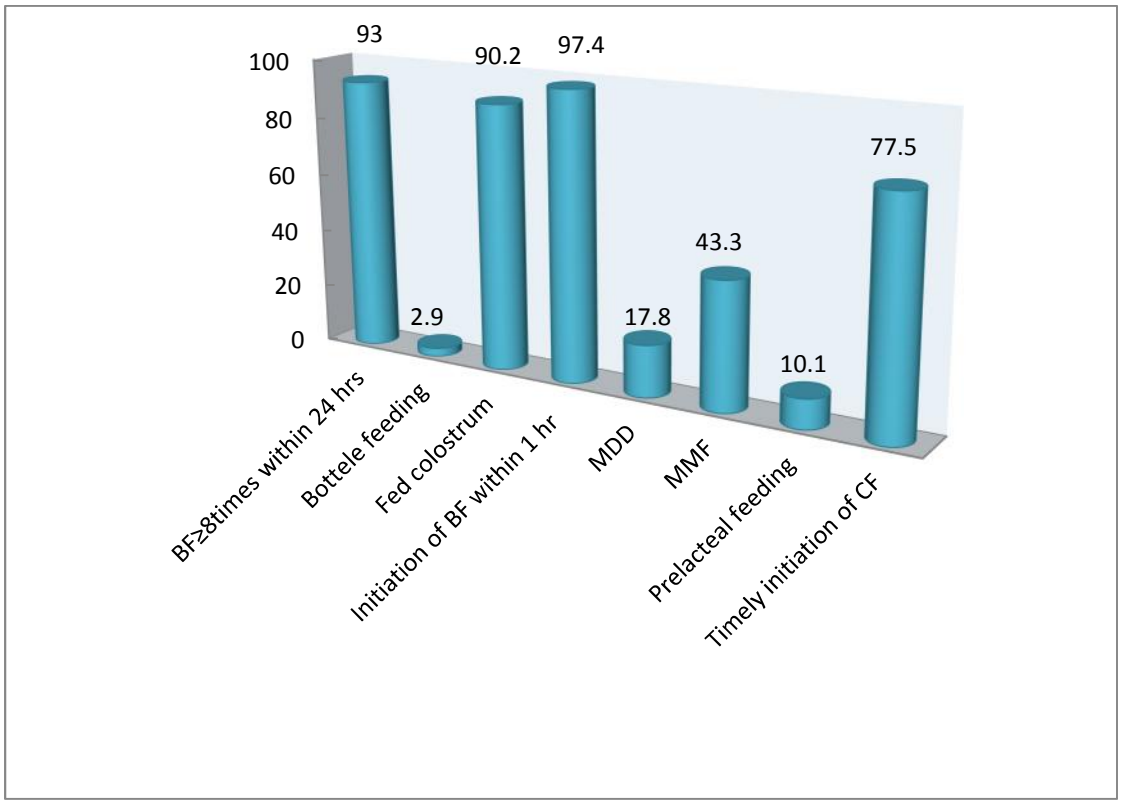

Figure 3: Selected children age 6-23 months feeding practice in Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Selected Mothers characteristics and health service utilization

One hundred twelve (18.3%) mothers have reported that they have high level of CMD. Four hundred seventy four (77.5%) have BMI >=18.5mg/m^2. About Two third of mothers 437(71.4%) reported that they have had high level autonomy to make decision in the house. One hundred fifty four (25.2%) mothers reported that they did not take additional meal during pregnancy/lactation. Majority of mothers 510(83.3%) reported that they got advise from health institution on IYCF. Ninety four (15.4%) mothers have no ANC follow up for the index child and 268(43.8%) mothers reported that they had 4 and above ANC follow up (Table 3).

Table 3: Selected Mothers characteristics and health service utilization in Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Variable (n=612)	Frequency	Percent
Mothers CMD		
low CMD	500	81.7
High CMD	112	18.3
Mother BMI		
>=18.5mg/m^2	474	77.5
<18.5 mg/m^2	138	22.5
Mother's Autonomy		
High level	437	71.4
Low level	175	28.6
Take additional meal during pregnancy/lactation		
No	154	25.2
Yes	458	74.8
Receive advise on IYCF from health institution		
No	102	16.7
Yes	510	83.3
ANC follow up		
>=4	268	43.8
1-3	250	40.8
No	94	15.4

Nutritional Status of the Children:

The overall prevalence of wasting, stunting and underweight is 14.1%, 31% and 13.1%, respectively. Proportion of wasting, stunting and underweight is high in male children and age group 12-23 months (Table 4).

Table 4: Prevalence of wasting, stunting and underweight by overall, sex and age groups among selected children age 6-23 month in Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Variable (n=612)	**Wasting** (Frequency (%))		**Stunting** (Frequency (%))		**Underweight** (Frequency (%))	
	Yes	No	Yes	No	Yes	No
Age in month						
6-11	24(3.9)	249(40.7)	79(12.9)	194(31.7)	22(3.6)	251(41)
12-23	62(10.1)	277(45.3)	111(18.1)	228(37.3)	58(9.5)	281(45.9)
Sex						
Male	48(7.8)	279(45.6)	99(16.2)	228(37.3)	48(7.8)	279(45.6)
Female	38(6.2)	247(40.4)	91(14.8)	194(31.7)	32(5.3)	253(41.3)
Overall	86(14.1)	526(85.9)	190 (31.0)	422 (69.0)	80 (13.1)	532 (86.9)

Factors associated with Wasting among children age 6-23 month:

In bivariate analysis Cough (P=0.044), Prelacteal feeding (P=0.104), Mothers Age (P=0.124), Mothers Education (P=0.040), Autonomy (P=0.022), Mothers BMI (P<0.0001), Child Age (P=0.001), Child Immunization (P=0.039), MMF (P=0.040) and Wealth index (P=0.069) were found to have association with wasting.

In multiple logistic regression analysis Mothers Age, Mothers Autonomy, Mothers BMI and Child's Age were found to be factors associated with Wasting in the final model.

Children from mothers whose age is in a range of 30-34 years were 2 times more likely to be wasted as compared to children from mothers in age range of 25-29 years (AOR=2.004(1.066-3.768)).

Children from mothers who have low autonomy were 2.3 times more likely to be wasted as compared to children from mothers who have high level autonomy (AOR=2.289(1.335-3.924)).

Children from mothers with BMI <18.5kg/m^2 were 3.2 times more likely to be wasted as compared to children from mothers who have BMI ≥18.5 kg/m^2 (AOR=3.239(1.893-5.542)).

