2020-03-11

PREVALENCE OF UNDERNUTRITION AND ASSOCIATED FACTORS AMONG CHILDREN AGED 6-59 MONTHS IN ANGOLALLA TERA DISTRICT, NORTH SHOA, ETHIOPIA, 2019

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Wisdom at the Source of the Blue Nile

BAHIR DAR UNIVERSITY

BAHIR DAR INSTITUTE OF TECHNOLOGY
SCHOOL OF RESEARCH AND POSTGRADUATE STUDIES
FACULITY OF CHEMICAL AND FOOD ENGINERING
PROGRAME: APPLIED HUMAN NUTRITION

PREVALENCE OF UNDERNUTRITION AND ASSOCIATED FACTORS AMONG CHILDREN AGED 6-59 MONTHS IN ANGOLELA TERA DISTRICT, NORTH SHOA, ETHIOPIA, 2019

MSc. THESIS

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JUNE, 2019
BAHIR DAR, ETHIOPIA

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A THESIS TO BE SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF BAHIR DAR UNIVERSITY, FACULITY OF FOOD SCIENCE AND CHEMICAL ENGINERING, DEPARTMENT OF APPLIED HUMAN NUTRITION IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN APPLIED HUMAN NUTRIITON

JUNE, 2019

BAHIR DAR, ETHIOPIA

DECLARATION

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have acknowledged and refereed all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation/ fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the University and can also evoke penal action from the sources which have not been properly cited or acknowledged.

Investigator; Leweyehu Alemaw Signature _____

Date of submission: _____20/11/2011_____

Place: Bahir Dar

This thesis has been submitted for examination with my approval as a university advisor.

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Acknowledgements

Abbreviations and acronyms

ANC	Antenatal Care
AOR	Adjusted Odds Ration
BF	Breast Feeding
BSc	Bachelor of Science
CI	Confidence Interval
COR	Crude Odds Ratio
EBF	Exclusive Breast Feeding
EDHS	Ethiopian Demographic and Health Survey
ENA	Emergency Nutritional Assessment
HAZ	Height for Age Z-Score
HEW	Health Extension Worker
IRB	Institutional Review Board
PNC	Postnatal Care
SD	Standard Deviation
SNNPR	Southern Nations, Nationalities and People's Region
SPSS	Statically Package for Social Science
UNICEF	United Nations Children's Fund
WAZ	Weight for Age Score
WHO	World Health Organization
WHZ	Weight for height Z-score

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Abstract

Background: Under nutrition is the major public health problem all over the world. In Ethiopia, child malnutrition rate is one of the most serious public health problem and the highest in the world. High malnutrition rates in the country pose a significant obstacle to achieving better child health outcomes..

Objectives: the study was aimed to assess the prevalence of under nutrition and associated factors among 6-59month of age children in Angolela Tera district, North Shoa, Amhara region, Ethiopia.

Methods: A community based cross-sectional study was conducted by simple random sampling technique with sample size of 414 enrolled mothers with 6-59month of children. Semi structured questionnaires wereused to collect data. The data was entered using EPI DATA version 3.1and analysis was done by SPSS version 24 and WHO Antro software were used for anthropometry calculation. Bivariable and multivariable logistic regression analysis was used.

Result:Among414 mothers with child pairs the result of our study indicated that 39.4%, 15.9% and 6.8% of children were stunted, underweight and wasted respectively. Multivariate logistic regression analysis identified male sex, child age, children having diarrhea within two week, diarrhea incidence before 2week and maternal ANC follow up were significantly associated stunting.Child sex, birth interval, family income, children having diarrhea within two week and diarrhea incidence before two week of data collection were significantly associated with underweight. Similarly, home delivery, Diarrhea with in two week, respiratory tract infection and prelacteal feeding were associated to wasting

Conclusion and recommendation: This study revealed high prevalence of under nutrition (stunting, underweight and wasting) among children aged 6-59 months in the study area. All the concerned body should be strengthening the health extension program to improve and provide necessary education for the community on nutritional program, environmental sanitation, ANC followup, diarrhea prevention, breast feeding, and weaning practices.

Keywords: Children, Stunting, Wasting, Underweight and under nutrition

1. INTRODUCTION

1.1. **Background**

Malnutrition is one of the major public health problems all over the world. Currently, it faces and associated with more than41%of the deaths that occur annually in children from 6 to 24 months of age in developing countries, which were approximately2.3million(1).

Globally, undernutrition accounts directly or indirectly for at least 35% of deaths in under five aged children. Undernutrition affects physical growth, contributes for morbidity and mortality, and reduces cognitive development, reproductive and physical work capacity(2).

Worldwide, 165 million children below five years of age were affected with undernutrition, of which 26% were stunted. This figure reduced by35%from253 million in1990. The prevalence of stunting was 36% in Africa and 27% in Asia. These remain a public health problem, one that often goes unrecognized. More than 90% of stunted children in the world have been living in Africa and Asia. An estimated 80% of world's stunted children lived in fourteencountries(India,Nigeria,China,Pakistan,Indonesia,Bangladesh, Ethiopia, Democratic Republic of Congo, Philippines, United Republic of Tanzania, Egypt, Kenya, Uganda, (3, 4).

Globally, an estimated 101 million children below five years of age were underweight. These accounted for 16% of children below five years of age. The prevalence was the highest, which was 33%, followed by Sub-Saharan Africa, which was 21%. These were 59 million in South Asia, while 30 million were in sub-Saharan Africa (5). Globally, the prevalence has declined, from 25% in 1990 to 16% in 2013; thesereducedby37%(6).

The other predictor of undernutrition is wasting. Globally, 52 million children below five years of age were moderately or severely wasted, 11% decrease from 58 million in 1990(5).

Wasting was decreased by 36% from 1990, which 159 million, 51 million children below five years of age were wasted, and 17 million were severely wasted in 2013. The prevalence of wasting was the highest in South Asia, which wasapproximately16%. Severe wasting was the highest in India, which had more than 25million wasted children (6).About one-third of deaths among children below five years of age were attributed to under nutrition and it can lead children to be at greater risk   due to common childhood infections, such as pneumonia, diarrhea, malaria human immune deficiency virus, or AIDS and measles(6).