Children with age range of 6-11monthrs were 66.1% less likely to be wasted as compared to children in age range of 12-23 months (AOR=0.339 (0.199-0.577)) (Table 5).

Table 5: Factors associated with wasting in selected children age 6-23 months of Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Variables	**Wasting (n=612)**		95% CI	
	Yes No (%)	No No (%)	COR	AOR
Child history of Cough within 2 weeks				
Yes	12(2)	120(19.6)	0.549(0.288-1.044)	
No	74(12.1)	406(66.3)	1	
Prelacteal feeding				
Yes	4(0.6)	58(9.5)	0.394(0.139-1.114)	
No	82(13.4)	468(76.5)	1	
Mothers Age				
15-19 Years	2(0.3)	17(2.8)	0.912(0.198-4.192)	
20-24 Years	14(2.3)	89(14.5)	1.219(0.602-2.469)	
30-34 Years	30(4.9)	115(18.9)	2.022(1.126-3.629)	**2.004(1.066-3.768)***
≥ 35 Years	16(2.6)	119(19.4)	1.042(0.532-2.043)	
25-29 Years	24(3.9)	186(30.4)	1	1
Mothers Education				
Literate	38(6.2)	295(48.2)	0.620(0.392-0.981)	
Illiterate	48(7.8)	231(37.7)	1	
Mother's Autonomy				
Low	34(5.6)	141(23)	1.785(1.112-2.866)	**2.289(1.335-3.924)****
High	52(8.5)	385(62.9)	1	1
Mothers BMI				
<18.5 kg/m^2	34(5.6)	104(17)	2.653(1.637-4.299)	**3.239(1.893-5.542)****
≥18.5 kg/m^2	52(8.5)	422(68.9)	1	1
Children Age in months				
6-11	24(3.9)	249(40.7)	0.431(0.261-0.711)	**0.339(0.199-0.577)****
12-23	62(10.1)	277(45.3)	1	1
Child Immunization				
Not	2(0.3)	21(3.4)	0.470(0.108-2.056)	
Partially	20(3.3)	189(30.9)	0.522(0.306-0.891)	
Fully	64(10.5)	316(51.6)	1	
MMF				
Yes	28(4.6)	237(38.7)	0.589(0.363-0.954)	
No	58(9.5)	289(47.2)	1	
Wealth index				
Low	14(2.3)	139(22.7)	0.600(0.318-1.132)	
High	28(4.6)	125(20.4)	1.334(0.793-2.242)	
Middle	44(7.2)	262(42.8)	1	

P<0.01, *P<0.05, **COR (Crude odds ratio), **AOR** (Adjusted odds ratio), **CI** (Confidence interval)

Factors associated with stunting among children age 6-23 month:

In bivariate analysis Take additional meal during pregnancy/ lactation (P=0.011), Cough (P<0.0001), Fever (P<0.0001), Diarrhea (P=0.228), Father Education (P=0.101), Autonomy (P=0.019), BF frequency (P=0.019), CMD (P<0.0001) and MMF (P=0.015) were found to have association with stunting.

In multiple logistic regression analysis Fever, Breast feeding frequency within 24 hours and MMF were found to be factors associated with stunting in the final model,

Children who have had fever within 2 weeks prior to data collection were 1.8 times more likely to be stunted as compared to children who did not have fever (AOR=1.799 (1.265-2.557)).

Children who breast feed $\geq$ 8 times in 24 hours were 52.8% less likely to be stunted as compared to children who had BF frequency <8 times in 24 hours (AOR= 0.472(0.247-0.903)).

Children who had minimum meal frequency were 38.2% less likely to be stunted as compared to children who did not have minimum meal frequency (AOR= 0.618 (0.442-0.866)) (Table 6).

Table 6: Factors associated with stunting in selected children age 6-23 months of Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Variables	**Stunting (n=612)**		95% CI	
	Yes	No	COR	AOR
	No (%)	No (%)		
Take additional meal during pregnancy/ lactation				
Yes	129(21.1)	329(53.7)	0.644(0.446-0.929)	
No	61(10)	93(15.2)	1	
Child history of Cough within 2 weeks				
Yes	59(9.6)	73(12)	1.330(0.902-1.961)	
No	131(21.4)	349(57)	1	
Child history of Fever within 2 weeks				
Yes	102(16.7)	139(22.7)	1.839(1.323-2.555)	**1.799 (1.265-2.557)****
No	88(14.4)	283(46.2)	1	1
Child history of Diarrhea within 2 weeks				
Yes	77(12.5)	148(24.2)	1.721(1.235-2.399)	
No	113(18.5)	274(44.8)	1	
Father Education¥				
Literate	156(25.9)	339(56.3)	1.016(1.000-1.032)	
Illiterate	34(5.7)	73(12.1)	1	
Mother's Autonomy				
Low	67(10.9)	108(17.7)	1.072(0.753-1.528)	
High	123(20.1)	314(51.3)	1	
BF frequency within 24 hours				
≥8 times	184(30.1)	385(62.9)	0.611(0.327-1.141)	**0.472(0.247-0.903)***
<8 times	6(1)	37(6)	1	1
Maternal CMD				
High	52(8.5)	60(9.8)	1.569(1.040-2.369)	
Low	138(22.5)	362(59.2)	1	
MMF				
Yes	68(11.1)	197(32.2)	0.581(0.419-0.806)	**0.618 (0.442-0.866)****
No	122(19.9)	225(36.8)	1	1

****P**<0.01,***P**<0.05, **COR** (Crude odds ratio), **AOR** (Adjusted odds ratio), **CI** (Confidence interval), **¥**(n=602)

Factors associated with underweight among children age 6-23 month:

In bivariate analysis take additional meal during pregnancy/lactation (P=0.002), Cough (P=0.069), Fever (P=0.141), Diarrhea (P=0.130), Autonomy (P=0.005), Child's Age (P=0.001), CMD (P=0.001), MMF (P=0.014), Father Occupation (P=0.016) and Wealth index (P=0.053) were found to have association with underweight.

In multiple logistic regression analysis Autonomy, Child age, CMD, Father's occupation and wealth index were found to be factors associated with underweight in the final model.

Children from mothers who have low autonomy were 1.8 times more likely to be underweight as compared to children from mothers who have high level autonomy (AOR=1.835(1.031-3.265)).

Children with age range of 6-11monthrs were 63.2% less likely to be underweight as compared to children in age range of 12-23 months (AOR=0.368(0.209-0.645)).