World Health Organization (WHO) in 2001reported that54%of all child hood mortality was attributable, directly or in directly, to malnutrition (7). It is not only an important cause of mortality and morbidity but also leads to physical and mental impairment in children. Health and physical consequences of prolonged states of malnourishment among children were delay in their physical growth, lower intellectual quotient, poor cognitive ability, decreased economic productivity, decreased reproductive performance, poor school achievement and poor school performance, greater behavioral problems and deficient social skills, and susceptibility to contracting diseases(8, 9).

Adequate nutrition is essential during childhood to ensure healthy growth, proper organ development and function, a strong immune system, and neurological and cognitive development. Children under nutrition continue to be a major public health problem in developing countries. Global data indicated that 60 million children are moderately malnourished while approximately 13 million children faced severe acute malnutrition. Globally, under nutrition contributes for more than one third of child deaths which can be prevented through public health interventions(10, 11).

Under nutrition can affect children's health and learning ability during their adulthood life. Children with under nutrition are usually suffered from chronic illnesses(12). Survival of malnutrition can suffer from impaired physical development and intellectual abilities, which in turn may diminish their working capacity with negative effects on economic growth. Child malnutrition may also lead to higher levels of chronic illness in adult life and these may have intergenerational effects, as malnourished females are more likely to give birth to low-weight babies(13).

Globally it is estimated that 35% of deaths among under-five children is attributed to under nutrition. Over two-thirds of these deaths, which are often associated with inappropriate feeding practices, occur during the first year of life. In developing countries nearly one-third of children are underweight or stunted. Under nutrition is a risk factor for infectious disease and deaths (14).

Ethiopia is a country with remarkable progress in reducing under-five mortality. On the other hand, currently under nutrition among children is a common health problem in the country(15).

Study done in Vietnam revealed that the prevalence of underweight, stunting and wasting was found to be 31.8%, 44.3% and 11.9%, respectively. Similarly, 48% of under-five children in East Africa are stunted (16, 17).

In Ethiopia, the levels of under nutrition were still high in magnitude. The 2016 EDHS report showed that stuntingwas58%in2000, 51%in2005, 44%in2011, and38%in2016.This report also showed thatwastingwas12%from2000to2005 and 10% from 2011to2016. The third predictor is underweight, which was 41% in 2000, 33% in 2005, and 29% in 2011, and24 in 2016(18).

The national trend showed that stunting and underweight prevalence continued to decrease but at a slow pace. The above trend showed that prevalence of wasting was not declined for three consecutive surveys.

Knowledge on the level of under nutrition and its contributing factors is an important prerequisite for developing strategies of nutritional intervention. However, there is no recent study which identified prevalence and predictors of under nutrition in the study area. Therefore this study was designed to identify prevalence of under nutrition and associated factors among children aged 6–59 months in Angolalla tera district.

1.2. Statement of the problem

Malnutrition is a major cause for more than 2.6 million child deaths every year, a third of the total of child deaths. Every hour of every day, 300 children die because of malnutrition but it's not recorded on death certificates and, as a result, it's not effectively addressed (19, 20). Worldwide, 165 million children below five years of age are affected with under nutrition, of which 26% are stunted(21). This figure reduced by 35% from 253 million in 2010. The prevalence of stunting is 36% in Africa and 27% in Asia. More than 90% of stunted children in the world have been living in Africa and Asia(21) .

Malnutrition refers to a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients. It is a state of nutrition where the weight for age, height for age and weight for height indices are below -2 Z-score of the NCHS reference. Malnutrition continues to be a major public health problem in developing countries. It is the most important risk factor for the burden of disease causing about 300, 000 deaths per year directly and indirectly responsible for more than half of all deaths in children(22).

Health and physical consequences of prolonged states of malnourishment among children are: delay in their physical growth and motor development; lower intellectual quotient (IQ), greater behavioral problems and deficient social skills; susceptibility to contracting diseases(23).

Much of the burden of deaths resulting from malnutrition, estimated to be over half of childhood deaths in developing countries, can be attributed to just mild and moderate malnutrition, varying from 45% for deaths due to measles to 61% for deaths due to diarrhea(24).

The majority of studies on child nutritional status have described prevalence of malnutrition among under-five children and analyzed socioeconomic, demographic and cultural factors associated with child malnutrition in SSA (25).

In Ethiopia, under nutrition is a major public health problem that occurs throughout full year round because of long term household food insecurity. Malnutrition is the underlying cause for 57% of child deaths in the country. Different studies conducted in Ethiopia, including the national data, indicated high prevalence of under nutrition among children. The Data from Ethiopian Demographic and Health Survey (EDHS) 2016 indicated that 38% of under-five children were stunted while 24% and 10% were underweight and wasted respectively(18).

However, the study of prevalence and associated factors of under nutrition among 6- 59 months age children has not been conducted at Angolela tetra district, North shoa, Amhara and Ethiopia Therefore, this study was designed to assess the prevalence of malnutrition and associated factors among children aged 6-59 months in this area.

1.3 .Justification of the study

The prevalence of undernutrition imposes significant costs on the Ethiopian economy as well as society. The high mortality due to under nutrition leads to the loss of the economic potential of the child .It affects children in many ways, predisposing them to different infectious diseases, psychosocial mal development, and cognitive deficiencies.

The prevalence of undernutrition in Ethiopia is relatively well documented, but not specific to the regions, localities and residence so far. It is also vary among regions, localities and residence and to the best of our knowledge there is limited data is available in study area. Study conduct in other districts is not addressing the main associated factors of undernutrition.

Therefore, this study wasaimed to assess the prevalence of under nutrition and associated factors among children aged 6-59 months can be used as a reference in priority setting and designing effective nutritional programs at Angolalla tera district.

1.4 .Significant of the study

The identification of possible factors for the occurrence of undernutrition in the area have greater input to program managers and policy makers for designing, proper implementation and evaluation of programs on reduction of child mortality and improvement of child health.

So that the information generated in this study is useful in designing appropriate interventions to improve nutritional status of under five children thus reducing child under nutrition in the target area and other similar area.

The study canalso contribute knowledge to the on-going research efforts on childhood under nutrition. Furthermore, the finding also may create awareness in the community, health institution and health care providers to formulate local appropriate interventions to prevent under nutrition among children.

2. LITERATURE REVIEW

2.1. Prevalence of undernutrition

Malnutrition remains one of the most common causes of morbidity and mortality among children under five children throughout the World (26). Worldwide, over 10 million children under the age of 5 years die every year from preventable and treatable illnesses despite effective health interventions. At least half of these deaths are caused by malnutrition(27).