Children from mothers who have high level of CMD were 2 times more likely to be underweight as compared to children from mothers who have low level of CMD (AOR= 2.107(1.168-3.803)).

Children from daily laborer fathers were 2.6 times more likely to be underweight as compared to children from farmer fathers (AOR= 2.605(1.342-5.054)).

Children from low wealth index household were 2 times more likely to be underweight as compared to children from middle wealth index household (AOR= 2.037(1.107-3.751)) (Table 7).

Table 7: Factors associated with underweight in selected children age 6-23 months of Dilla zuriya Woreda, Gedeo zone, south Ethiopia, March, 2015.

Variables	**Underweight (n=612)**		95% CI	
	Yes	No	COR	AOR
	No (%)	No (%)		
Take additional meal during pregnancy/ lactation				
Yes	48(7.8)	410(67)	0.446(0.273-0.729)	
No	32(5.2)	122(20)	1	
Child history of Cough within 2 weeks				
Yes	24(3.9)	108(17.7)	1.683(0.998-2.838)	
No	56(9.1)	424(69.3)	1	
Child history of Fever within 2 weeks				
Yes	38(6.2)	203(33.2)	1.466(0.914-2.352)	
No	42(6.9)	329(53.7)	1	
Child history of Diarrhea within 2 weeks				
Yes	36(5.9)	189(30.9)	1.485(0.923-2.387)	
No	44(7.2)	343(56)	1	
Mather's Autonomy				
Low	34(5.6)	141(23)	2.050(1.264-3.323)	**1.835(1.031-3.265)***
High	46(7.5)	391(63.9)	1	1
Child's Age				
6-11 months	22(3.6)	251(41)	0.425(0.253-0.714)	**0.368(0.209-0.645)****
12-23 months	58(9.5)	281(45.9)	1	1
Maternal CMD				
High	26(4.2)	86(14.1)	2.497(1.482-4.207)	**2.107(1.168-3.803)***
low	54(8.8)	446(72.9)	1	1
MMF				
Yes	24(3.9)	241(39.4)	0.517(0.311-0.860)	
No	56(9.2)	291(47.5)	1	
Father Occupation¥				
Merchant	6(1)	62(10.3)	0.745(0.305-1.818)	
Daily laborer	18(3)	61(10.1)	2.271(1.235-4.175)	**2.605(1.342-5.054)****
Gov't Employee	10(1.7)	37(6.1)	2.080(0.970-4.461)	
Others	0	8(1.3)		
Farmer	46(7.6)	354(58.9)	1	1
Wealth index				
Low	26(4.2)	127(20.8)	1.883(1.070-3.316)	**2.037(1.107-3.751)***
High	24(3.9)	129(21.1)	1.712(0.962-3.045)	
Middle	30(4.9)	276(45.1)	1	1

**P<0.01,*P<0.05, COR (Crude odds ratio), AOR (Adjusted odds ratio), CI (Confidence interval), ¥(n=602)

CHAPTER SIX: DISCUSSION

This study revealed that 14.1% of the studied children were wasted. This finding is comparable with other studies done in different areas. Guto Gida district, West Ethiopia (12.53%), Bangladesh (18%) and Sri Lanka (17.1%) (42,45,46). But study done in Sidama zone showed a lower prevalence (8.3%) of wasted children (54). These differences may be attributed to heterogeneity of study participants due to difference in socio-economic status, accessibility and availability of health service.

This study showed 31 % of children age 6-23 months were short stature. This figure is lower as compared to studies from Sidama zone (37.2%), Zambia (44.5%), Tanzania (43%) and Nepal (41%) (,23,41,52,54). The higher prevalence in Sidama zone is attributable to age of the study participants. It includes children under 2 years of age. For the other studies the difference might be due to effectiveness of different nutritional programs particularly Stunting Reduction Strategy implemented since 2010 in Ethiopia. But a study from East Wollega zone showed lower prevalence (15.7%) of stunting (57). This might be due to difference in socio-economic conditions among study participants.

Prevalence of underweight in children age 6-23 months was 13.1%. This finding is lower from study done Sidama zone (25.6%), Tanzania (22%), Sri Lanka (21.3%), Bangladish (35%) and Nepal (24%) (23, 41, 45, 46,54). The higher prevalence in Sidama zone is attributable to age of the study participants. It includes under 2 children. For the other studies the difference may be due to effectiveness of different nutritional programs. Since nutrition is one of package of the HEP and integrated into IRT (Integrated Refresher training). But a study done in East Wollega zone showed lower prevalence (8.9%) of underweight (56). This might be due to difference in socio-economic conditions among study participants.

Even though aged mothers are well experienced on child care than their younger counterparts, children of mother in age range of 30-34 years were 2 times more likely to be wasted than children of mother in age range of 25-29 years. This may be explained by the fact that, in many rural areas, mothers with increased age are multiparous and their infant and young children will fall in hands of their school aged children for feeding and hygiene. This will deprive the

nutritional status of their infant and young children since maternal care is given by those young school aged children.

The results of our study also demonstrate that positive association between child's age and wasting and underweight. This finding is in line with findings from EDHS 2011, Somali region, India and Sri Lanka which showed the positive association. (17,20,21,30,46). This may be explained by the fact that foods for weaning are typically introduced to children in the older age group, thus increasing their exposure to infections and susceptibility to illness. Furthermore, inadequate feeding practices may contribute to faltering nutritional status among children in these age groups (17). In addition, extended periods of inadequate food intake as compared to the energy demand will also magnify the magnitude.

Those mothers with low level of autonomy are 2.3 times more likely to have wasted children and 1.8 times more likely to have underweight children. Support to the present finding, a study from Kersa district East Ethiopia revealed that wasting was associated with individual based decision-making on the care or treatment. And also lack of maternal access to health facilities was significantly associated with acute child undernutrition (wasting) (47). There are also studies from developing countries showing association of maternal autonomy and child undernutrition (16,21,29,30). Increased household earning is not the only indicator for child undernutrition but also mother's power to control over the income is necessary. When cash income is controlled by mothers its likely to be expended for food and health service purchasing. This intern helps the mothers to give appropriate care for their infants and children.

Children of mothers with BMI <18.5mg/m^2 were 3.2 times more likely to be wasted as compared to children of mothers who have BMI ≥18.5 mg/m^2 . This finding is analogous to study from India demonstrated that increase in BMI is protective for the wasting (29). There are studies from developing countries showing association of maternal BMI and child undernutrition other than wasting (17,24,30). Maternal under-weight is believed to increase the risk for low birth weight and intrauterine growth retardation (28). Hence, malnutrition in early childhood can lead to cognitive and physical deficits, and may cause intergenerational malnutrition i.e. similar deficits in future generations as under nutrition mothers give birth to low birth weight infants (7). Also maternal nutritional status improves the quantity and quality of breast milk, which is the major source of energy for their child (22,50).

Of the studied three common childhood illnesses only history of fever episode was associated with stunting. Children with history of fever episode were 80% times more likely to be stunted as compared to children who have not had fever episode. This finding is parallel with result from study done in Uganda, showed that Stunting was positively associated with history of a fever episode (25). This association is likely due to the vicious cycle of the malnutrition–infection interaction. In addition, infection has association with undernutrition through its cumulative effect on children to loss their appetite for food, increased requirement and improper care during illness. Furthermore, various studies have shown that common childhood infections exert their influence in precipitating undernutrition especially in borderline cases when they recur frequently (49).

A risk of stunting is minimized (38.2%) to children who get minimum times of meal in comparison to children who didn't get minimum times of meal. This was analogues with other study done in Padampure, Nepal, for the negative association that the risks of stunting is higher (3.6) in children who didn't get minimum times of meal (55). In contrast finding from Ethiopia, Sidama zone and East Wollega zone, no association was found (54,57). Foods items available in Dilla zuriya woreda households are mainly enset and maize. Hence, Complementary foods are often of inadequate nutritional quality. Also Complementary foods may be too small in amounts and not frequently enough.

Breast feeding frequency was protective for stunting. This finding is inconsistent with similar studies done in Sidama zone and East Wollega zone, no association was found. A Study from East Wollega zone showed BF frequency negative association with underweight. (54,57). Breast milk it has a relatively high fat content compared to most complementary foods, breast milk is a key source of energy and essential fatty acids (50). Low frequency of breastfeeding also contributes to insufficient nutrient and energy intake in infants beyond 6 months of age (51). Maintaining BF frequency is essential since breast milk has significant benefits to the child to prevent undernutrition.

In this study, maternal CMD has positively association with underweight. Children from mothers who have high level of CMD were twice more likely to be underweight as compared to children from mothers who have low level of CMD. But other studies from developing countries found that there is significant association of level of maternal CMD or depression and short stature

(33,35,37). Some evidence exists to suggest that in the developing world, major depression in the postnatal period can have a negative impact upon mother – infant inter-actions, which in turn are related to negative outcomes in infant attachment security, poor hygiene, gastrointestinal infections and diarrhea. Notably, infants of depressed mothers were less likely to be fully immunized at 12 months compared with infants of non-depressed mothers in Pakistan, possibly indicating a lack of appropriate health-seeking behavior in depressed mothers (36). Therefore mothers may not engage properly in child care practices like optimal BF, & CF and responsive feeding.

In this study children from low wealth index HH were twice more likely to be underweight as compared to middle wealth index. This finding is also in line with study done in kailali District of Nepal, showed that underweight was inversely associated with household wealth index (23). Low income households may be unable to purchase protein and vitamin rich foods throughout the year.

In majority of HHs in LAMIC are headed by the male that determine the income and purchasing power for health service and food in the households. It is also known that better economic conditions increase the living standard of the families, which allow them to take essential care of the children. Similarly, children of daily laborer fathers were 2.6 times more likely to be underweight than their farmer father counterparts.

6.1. Strength and limitation of the study

Strengths

- Cases were studied under community level where the true magnitude of the undernutrition can be estimated.
- Samples were selected by simple random sampling by using family folder as sampling frame which guaranteed the equal chance of every child to be participant in the study.

Limitations

- It was difficult to entertain the seasonal variations and day of the week effect. It may not truly represent child's usual intake and may affect the food groups, which consumed by infant & young child during the time of interview.
- There might be potential recall bias among respondents answering questions relating to events happening in the past.
- There might be also Social desirability bias
- Technical error while taking the anthropometric measurement by the principal investigator.
- The cross-sectional nature of the study itself is difficult to predict variables in order to detect cause effect relationship.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

This study indicates that undernutrition is a major health problem among children age 6-23 months in Dilla Zuriya woreda. Furthermore, undernutrition was found to be a result of maternal, socio-economic and child individual factors. A significant proportion of children age 6-23 months were undernourished. Stunting is more prevalent relative to wasting and underweight. High level of maternal CMD is found to be an intermediate factor for a child to be underweight. Demographic and Socio-economic factors such as maternal age, father's occupation and household wealth index were predictors of undernutrition. Maternal low autonomy is also modifiable factor for child wasting and underweight. Risk of stunting is high in children who had fever episode, who had breast feed <8 times and who didn't get acceptable MMF over 24 hours. Risk of wasting and underweight was high in children age 12-23 months.

7.2 Recommendation

For community

- ϖ It would be better to give child age specific attention on feeding.

For Regional/ Zonal or district Health Sector

- ϖ Strengthening and encouraging of child proper feeding practices.
- ϖ Strengthening of programs to reduces common childhood infections.
- ϖ Incidence of maternal common mental disorders is higher during perinatal period. Hence, mothers who came for infants and child immunization would better to get screening for CMD to reduce its effect in affecting child growth.

For Regional/ Zonal or district microfinance bureau

- ϖ Improve households' income through creation of employment or economic engagements for those with no job or with no regular job that do not compromise important child care practices such as breastfeeding.

For Regional/ Zonal or district Agriculture Sector

- ϖ Enhance farmers to produce diversified food items besides coffee production and strengthen provision of trainings and supervision to maximize production throughout the year.

For Researchers

- ϖ Undertake analytical study to understand the cause and effect relationship between undernutrition and maternal CMD and low autonomy.
- ϖ Undertake studies to investigate factors associated with maternal CMD and low autonomy through quantitative and qualitative measurement.

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ANNEXES QUESTIONNIARE

JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCE

DEPARTMENT OF POPULATION AND FAMILY HEALTH

Questionnaire Number _____

Household code number_____

District Name _____Kebele_____

SECTION I. GENERAL INFORMATION

INTRODUCTION AND CONSENT

Hello. My name is _____ and I am collecting data for a research for the partial fulfillment of MPH in Jimma University. We would very much appreciate your participation in this survey. The survey usually takes between 10 and 15 minutes to complete.

As part of the survey we would first like to ask some questions about your household. Whatever information you provide will be kept strictly confidential, and will not be shared with anyone other than the principal investigator.