Malnourished children have lowered resistance to infection; therefore, they are more likely to die from common childhood ailments such as diarrheal diseases and respiratory infections. In addition, malnourished children that survive are likely to suffer from frequent illness, which adversely affects their nutritional status and locks them into a vicious cycle of recurring sickness, faltering growth and diminished learning ability. In developing countries, malnutrition is a major health problem(27).

WHO reports that stunting is one of the most important indices of child well-being throughout the world(30) .Globally, an estimated 171 million children do not have the opportunity to reach their full potential because of poor nutrition in the earliest months of life. In developing countries approximately 32%, or 186 million children <5 years of age are stunted (19, 30). According to the latest United Nations estimates, about 165 million children under 5 years of age, or 26%, are stunted in 2011. More than 90% of the world's stunted children live in Africa and Asia, where respectively 36% and 27% of children are affected (31).
The burden of malnutrition is much higher in South Asia compared to that in Africa and other parts of the world. The prevalence of underweight and stunting in South Asia has been recorded as 46 and 44 percent, respectively(28).

According to study conducted in India the prevalence of stunting under five children in 2015 was 59.3 % (32). A population-based cross-sectional study conducted In Pakistan, 8% of children stunted in 2011(33), and in Sri Lanka 15% under five children were affected from stunting in 2015 (34) .Another community based cross-sectional study which was conducted in Brazil, prevalence of stunting among children under five years old in 2014 was 62% (35) and in Bangladeshi 41% under five children are stunted(36), in China14%).

Study done on malnutrition among under-five children in Bangladesh revealed that, the high prevalence of stunting and underweight, for instance 42% and 40% of under-five children were stunted and underweighted, respectively. Also study conducted nutritional status of under- five children in Mongolia also showed that, the prevalence of stunting, wasting and underweight were 15.6%, 1.7% and 4.7%, respectively(47, 48).A cross-sectional study conducted in Belahara VDC of Dhankuta district in Nepal located in South Asia, the prevalence of underweight, stunting and wasting were 27%, 37% and 11%, respectively(49).

The number of undernourished (low weight for age)people of all ages in sub-Saharan Africa increased from about 90 million in 1970 to 225 million in 2008, and was projected to add another 100 million by 2015, even before the current world food price hikes(29).Based on 2015 global nutrition report of Africa 58 million children under age five are too short for their age (stunted) (37). Another study which is conducted in tribal children in India was 57%(38).

Under-nutrition of children is unfortunately still very common in many parts of Africa. For example, 42% of the children in sub-Saharan Africa are stunted (i.e., have a low height for their age) an indicator of chronic under-nutrition(39). Prevalence of stunting in Nzega District, Rural Tanzania 26.1% in 2015(40) ,in Zambia 44.5%(41),in Kenya 39%(42), in Nigeria 46.7% (43), in Egypt 20.3% (31), in Democratic Republic of Congo 43.9%(19) and in Uganda 41.6 % (44).
A study conducted on influence of socio-economic factors on nutritional status of children in a rural community of osun state, Nigeria revealed that the prevalence rates of underweight, wasting and stunting were 23.1%, 9 % and 26.7% respectively and also prevalence and determinants of malnutrition among Under-five Children of Farming Households in Kwara State, Nigeria results indicate that 23.6%, 22.0% and 14.2% of the sample children were stunted, underweight and wasted, respectively(45, 46) .

The prevalence of children under five years with acute malnutrition in Southern Sudan is one of the highest in the world approximately one out of every five children (22%) suffers from moderate to severe acute malnutrition (wasting). The prevalence of acute malnutrition among this age population in Southern Sudan is almost twice as high as in other parts of Sudan and also study conducted in a decertified area of Sudan - Alrawakeeb valley revealed that the prevalence of malnutrition among these children is very high (27.5% were severely malnourished and 35% suffered from either mild or moderate malnutrition (50, 51).According to research conducted in

pre-school children in a rural area of western Kenya reveled that, the prevalence of stunting, underweight and wasting were 30%, 20%, and 4%, respectively (52).

Although a cross-sectional survey conducted in a rural locality called Gumbrit, the overall prevalence of malnutrition in the community was high with 28.5% of the children being underweight, 24% stunted and 17.7% wasted .Similarly, study done at Beta-Israel community revealed that, the prevalence of stunting, Underweight and wasting were 37.2%, 14.6%, and 4.5%, respectively. Moreover, severe stunting, severe underweight and severe wasting were seen in 14.8%, 2.9%, and 0.5% of the Children respectively(53, 54).

A community based cross-sectional survey conducted West Go jam zone revealed that 49.2 % children were found to be under-weight, 43.2 % of the children under age five were suffering from chronic malnutrition and 14.8 % acutely malnourished (16).The cross sectional survey conducted rural communities of Tigray region also revealed that, the levels of stunting, underweight and wasting were 42.7%, 38.3% and 13.4%, respectively (55).

A cross sectional study conducted in Aynalem village in Tigray region, the overall prevalence of stunting, underweight and wasting were 45.7%,43.1% and 7.1% ,respectively(56) . According to research conducted in Gimbi district Oromia region indicated that, 32.4 % stunted, 23.5 % underweight and 15.9% of the children were wasted. Prevalence of severe stunting, severe underweight and severe wasting respectively were 15.7%, 8.0 % and 5.7% (57).

A community-based cross-sectional study conducted in rural kebeles of Haramaya district although revealed that, the prevalence of stunting, underweight, and wasting were 42.2%, 36.6%, and 14.1%, respectively. In addition, the proportion of the prevalence of malnutrition by its level of severity indicated that 19.9% were severely stunted, 16.6% were severely underweight and 3.9% were severely wasted (58).In fact, malnutrition was the underlying cause of 57% of child deaths in Ethiopia with some of the highest rates of stunting in the world. Contributing factors to stunting include widespread poverty, limited employment opportunities, poor infrastructure, high population pressure, low education levels, inadequate access to clean water and sanitation, high rates of migration and poor access to health services. Without increased efforts to improve the nutritional status of vulnerable groups such as mothers and children under five years old, it is difficult and risks falling of halving underweight and reducing child stunting(59).

2.2 Associated Factors of undernutrition

2.2.1. Demographic factors

The prevalence of stunting and underweight were significantly associated with the age group of children in Aynalem village in Tigray region. Both highest prevalence of stunting and underweight were observed among the age group of 12-24 months whereas the lowest prevalence of stunting, wasting, and underweight were observed among the age 0-6 months age group(56).

A community based cross-sectional study conducted in Brazilian semi-arid region indicated that the level of stunting increases with increasing age of child (95% CI: 9.3 to 12.4) (62). Another study conducted in Hawse town, children who are aged above 24 months are about 4 times more likely to be stunting than below 12 months old ones (AOR=3.97 [95%CI, 1.30-12.11]) (63). Study in Oromia region, children age group 13-24 months are about 7 times more likely to be stunted than children age 6-11 months(AOR=7.15; 95%CI=2.33,21.90) (64).

Another community based cross-sectional study conducted in Pakistan; the male-female ratio was 1.11 with 52.5% boys and 47.5% Girls (19). Study conducted in Ethiopian Somalia female was stunted 1.47 times than male (AOR: -s1.47, 95% CI 1.02, and 2.11) (65). In Lalibela town the study confirms that high prevalence of stunting in boys (25.5%) than girls (21.8%) (66). Female children are about 0.75 times less likely to be stunting compared to male children (AOR=0.74; (95%CI: 0.56-0.98)(66). A community based cross sectional study in Eastern Ethiopia investigate that, the male–female ratio is 1.34 with 57.3% boys and 42.7% girls (67). In contrast the studies conducted in Hawassa Town(63), in Northern Province(68) ,in Pakistan(33) and in South East Amhara Ethiopia suggested that, there is no significant difference in prevalence of stunting by sex of the child(69).

Study conducted in Egypt indicated that, higher levels of stunting are found in children of higher birth order (24.31% for birth order 5 vs. 17.26% birth order 1)(31) . Another study in Wendo Genet wereda, sidama zone, southern Ethiopia birth order 5-12 are 3.2 times more likely to be stunted than those with birth order ≤ 5 (AOR= 3.19 [95%CI: 1.64-6.21]) (30).

Study conducted in Brazil show that, children whose preceding birth interval is less than two years are 1.5 times more likely to be stunting as compare with children whose preceding birth interval is 48 months and more(62) . According to 2016 EDHS With the exception of first births, there is an inverse relationship between the length of the preceding birth interval and the proportion of children who are stunted (70).

The longer the interval, the lower the proportion of children stunting. But in contrast the study conducted in Hawassa University Technology Villages, Southern Ethiopia indicates that the birth gap does not show association with stunting(63).

A 2015 study in Zambia shows that stunting in children is high among mother's aged 20–24 and 40–44 years (49.7 percent and 56.9 percent respectively p=0.007) (41). Study in the Case of Hawassa University Technology Villages, Southern Ethiopia mother's age during child birth (than 21 years significantly associated with stunting with odds of (COR=2.55 [95CI, 1.20-5.42]), (COR=1.80 [95CI, 1.05-3.08]) (63).

In Zambia, children living in households where mother's report their marital status as " living together" and "never been married" are less likely to be stunted (27.3 percent and 29.9 percent) compare to those mother's report either as widowed or divorced (74.2 percent and 57.4 percent) respectively (p<0.001). But In DRC there is no statistically significant association observed between the prevalence of stunting and mother's marital status (71).

2.2.2. Socio-economic factors

As study on influence of socio-economic factors on nutritional status of children in a rural community of osun state, Nigeria, Children of mothers who were not educated beyond secondary school level had one and a half to two times the prevalence rate of stunting. On the other hand, children of mothers with post-secondary education were apparently more often affected by wasting than those with less educated mothers but there was no consistent trend in the pattern of wasting or stunting with respect to paternal educational level. Low maternal income and overcrowding were associated with higher prevalence of wasting. However no association was found between the source of drinking water or social class and malnutrition(49).

According research conducted in Belahara VDC of Dhankuta district in Nepal located in south Asia, poor socioeconomic status was found risk factors for both stunting and underweight, Children reared in the jointly family were found less like to be stunted than those in nuclear family. Also ethnic group and age of mothers at pregnancy seems to have significance association with stunting but maternal education not associated. Nevertheless, study conducted in a decertified area of Sudan - Alrawakeeb valley revealed that maternal education was found to be the strongest factor associated with malnutrition among under five children (49, 51).

Among the socio-economic variables included in the study rural locality of Gumbrit, the only family income was significantly associated with malnutrition. Study conducted at Beta-Israel also show that the main contributing factors for under-five malnutrition were found to be sex of the child, child's age, diarrhea episode, deprivation of colostrums, duration of breastfeeding, pre-lacteal feeds, type of food, age of introduction of complementary feeding and method of feeding(53, 54).

Study in Brazil, the prevalence of stunting is 10.9% (95% CI: 9.3-12.4). This prevalence is higher for children whose mothers have 0-4 years of schooling (62). In Zambia, Children whose mothers have attained higher education are less likely to be stunting (about three in every ten compared to about five in every ten with primary education; p=0.058) (41). In Bangladesh, Father's education shows an inverse relationship with severe stunting and moderate stunting over normal. For instance, as compared to the children whose fathers has higher education, the children whose fathers has a secondary level of education, primary education and no formal education are 1.5 times, 1.9 times and 2.3 times as likely as to be severely stunning respectively (72). But another study in Sri Lanka show that, maternal educational status is not associated with the prevalence of stunting (73).

A study which is conducted in Sidama Zone Ethiopia, paternal education, those children in house hold of paternal education level 7-8 grade are more likely to be stunted than paternal education level above and below these grades. AOR= 2.29 [95% CI: 1.15-4.54]) (73).

Education of women is believed to exert an impact on health and nutritional status of children since it provides the mother with the necessary skills for child care, increase awareness of nutritional needs and preference of modern health facilities as well as change of traditional beliefs about diseases causation, and use of contraceptives for birth spacing (72).

In Bangladeshi, household's wealth index shows a highly statistical significant inverse association with being severely and moderately stunting over normal. The likelihood of being severely stunted is 4.1 times, 3.5 times, 2.3 times and 1.9 times respectively among children from the poorest, poorer, medium and the richer than those of the richest families. In addition, the comparison of odds ratios revealed that as compared to the children from the richest households, the children from the poorest, poorer, medium and the richer households were 2.3 times, 2.3 times, 1.9 times and 1.8 times as likely as to be moderately stunted over normal than the children who were from the richest households(72) . Study in Sri Lanka, Prevalence of food secure, food insecure without hunger, food insecure with moderate hunger and food insecure with severe hunger in households are 48.9%, 40.5%, 8.7% and 1.8%, respectively . Prevalence of stunting in under five children is significantly associated with their household food security status (41).