You are selected for this study only by chance and participation in this survey is voluntary. If we should come to any question you don't want to answer, just let me know and I will go on to the next question; or you can stop the interview at any time. However, I hope you will participate in the survey since your views are important.

At this time, do you want to ask me anything about the survey?

May I begin the interview now?

Yes ☐

No ☐

Signature_____Date_____

SECTION 2. SOCIO DEMOGRAPHIC CHARACTERSTICS

SOCIO-ECONOMIC and DEMOGRAPHIC CHARACTERSTICS			
No	**Question**	**Response**	**skip**
201	How old are you?	Age in completed years_____	
202	How many household members are there at your household?	_____	
203	How many under 5 children do you have, other than the index child?	_____	
204	What is your current marital status?	1. Single 3. Divorced 2. Married 4. Widowed 5. Other (specify)_____	
205	What is your Religion?	1. Orthodox 3. Muslim 2. Protestant 4. Catholic 5. Others(specify)	
206	What is your Ethnicity?	1. Gedeo 3. Oromo 2. Amhara 4.Gurage 5.Other(specify) _____	
207	What is your educational status?	1. Illiterate 4. 9-10 grade 2. 1-4 grade 5. 11-12 grade 3. 5-8 grade 6. College and above	
208	What is your occupation/employment?	1. House wife 4.Daily laborer 2. Farmer 5.Gov't employee 3. Merchant 6.Other(specify)_____	
209	What is your husband's educational status?	1. Illiterate 4. 9-10 grade 2. 1-4 grade 5. 11-12 grade 3. 5-8 grade 6. College and above	
210	What is your husband's occupation/ employment?	1. Farmer 3. Daily laborer 2. Merchant 4. Gov't employee 5. Other(specify)_____	
211	Who is/are the head/s of the house?	1. Only my husband 3. I myself 2.Both jointly	
212	Who decides on your own health? (e.g. utilizing health service)	1. Only my husband 3. I myself 2.Both jointly 4.Others,(specify)_____	
213	Who decides on large purchases? (e.g. renting land, buying cattle, TV. etc)	1. Only my husband 3. I myself 2.Both jointly 4.Others,(specify)_____	
214	Who decides on household purchase for daily needs?	1. Only my husband 3. I myself 2.Both jointly	

	(e.g. salt, onion, etc.)	4.Others,(specify)_____	
215	Who decides if you need to visits your family, friends or relatives?	1. Only my husband 3. I myself 2.Both jointly 4.Others, (specify)_____	
216	Do you/ your household have?	No=0 Yes=1	
		|__| Radio |__| Television	
		|__| Mobile Telephone |__| Satellite dish	
		|__| Landline phone |__| Table	
		|__| Chair/bench (not stool)	
		|__| Bed with sponge mattress	
217	Does any member of this household own?	No=0 Yes=1	
		|__| Bicycle |__| Motorcycle/"bajaj"	
		|__| Animal-drawn cart |__| Car/truck	
218	Does any member of this household own any agricultural land?	No=0 Yes=1	
219	Does this household own any livestock, herds, other farm animals, or poultry?	No=0 Yes=1	**If NO to Q222**
220	If **YES to Q 219**, How many of the following animals do this household own?	|__|__|__| Milk cow s, oxen or bulls	
		|__|__|__| Horses, donkeys, or mules	
		|__|__|__| Goats	
		|__|__|__| Sheep	
		|__|__|__| Chicken	
		|__|__|__| Bee-hives	
221	If **YES to Q 219**, Do you have a separate room for the above animals	0.No 1. Yes	
222	Does any member of this household have a bank account?	0.No 1. Yes	
223	Housing condition:-	**Roof:-** 1. Thatch/leaf 2. Corrugated iron sheet	
		Floor:- 1. Earth/Mud 2. Cement/Bricks 3. other	
		Wall:- 1.Wooden & mud 2. Stone with lime/cement	
		Number of members per sleeping room:- _____	
		Kitchen:- 1. Separate 2. In the living room	

224	What is the major source of Water supply for drinking?	1.Pipe 2.Protected spring/ well 3.Unprotected spring/well 4. Surface water (river, pond, stream) 5. Other(specify)_____	
225	Do you treat the water to make it safer for drink?	0.No 1. Yes	**If No to Q227**
226	If **YES to Q225**, What method do you usually used to make water safer for drink?	1. Boil 2. (Waha agar) 3. Strain through cloth 4. Let it stand and settle 5.Others_____	
227	Do you have a latrine?	0.No 1. Yes	**If NO to Q301**
228	If YES to Q227, which type of latrine do you have?	1. Pit 2. VIP	

SECTION 3. MATERNAL FACTORS

MATERNAL HEALTH			
301	Did you attend ANC service for the index child?	0.No 1. Yes	**If NO to Q303**
302	If **YES to Q301**, How many times did you attended the ANC service	_____	
303	Have you received advice from the health institution about the complementary feeding practice?	0.No 1. Yes	
304	Did you take additional meal during pregnancy/lactation?	0.No 1. Yes	

SECTION 4. QUESTION RELATED TO COMMON MENTAL DISORDER

The following questions are related to certain pains and problems that may have bothered you in **the last 30 days**. If you are unsure about how to answer a question, please give the best answer you can.

QUESTIONS RELATED TO MATERNAL COMMON MENTAL DISORDER			
401	Do you often have a headache?	0. No 1. Yes	
402	Is your appetite is poor?	0. No 1. Yes	
403	Do you sleep badly	0. No 1. Yes	
404	Are you easily frightened?	0. No 1. Yes	
405	Do your hands shake?	0. No 1. Yes	
406	Do you feel nervous, tense or worried?	0. No 1. Yes	
407	Is your digestion poor?	0. No 1. Yes	
408	Do you have trouble thinking clearly?	0. No 1. Yes	
409	Do you feel unhappy?	0. No 1. Yes	
410	Do you cry more than the usual?	0. No 1. Yes	
411	Do you find it very difficult to enjoy your daily activity?	0. No 1. Yes	
412	Do you find it difficult to make decision?	0. No 1. Yes	
413	Is your daily work suffering?	0. No 1. Yes	
414	Are you unable to play a useful part in life?	0. No 1. Yes	
415	Have you lost interest in thinking?	0. No 1. Yes	
416	Do you feel that you are a worthless person?	0. No 1. Yes	
417	Have you thought of ending your life been on your mind?	0. No 1. Yes	
418	Do you feel tiered all the time?	0. No 1. Yes	
419	Do you have uncomfortable feeling in your stomach?	0. No 1. Yes	
420	Are you easily tired?	0. No 1. Yes	

SECTION 5. CHILD FACTORS

CHILD HEALTH			
501	What is the Sex of Child?	1. Male 2.female	
502	What is the age of your child?	_____ Months	
	Verify child's date of birth by asking to see the Family Health card or vaccination card, or local calendar of events		
503	What is the immunization level of your child?	1. Not vaccinated 2.Partially vaccinated for age 3. Fully vaccinated for age	
504	What is the birth order of the child?	_____	
505	What is birth interval from the preceding child?	_____ Months	
506	Was there any of the following common childhood illnesses in the last 2 weeks?	No=0 Yes=1 |__| Cough	
		|__| Fever	
		|__| Diarrhea	
CHILD FEEDING PRACTICE			
507	Did you start breast feeding with in 1 hour after you deliver the child?	0. No 1. Yes	
508	Did you fed colostrum to your child?	0. No 1. Yes	
509	In the first three days after delivery, did you gave pre-lacteal feeding to your child?	0. No 1. Yes	
510	Did you still breast feed your child?	0. No 1. Yes	**If YES to Q511**
511	If **NO to Q509**, at which age did you discontinued breast feeding?	_____	
512	What is the daily frequency of breast feeding?	_____	
513	When do you breast feed your child	1. When she/he cries 2. On demand 3. On Schedule4. Other specify_____	
514	Did the child start complementary feeding?	0. No 1. Yes	**If No to Q701**
515	If **YES to Q513**, at what age did your child starts complementary feeding?	_____	

516	What is the daily frequency of complementary feeding?	_____	
517	What do you mainly use to feed your child?	1. Bottle 2. Cup and spoon 3. Other (specify)_____	

CHILD DIETARY DIVERSITY SCORE:

Now I would like to ask you about the types of foods that the index child ate yesterday during the day and at night. Say YES if the index child ate the food in the question. Say NO if she/he does not ate the food in the question

601	Any food made from grains such as maize, millet, wheat, barley, sorghum, rice, *teff* or Any roots or tubers such as white potatoes, white yams, cassava, false banana (*kocho*):	0. No 1. Yes	
602	Any food made from legumes such as lentils, beans, *guaya*, peas, nuts (*lewz*), sesame(*selyit*), chickpea	0. No 1. Yes	
603	Any milk or milk products such as milk, yoghurt, cheese, or other milk products (excluding breast milk):	0. No 1. Yes	
604	Any meat such as beef, lamb, goat, chicken, duck or fish/sardines or Any organ meat such as liver, kidney, heart, or other organ meats:	0. No 1. Yes	
605	Egg	0. No 1. Yes	
606	Any dark green leafy vegetables such as kale (*abeshagomen*), spinach (*kosta*), lettuce (*selata*) or any food made from fruits or vegetables that have yellow or orange flesh such as carrots, pumpkin, squash, orange/red sweet potatoes, ripe mangoes, or papaya:	0. No 1. Yes	
607	Any other fruits or vegetables such as eggplant, tomatoes, peppers, onions, beets, zucchini, *fosoliya*, avocado, lemon, green mango, banana, garlic, cabbage (*tikilgolmen*), *gishta*:	0. No 1. Yes	
608	Any food made with oil, fat, butter, or ghee:	0. No 1. Yes	

ANTHROPOMETRIC MEASUREMENTS

701	Mothers Anthropometry	Wt_|__|__|__|.|__| kgs Ht |__|__|__|.|__| Cms	
702	Child Anthropometry	Wt |__|__|__|.|__| kgs Lth |__|__|__|.|__|Cms	

Quritumma

Jiima University

Ardinka fayyunitenna cii'lotixxa saayiinisse

Ardinkanna haddo fayunnite baarachotixxa kuta

Qurituuminka Lakossa----------

Minika gargarutetika lakossa----------

Loolinka summa---------- Loola ----------

KUTA 1: Duuchinga taarjaa

Eishajjo

Ashamma'a summi_____hiyyemma. Jimmaxxe universteen laangaxxe degre'a ebatixxe xinate'a taarjja bukki asa'aniteen. Tene xinate'en afeendinexxe gaalatefaantaanen. Qoortummi 10-15 yaana giddo muuxxendaan.

Edinse'e mine haanokka udaakke qoortummuwa laanqannen. Utinaane'ekki taarjji xinnate xinaake asamanji gaari'idarre ayina egena'asha asinabaan.

Tenexinate'en eye'ekiiri ixxikki kaaddawodda eyitinaanekinna womma'a eetiniteeni. Kone qoortumma laanqanno wodda hissa haasina'nebaxxi qoortimmi hedho'lle hordoffakka qoortummi hissitinasha lanqaanen yookin qoortummuwwa kone'e hassinexxe yaanan'i waaliyyo dandetinan kaadollenna haano'oxxi etti xinaatete lumokke gaargarssa afee'n

Xinatete egena'a hissinanakki tarjji hedhe?

Qoortummuwwa konne asiyoote'e eeti affine'e?