A community based case control study shows in Nepal; families with poor economic status are higher among cases (62.7%) than controls (39.8%). Most of the families (65.3%) with cases had no food security compared with the families (35.6%) having controls(74) . Study conducted in Kenya (66) and Sidama Zone no significant association between under five children nutritional status (stunting) and socio Economical factors (37). In southern Ethiopia Low monthly income (less than500 ETB), mother's age during child birth (than 21 years significantly associate with stunting with odds of (COR=2.55 [95CI, 1.20-5.42]), (COR=1.80 [95CI, 1.05-3.08])(63) .

Malnutrition varies from country to country depending on economic, ecological, social, and other factors. In Ethiopia at present the most serious nutritional problems are mainly due to low intake of foods in general. The problem is more severe among children aged 1-3 years who suffer from Kwashiorkor and Marasmus (4%) and underweight (60%). Any change in income or income from influence of the nutritional status at the household and individual levels. The effect of income is measured by expenditure on food which reflects a household's income and resources (75).

2.2.3. Environmental factors

Study which is conducted in Pastoral Community of Korahay Zone, Somali Regional State, Ethiopia 2016, using unprotected well (AOR: 3.41, 95% CI 1.96, 5.93) as source of water supply showed significant association with stunting (74).

Mizan-aman town, bench majji zone Ethiopia, also confirms that children whose drinking water is from a non-improved water source are more likely to be stunted than children with access to an improved water source (19). Study conducted in rural Somalia confirms that, toilet facilities availability had significant association with risk of being stunted (AOR: 1.71, 95% CI 1.13-2.58.)

2.2.4. Health care related factors
According to the study conducted in Nepal indicated that, children who are very small at birth (low birth weight) has a higher prevalence to be stunting than children with normal size (74).

The study in Nepal show that, the proportion of stunting children are slightly higher for unimmunized children (74),But Study in Brazil confirm that no significant relation of immunization with that of stunting (62).

In Kenya, 62 % of children who had low birth weight (less than 2500) were stunted compared to 36 % of the children who were of optimal weight (above 2500) (42). Study in Sri Lanka confirm that birth weight has a direct relationship with prevalence of the child(73) . Based on study in East Welega zone confirm that children whose birth weight are perceived as below average are 1.9 times more likely exposed for risk of stunting than children whose birth weight are perceived as average and above (P<0.01) (76).Study conducted by save the children in Ethiopia show that, Infants and children reported to have a very small birth size are twice (2.02) as likely to be stunted as those that are very large at birth (77).

Study in wendo genet wereda southern Ethiopia, justify that immunization is directly associated with stunting(30) . A community based cross-sectional study which is conducted in East Welega zone confirm that, those children did not take complete vaccine were 1.7 times more likely to be wasted (AOR=1.73, 95%CI: 1.20-1.97) than those who took the complete vaccine(76) .

Study in Brazil show that, stunting is 44.2% in children with diarrhea and 27.4% without diarrhea, OR = 2.10 [95% CI, 1.110-3.972], P = 0.026)(33).The study in Gojjam showed that, Children experiencing diarrhea are 2.3 times more likely to be stunted compared to children

without diarrhea (16). In contrary study conducted in Ethiopia indicated, the association is not statistically significant (16).

Study in Nepal, stunting is significantly associated with the frequency of antenatal care visit(74). In Zambia Children whose mothers has attend antenatal clinics less than three times and four or more times has reduced odds of being stunted (AOR=0.562, 95%CI: 0.294, 1.074; p=0.081 and AOR=0.483, 95%CI: 0.255, 0.917; p=0.026) compared to those whose mothers are not attend(41).

Study conducted in South East Amhara Region indicated that there is significant association between antenatal care visit and stunting with [AOR = 1.837 at 95% CI (1.115, 3.025)] (69).

In contrast studies conducted in India, in Sri Lanka and Egypt no significant association between stunting and antenatal care (34, 38, 78).

Study conducted in Pastoral Community of Korahay Zone, Somali Regional State, Ethiopia 2016 showed that, those mothers who hadn't postnatal visits 1.2 times more likely to be stunted than who had post natal visit (AOR: 1.59, 95% CI 1.07, 2.37) (65).

Another study in Zambia, findings shows that, four in every ten children whose mothers delivered at a health facility are likely to be stunted than those whose mothers delivered at home five in every ten p=0.038 (41). In Nairobi Kenya study indicated that the odds of stunting for a child born to a mother who gives birth at home are 39 % higher compared to giving birth in a health facility (P<0.05 (19). Study in Sideman Zone, justify that a significant association between place of delivery and stunting (30).

2.2.5. Dietary factor

Study conducted in Zambia Children (6–23 months) who are not being breastfed are more likely to be stunted as compared to those who reported being breastfed at the time of delivery (AOR=1.384, 95%CI: 1.067, 1.796; p=0.014) (41). Another study in Hawasa town, shows that shorter length of breast feeding is contributed for stunting (COR=3.04, [95% CI, 1.19 8.06])(63) . In contrary study in Gojjam indicated that, there is no significant difference in prevalence of stunting by initiation of breastfeeding after delivery (19).

Study in India indicate that stunting among children who were feed Colostrums (42.1%) is significantly less (P<0.01) than that among those who were not fed Colostrum (59.0%) (19).

Study in Hawasa town showed that , colostrums feeding has increased the odds of stunting significantly (p<0.05)(63). Another study in west Gojjam, Colostrum feeding and stunting is found highly significant (p<0.001) for children under age five. More children deprived of Colostrum (52.0%) are stunted than children who received it (16).

In West Gojjam, children who receive pre-lacteal feeding were found to be at significantly higher risk of stunting than children who did not. It is noticed that children who receive pre-lacteal feeding were 1.8 times more likely to be stunted than children who did not receive pre-lacteal feeding at the time of birth(16) .In North Shewa Oromia regoin, Regarding the association of pre-lacteal feeding with stunting, children who were fed butter as pre-lacteal feeding were about 3 times more likely to be stunted as compared to children who received water with sugar by their mothers/care taker (AOR=3.102;95%CI=1.82,5.31) (64).