Eeti ☐

Waawoti ☐

Besissa_____ Barra_____

Kutta 2: Ardika galiduma nna economtixxa estatikise

Gaalduminikanna Deemokrasetikka Taarijja			
Laak kossa	Qoortumma	Hiissa	Tubaali
201	Wogga Atixxi Me'ete?	Wogga /Barriki----------	
202	Konne Mini giddo Me'e Manjo Hedha'a?	----------	
203	Ondde woggan buta'a hexxexxa me'e osse afe`ete`?	----------	
204	Buulitetika yaada	1.Herundebaxxi 2.Herundexxe 3.Gorsume'a 4.mininki ani re'exxe 5.Welle(kuli)_____	
205	Heene'e Adde Hordoffate?	1.ortoodokisee 2.protestaanitte 3.Islaama 4.kaatolike 5.welle (kuli)_____	
206	Hene'e Goosaana'ni Illendete?	1.Gede'oke 2.Qawete'e 3.Orromote'e 4.Gurragete`e 5.welle (kuli)_____	
207	Atixxi Baarachotixxi koobba Hitee'e Qicco?	1. Baratebaaxxe 2. 1-4 kuta qiccon 3. 5-8 kuta giccon 4. 9-10 kuta giccon 5.11-12 kuta giccon 6. kollejenna okko Immi'a	
208	Huujetiki Yaadi	1.Mininxxe Amaa 4.Baaratikki Huujaali 2.Huuje gaalaake 5.Manigistetiki Hujaali 3. Daadalle gaalaake 6. Welle (kulli)_____	
209	Atike Minike Aniki Baarachotik Yaadi	1. Baraateebakke 2. 1-4 kuta giccon 3. 5-8 kuta giccon 4. 9-10 kuta giccon 5. 11-12 kuta giccon 6.kollejenna okko immi`a	
210	Atike minke Anixxi Hujjetiki Yaadi	1. Huuje gaalake 2. Daadalle gaallake 3. Baaratiki Hujaali 4. Maangisteetiki Hujaali 5. Welle (kuli)	
211	Konne Miniki Gaalichanjji Ayeete?	1. Ankke Miniki Anna caala 2.Aninna AnkkiMinik Anni Miteenibba 3. Anin calli	
212	Cii'leyetixxa Gargarssa Hasaato wodda Ati'a Murte uwwaki Ayeete'e?	1. Ankke minikenna cella 2.Aninna Anki miniki Anni miteeniba 3. Anina calla 4. welle (kuli)___	
213	Luumooxxi yaane Hirendda wodda Murtee uwwaki Ayyete'e? (Fakkenakke hoorinikka Teelevizinetikka Hirra)	1. Ankke minikenna cella 2.Aninna Anki miniki Anni miteeniba 3. Anina calla 4. welle (kuli)___	
214	Baaratee`nni Hirendaxxe yaanuwwa Murte uwwaki Ayyete? (Fakkenakke Maxinne,shunikurte fakkataxxa welle)	1. Ankke minikenna cella 2.Aninna Anki miniki Anni miteeniba 3. Anina calla 4. welle (kuli)___	
215	Haado, Jaalo, fiira, qorra Hassatowodda Murte uwwane'eki Ayyete?	1. Ankke minikenna cella 2.Aninna Anki miniki Anni miteeniba 3. Anina calla	

		4. welle (kuli)___	
216	Kunni mi'uwwi konne mini giddo hedhee`e?	Hedhe'ebaani =0 Heedhe'eni =1 |__| Raadone |__| Teeleviziyine |__| Moobayilletixxa silke |__| Dishee |__| Minixxi silke |__| fuutinxxa firaashe |__| Dagalisanjjo wonbare |__| Beera	
217	Kunni mi'uwwi konne mini giddo hedhee`e?	Hedhe'ebaani =0 Heedhe'eni =1 |__| Sayyikille |__| Mottoree/ bajajee |__| Haaratixxa /fara'adinixxaa gaaree |__| kammolee	
218	Hujetiki buttin hedhe`e?	0. Hexxeba 1. Hexxe`e	
219	Gaafinki laluwwi horruwwi yookin lukuwwa affine`e?	0. Hexxeba 1. Hexxe`e	Hexxeba` a hinoole qortumm a 222
220	Qortumma 219 ke`e eeti hitinoole hite`e qiccon horre afinne`e?	|__|__|__| adotika lalo qoriyyo |__|__|__| luko |__|__|__| fadhdhado |__|__|__| re`e |__|__|__| gedhdheb |__|__|__| kinisinxxa sa`o	
221	Qortumma 219 ``eeti``hitinoole horuwwi hedhaaxxci bakuwwa gargarti hexxe?	0. Hexxeba 1. Hexxe`e	
222	Banketika malaqa gulisinaake daabitara afeeki manji hedhhe?	0. Hexxeba 1. Hexxe`e	
223	Minika yaada :-	**Guuto kaphpheme`echi** 1. Bada`ati 2.qorqoroti **Butta fayemeechchi** 1. Butinna 2. Simintoto 3. Welle heexoole_____ **Gimmo** 1. Haqetinna dhoqeti 2. kinnotina simintoti **Mite mini giddo galduminxxe baka`n diphphaneeke manjiki laakkossi:-_____** **Raisenaaxxi bakka** 1. Gargarti hexxexxe baka 2. mini giddo	
224	Wode`e alifitina'nekki haabai'ite?	1. Banbaka`n 2. Koffendeexxe muume 3. Kofendebaaxxe muume 4. Ballemeke wode`e balle (galaana) 5. Wolle heexoole__	

225	Woddi`i hawwate`e kaddashsha dhukusaate?	0. Hexxeba 1. Hexxe`e	Hexxeba` a hinoole qortumm a 227
226	Qortumma 225 ke`e eeti hitinoole hoone ci`loominixxe biffa /orra/ la`ofatate	1. Danfishsha 2.Woha agaareti 3. Carqeti fiila 4. Huuri offo`laasha assa 5. wolle heexoole_____	
227	Fole`i mini hedhdhe?	0. Hexxeba 1. Hexxe`e	Hexxeba` a hinoole qortumm a 301
228	Qortumma 227 ke`e eti hitinoole heene bifake fole`i mine hedhe ?	1. Bale 2. VIP	

Kutta 3- Amatte`e qurtuma Amati mitteba abidemeka qortuma

Amatixxa fayyunite			
301	Konne sile`ni cilloti mine hordofaa affeta`a ?	0. Hexxeba 1. Hexxe`e	
302	Qortumma 301 ke`e eeti hitotole me`e yanna qicco`n hordofeta?	----------	
303	Anote`e hasisaaxxa geltaaxxa itta uudaaxxa gorsa ci`lotiminba`an adhdhite egendete?	0. Hexxeba 1. Hexxe`e	
304	Siliki hexxe unnisitato wodda welle labendexxa ita itaata?	0. Hexxeba 1. Hexxe`e	

Kuta 4:- Amatixxe samotixxe dhiboni weliti abidemeekka qortuma

Kabba hundin hedhdheke qortummuwwini saxxexxe 30 barra giddo laqenedeexxa dhibbo /rakko uudaan. Hisate`e dhugaatika hisichcho alfa gophphotole ballo caalideexxa hissa uwwi.