In Khartoum, breastfeeding duration can protect the child's nutrient deviancies and to avoid contaminated food especially for young children significant correlation is observed between duration of breastfeeding and prevalence of stunting (p value = .000) (81) . In west Gojjam, a significantly higher prevalence of stunting (48.7%) is observe among children who are breastfed between 1 and 2 years than among children breastfed for less than 1 year(16) .But in contrast study in Brazil(62) ,and in Bangladeshi(36)there is no significant association between stunting and duration of breast feeding.

Study conducted in west Gojjam show that, there is significantly more stunting among children who are bottle fed (49.8%) (16). But study in Hawasa town confirms that bottle feeding of children has no association with the presence of stunting (63).

The study conducted by Disha et al show that, infant young and child feeding practices related to complementary feeding are positively and significantly ($p<0.05$) associated with under nutrition indicators, particularly HAZ(19). Study in Gojjam indicates that, age of the child when complementary foods started has a highly significant negative association with long-term nutritional status(21).

2.3 .Conceptual framework

Health care factors
- ➤ Childs immunization status
- ➤ Mother's antenatal care visits
- ➤ Diarrhea
- ➤ Respiratory tract infection

Socio demographic factors
- ➤ Age of the child
- ➤ Mother's age of pregnancy
- ➤ Mother's place of deliver
- ➤ Sex of the child
- ➤ Weight of birth
- ➤ Birth order
- ➤ Birth interval
- ➤ Family income
- ➤ Educational status

Under-nutrition

Environmental factors
- ➤ Source of drinking water
- ➤ Availability of Latrine facility

Dietary factors
- ➤ Breast feeding
- ➤ Time for initiation of breastfeeding
- ➤ Colostrum feeding
- ➤ P re-lacteal feeding
- ➤ Duration of breastfeeding
- ➤ Complementary food
- ➤ Method offeeding

FIGURE 1:Conceptual framework of the study, adopted from UNICEFand different Literatures (39, 63, 77) .

3. OBJECTIVES

3.1. **General Objectives**

➢ To assess the prevalence of undernutrition and associated factors among children age 6-59 months at Angolalla Tera district, North Shoa Zone, Amhara Region, Ethiopia, 2019

3.2**. Specific Objectives**

❖ To assess the prevalence of undernutrition among children 6-59 months old at Angolalla Tera district , North Shoa Zone, Amhara Region, Ethiopia,2019

❖ To identify associated factors for under-nutrition among children 6-59 months old at Angolalla Tera district , North Shoa Zone, Amhara Region, Ethiopia,2019

4 .MATERIALS AND METHODS

4.1.Study Area

The study was conducted in Angolalla Tera woreda North Shewa zone. This woreda is 112Km far from Addis Ababa the capital city of Ethiopia. Angolalla Tera is bordered on the south by Hagere Mariamna Kesem, on the west by the Oromia Region, on the north by Basona Werana, and on the south east by Asagirt.

The mean annual temperature of the woreda ranges from 16^0C- 27^0C. However, the hottest months of the woreda are from February to May. The woreda has 21 kebeles, with total area of 1,508.19Km hectare and in this area there are 98,382 a total population, of which comprise 50,458males and 47,924 females and out of those populations 15,175are under five children, out of those there are7, 401are male's and7, 774 are females. There are four health center, 21 health post. The livelihood of most of the woreda population is earned from farming. (AngolallaTera administrative office).

4.2.Study Design and period

A community based cross-sectional study was conducted from Febrauary30/2019to march30/2019.

4.3. Populations

4.3.1. Source Population: -
The source populations were all mothers with children pair from 6-59 months of age who lives in the house holds of Angolalla tera district North Shoa, Amhara region.

4.3.2. Study population: -
The study populations was all randomly selected children 6-59 months of age who were living with their mothers in the sampled kebeles ofAngolalla tera district administration during the study period.

4.4. Inclusion and Exclusion criteria

4.4.1. Inclusion criteria
➢ Children 6-59 months of age who were living with their mothers and whose mothers were available in the selected households.

4.4.2. Exclusion criteria
➢ Children, who were seriously ill, had physical deformities of limbs and spines were excluding because of difficulty in height measurement.
➢ Child's mother critically ill, during data collection was excluded

4.5. Sample Size Determination and Sampling Techniques

The sample size was determined using a single population proportionformula assuming that 51.1% was the prevalence of stunting under five children which was done in Amhara region, Lalibela town northern Ethiopia in 2014(66) and taken the highest prevalence from Amhara region to make more representative . And a 5% margin of error with 95% confidence level with anticipated a 10% non-response rate.

$$ n = \frac{(Z_{\alpha/2})^2 P(1 - P)}{d^2} $$

Where $(Z \alpha/2)2$ = level of confidence (1.96)

P = stunting prevalence of 2014 in Lalibela town 51.1 %

d =margin of error 5%

n= (1.96)2 (0.511) (0.489)/ (0.05)2 = 384

The required sample size was 384 and with adjustment for non-response rate (10%) the final required sample size was 422 mother child pair.

4.6. The sampling technique and procedures

Simple random sampling technique was used to select children from households. From 21 kebeles, six kebeles were selected by simple random sampling (lottery method). Study participants/households/ were allocated to selected kebeles by proportionate allocation and from each selected kebeles study participants were selected by simple random sampling (table of random numbers) based on frame existing in health posts . Formula used to calculate sample size of each selected kebeles: $ni=(n*Ni)/N$ where ni=sample size of each selected kebeles n=total sample size Ni=total number of households with 6-59 months old children in each selected kebeles N=total number of households with 6-59 months old children in all selected kebeles.

There are a total of 2,296 eligible children's in the selected kebeles during the study period (Angolalla Tera district health office administration, 2018). Using this information as baseline data, the total number of clients that were interviewed for each kebele wascalculated.

Therefore, the total number of study participants was 422. Simple random sampling technique was used to include a sample of 422 study participants. If there were more than one eligible child in the house hold lottery method was used. If the respondent was not available after three repeated visits the house hold was named as non-respondent.

Angolalatera district (21 kebele)

Simple random sampling method

Six kebele selected

| KEBEL 2 | KEBEL 5 | KEB9 | KEBEL12 | KEBEL15 | KEBEL 19 |

Total targeted population (N) in five randomly selected kebeles

| 450 | 460 | 351 | 295 | 255 | 485 |

Proportional sample size (n)

| 83 | 85 | 64 | 54 | 47 | 89 |

Total=422 children selected by simple random method
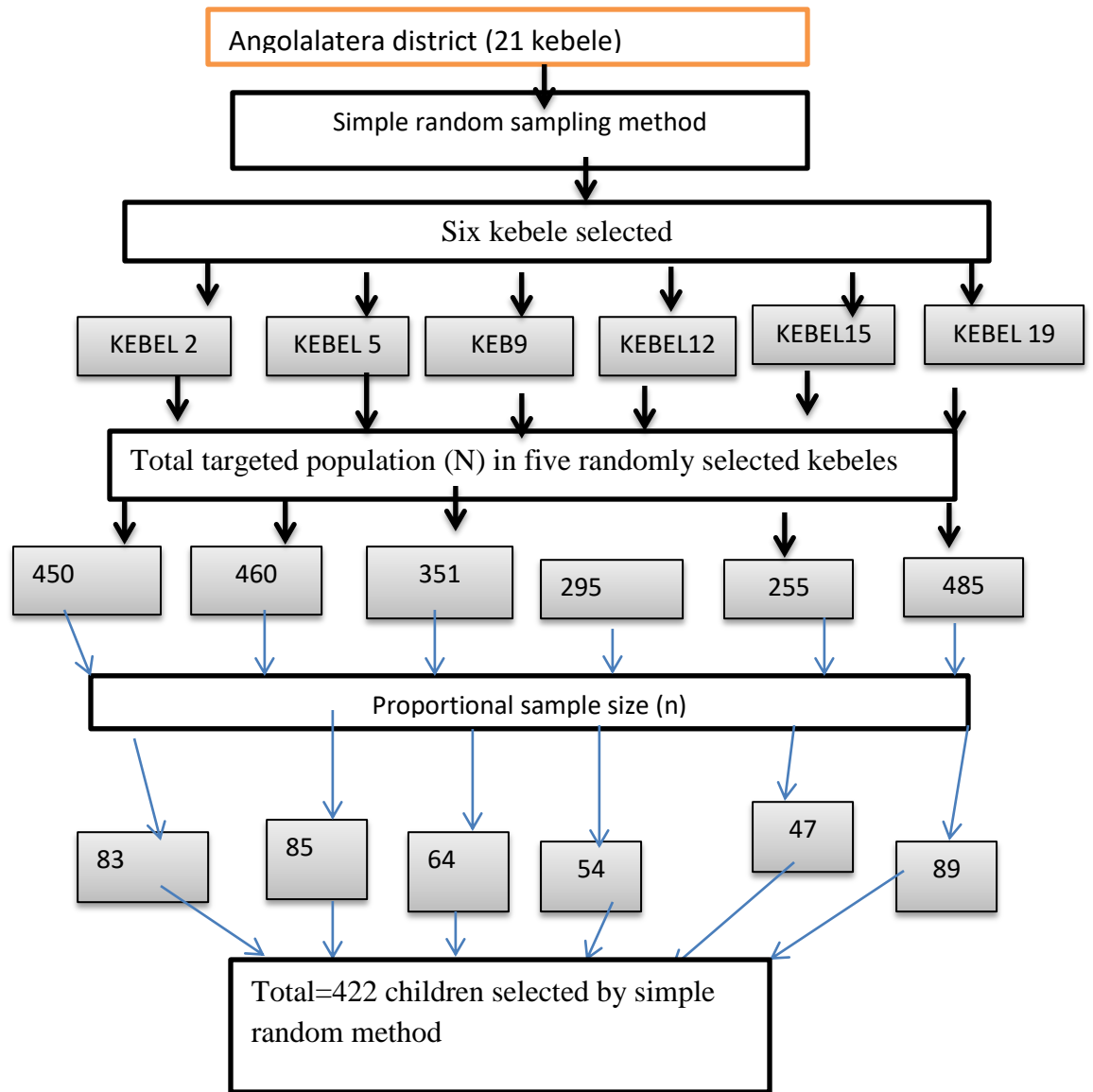
FIGURE 2: Schematic presentation of sampling procedure for the prevalence of under nutrition and association factors among 6-59 months children's in Angolalla tera district, North shoa zone, Amhara Region, Ethiopia, 2019.

4.7. Study Variables

4.7.1. Dependent variable
➢ Undernutrition indicated by wasting, stunting and underweight status in children 6–59 months of age

4.7.2. Independent variables

Socio demographic factor:- Age of child, Sex, marital status of the mother, birth order of the child, preceding birth interval of child, mother's religion, family income and educational status

Environmental factors: - Source of drinking water and availability of Latrine facility

Dietary factors: - Ever breast feeding, time for initiation of breast feeding, Colostrum feeding, pre-lacteal feeding, duration of breastfeeding, age for introduction of complementary food and method of feeding.

Health care factors: - Child's immunization status, child's diarrhea, mothers antenatal care visits, mother's age of pregnancy, and mother's place of delivery

4.8. Operational Definitions

Under-nutrition: is defined as stunting, wasting or underweight (HAZ or WHZ or WAZ below -2 SD of the median value of WHO standard).

Anthropometry: Measurement of the variation of physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition by weight-for-age, height-for-age and weight-for-height(82) .

Complementary food: Foods which are required by the child, after six months of age, in addition to sustained breastfeeding.

Diarrhea: Diarrhea is defined for a child having three or more loose or watery stools per day.

Stunting: A child was defined as stunted if the height for age index was found to be below -2 SD of the median of the WHO standard curve. Severe stunting was diagnosed if it was below -3 SD (82).

Underweight: Refers to a deficit and is defined as underweight if WAZ below the -2 SD from the NCHS/WHO reference of the median of the standard curve. A severely underweight was diagnosed if it was below -3 SD (82).

Wasting: Nutritional deficient state of recent onset related to sudden food deprivation or mal-absorption utilization of nutrients which results weight loss, weight-for-height below-2SD from the NCHS/WHO median value. Severe wasting was diagnosed if it was below -3 SD (82).

Duration of breastfeeding: - The number of months of breast feeding among Children

Pre-lacteal feeding: - Newborns exposed to any foods, substances or drinks other than human milk before the initiation of breastfeeding or during the first three days of birth

Currently on vaccination:-children who have receiving a vaccination according to the EPI schedule based on their age.