Qortummi ammatixxi sammixxi welti abidendexxe			
401	Yo`oxxa yanna bowasisaa?	0. Hexxeba 1. Hexxe`e	
402	Itatikki hasiti shiixxoke`e?	0. Hexxeba 1. Hexxe`e	
403	Diphato wodda mugi daga`nebba?	0. Hexxeba 1. Hexxe`e	
404	Sodachchisabaxxi yaane sodachisa`nee?	0. Hexxeba 1. Hexxe`e	
405	Anga roqonisita`nee?	0. Hexxeba 1. Hexxe`e	

406	Alayyo/hiffo laqendane'e?	0. Hexxeba 1. Hexxe`e	
407	Sagale dayyendebangi godobi giddo turita`nee?	0. Hexxeba 1. Hexxe`e	
408	Yaane hubate ca`a asedhatixxi rakko hexxe?	0. Hexxeba 1. Hexxe`e	
409	Gamashsho gophatixxi rakko hexxe?	0. Hexxeba 1. Hexxe`e	
410	Edi qicci`ni gaargarti hexxexxa oodha ooxxe egendete?	0. Hexxeba 1. Hexxe`e	
411	Duchi wodixxa hodho xemi`shshatixxa rakko gelitee egende?	0. Hexxeba 1. Hexxe`e	
412	Yaane duchchini muratixxi rakko affete`e?	0. Hexxeba 1. Hexxe`e	
413	Barra barande`ni hujatexxi huje gibisa`nexxe?	0. Hexxeba 1. Hexxe`e	
414	Hedho atixxe`n hujoto`a hassetexxe yaane hujebexoki gateete?	0. Hexxeba 1. Hexxe`e	
415	Yaane giddi'a wuirte hede egenatixxa jaalala gophphete?	0. Hexxeba 1. Hexxe`e	
416	Haranga la`o afenekebaan hitte hedaate?	0. Hexxeba 1. Hexxe`e	
417	Lubbo balesedhdhate hede egendete?	0. Hexxeba 1. Hexxe`e	
418	Yo`oxxa yanna gonphphe hexxa?	0. Hexxeba 1. Hexxe`e	
419	Godobinke loola`n elobaxxi yaane laqendaa?	0. Hexxeba 1. Hexxe`e	
420	Sholla qicinni gonphphe laqendaa?	0. Hexxeba 1. Hexxe`e	

Kuta 5:- Annoti mitteba abidemeka qortuma

Anotixxa fayyunitte			
501	Annotixxi labba meyunite machcho	1. Labaake 2. meyaake	
502	Annotixxi wogga me`ette?	_____agenjjo	
	Annotixxi kitibaatetiki yaadi		
503	Anno tinni me`essoxxe	1. kitbaate adhdhiteba 2.Gamissa wogga kitibate dhdhite 3. Wo`ma wogga kitibate adhite	
504	Annotinni eddo hexxexxe annonaain hitte qicco bayyata `ne woggati?	_____	
505	Tenne lame torba giddo ano ela gophphemma?	_____agenjjo	

506	Annotixxi labba meyunite machcho	Wawoti =0 Eeti=1 |__| Qufa'aa	
		|__| Ebinjjo	
		|__| Albaate	
Annotixxa itta uudaaxxa			
507	Tene anno ildetxxe yaana'n mitte yana giddo ununa unisiteeta`a?	0. Hexxeba 1. Hexxe'e	
508	Takkaxxa woddi'inxxa kutta ununa anote'e unusiteeta?	0. Hexxeba 1. Hexxe'e	
509	Taakaxxe saase barra qicco'n Annote'e ununi edi gama itta uteeta?	0. Hexxeba 1. Hexxe'e	
510	Konne qicco'n annote'e ununisitate?	0. Hexxeba 1. Hexxe'e	Eeti hinoole qortumma 511
511	Qortumma 509 ke wawoti hinoole mekesoke agenjo'n ununissa urissete?	_____	
512	Barrate'n me'elle ununisitatte?	_____	
513	Anno haano haano ununisitate?	1. Anno Ooxxa wodda 2. anno Hassa wodda 3.Abidendeexxe yanna'n 4. Welle(kuli)	
514	Ununnake'n lebbe welle itta uwwitete?	0. Hexxeba 1. Hexxe'e	Hedheba hinoole qortumma 701
515	Qortuma 510 ke`e eeti hinoole mekesoke Agenjo'n welle ita uwwitete?	_____	
516	Barate'n ununake'n welle ita me'elle uwwitete?	_____	
517	Anno itissate'e umo Asite maachcho la'efataate?	1. Xuuxxo 3. Welle (kuli) 2. kubayakana mooqo	
Annotate hassissaxxa sagale seeriki 24 yana giddo			
601	Gummuwwa fakkenake'e : badala,mishinqa,Dine,So'a,Ruuze Xeefe yookin hidichuwwakena`ni Golaloka Maxaxesha ,Boyinna waasakenaa`n gisendeexxa ita?	0. Hexxeba 1. Hexxe'e	
602	Gummuwwatenaa'n fakkennake'e Misera, Baqela, Gaaya, Atarra Looze, Salaaxxa/shunburrik gesendeexxa sagalle-	0. Hexxeba 1. Hexxe'e	
603	Adonna Adoti hunjaachcho: Adotenaan:- Irigo, Iyibe nna welle Adotinaa'n Gesendeexxa sagale (Ununi gadhidare)	0. Hexxeba 1. Hexxe'e	

604	Maalakenaa'n fakkenake'e saayi maala, koorbesin maala, Re'iti, lukoti, daakiyet (qulxumeti maala/ tidho, onnatinaa'n gesemeeka maala.	0. Hexxeba 1. Hexxe'e	
605	Quuphphekenaa'n gisendeexxa ita	0. Hexxeba 1. Hexxe'e	
606	Xiloka Hanjaka Shafa Afexxa lattuwwa fakkenake'e shaana, Qoosixxa, salaaxxa, yookin Giddo wekitte Burtukaninsha hexxeexxe latuwwa /Gumuwwa/ fakkenna: kaarote, Baaqula, Burtukaana/diinnichcha /Raxxexxe Mango/Paapayakena' gissendeexxe saagale.	0. Hexxeba 1. Hexxe'e	
607	Welle firafire murdho fakkennake; Timatime ;barbarre shunkurte ; dimoke Hidda Zukunni Fosoliyya abkaato,loomme, hanjakka monggo Muzze Qulubbe Bekicha shannana/Gishixxa	0. Hexxeba 1. Hexxe'e	
608	Zayitte, qibbate , zaayite Buurokenaa`n Yookkin itattike Burronna'n qophphotexxa saagale	0. Hexxeba 1. Hexxe'e	

Anitirophomeetretixxa Mikaa

701	Amaatixxxa Anitirophomeetre	Ha'urre |__|__|__|.|__| k.g Hoojja |__|__|__|.|__| S.M	
702	Annotixxa Anitirophomeetre	Ha'urre |__|__|__|.|__| k.g. Hoojja |__|__|__|.|__| S.M	