4.9. Data collection tools and procedure

Data was collected by using semi structured questionnaire which was adopted from UNICEF and reviewing literatures of similar studies based on the objective of this study. Questionnaires wereprepared in English and translated into Amharic language and then back to English to keep its consistency. The tool contains on undernutrition, demographic, socio-economic, environmental, healthcare and dietary factors among children age (6- 59months).

Four diploma nurses were collected the data and one BSc nurse was take part in the supervision. Those participants were involved on anthropometric measurement, data collection and supervising the enumerators.

The data collectors and supervisors were selected based on experience on research, familiarity with the study area, local language and interest to participate on the study. Selection was done in the presence of community leader and woreda health office after briefly communicating the objective of the study with them. Training was given to data collector and supervisor by principal investigator for one day about the objectives of the study, data collection instruments, data collection procedures, physical measurement and the ethical consideration during data collection.

Anthropometric data: The anthropometric data were collected using the procedure stipulated by the WHO (2006) for taking anthropometric measurements. Before taking anthropometric data for children; their age should first determined in order to ensure the target population. A child birth card and a local event were used to establish the birth period. The mothers were asked whether the child was born before or after certain major events until a fairly accurate age is pinpointed. (82)

Height/length measurement: Body length of children age up to 24 months was measured without shoes and the height was read to the nearest 0.1cm by using a horizontal wooden length board with the infant in recumbent position. However, height of children 24 months and above was measured using a vertical wooden height board by placing the child on the measuring board, and child standing upright in the middle of board. The child's head, shoulders, buttocks, knees and heels touching the board.

Weight measurement: Weight was measured by electronic digital weight scale with minimum/lightly/clothing and no shoes. Calibration was done before weighing every child by setting it to zero. In case of children age below two years, the scale was allowed weighing of very young children through an automatic mother-child adjustment that used to eliminate the mother's weight while she standing on the scale with her baby.

4.10. Data quality control

Pre-testing was conducted on 5% of sample size at Basona Werana district prior to the actual data collection process. The pre-test data was used only for Training of data collectors and to check validity and consistency of the tool. The data collectors were trained on accurate measuring of the child's height, weight and age.   `

The scales indicators were checked against zero reading after and before weighing every child. On daily basis collected information were reviewed and possible errors should returned to the data collectors for correction .The investigator was supervise and reviews every questionnaire for completeness. Data entry, coding and cleaning was performed by the principal investigator.

4.11. Data processing and analysis

 After coding, the data was entered, using EPI DATA version 3.1and it was exported to SPSS version 24for analysis. The descriptive statistic was carried out to compute the different frequency, percentage and different diagrams. To determine the actual predictors for the stunting, underweight, and wasting binary logistic regressions was applied and the variables found to have p – value of <0.2 in bivariable logistic regression with the outcome variable was entered into multivariable analysis ,which uses to control confounding factors. Furthermore, the variables which have significant association will be identified on the basis of p-values< 0.05 and AOR, with 95% CI to measure the strength of the associations. Finally, the finding of this research was presented with text, graph and table

4.12. Ethical consideration

Ethical clearance was obtained from Institutional Review Board (IRB) of BahirDar University, Department of Applied human nutrition and support letter was issued from Bahir Dar University then delivered to Angolalla tera district Health office and finally to the respective health institution. In addition, informed consent was obtained from the parents to confirm their willingness for participation after explaining the objective of the study. The parents were notifying that they had the right to refuse or terminate at any point of the interview and their name may not be mentioned and information provided by each respondent will be kept confidential.

5. RESULT

5.1 Demographic and socio-economic characteristics

Out of 422 children with their mother, a total of 414 actually participated in the study with response rate of 98.1%. The mean age ($\pm$1SD) of participant children was 24.93($\pm$ 15.57) months for both sexes.More than half, 212(51.2%) of the children were male and nearly one third, 142(34.3%) of the children were found in the age group 12-23 months. Among the total respondents, 389(94.0%) were Amharaand, 362(87.4%), were orthodox religion followers. From the total participant, the first birth order children were 118(28.5 %,)and137 (33.1%) of the children were born in less than 24 months spacing from the preceding siblings. From the total number of mothers, 362(87.4%) were married, 363(87.7%) were housewives and 258 (62.3%) of mothers had no formal education. (Table 1)

Table1:- Demographics and socio-economic characteristics of children among 6 to 59 months in Angolalla tera district, North shoa, Amhara ,Ethiopia, 2019 (N=414)

Variable,N=414	Category	Frequency(N)	Percent (%)
Child age	6-11month	91	22.0
	12-23 month	142	34.3
	24-35 month	64	15.5
	36-47month	52	12.6
	48-59 month	65	15.7
Sex of child	Male	212	51.2
	Female	202	48.8
Child birth interval	First child	118	28.5
	<24month	137	33.1
	≥24month	159	38.4

Variable ,N=414	Category	Frequency(N)	Percent (%)
Child Birth Order	First child	118	28.5
	From2-3child	137	33.1
	From4-5child	107	25.8
	Six and above	52	12.6
Mothers age at pregnancy	<20	29	7
	20-34	236	57
	>35	149	36
Residence	Rural	340	82.1
	Urban	74	17.9
Religion	Orthodox	362	87.4
	Protestant	39	9.4
	Muslim	13	3.1
Marital status	Married	362	87.4
	Divorced	30	7.2
	Widowed	6	1.4
	Unmarried	16	3.9
Education of mother	No formal education	258	62.3
	Primary (1-8)	144	34.8
	Secondary (9-12)	9	2.2
	Above secondary	3	0.7
Occupation of mothers	Housewife	363	87.7
	Government employee	16	3.9
	Merchant	8	1.9
	Private	27	6.5
Family monthly income(ETB)	<1596	351	84.8
	≥1596	63	15.2

5.2. Health care and environmental characteristics

As it is depicted in Table 2, 185(44.7%) of children had normal birth weight 2.5-4.0 Kg and 50(12.1%) were <2.5Kg. From the total of 414children, 183(46.3%) were fully vaccinated,whereas, 166(42%)of them are not fully vaccinated. Among the total children, 288(69.6%) had got diarrhea during two weeks of period prior to data collection and 245(59.2%) children were affected by recurrent diarrhea.Out of the total mothers,251(60.6%)of mothers delivered at health institutions, were as 163(39.4%)delivered at home. Majority336(81.2%) of the mothers had no postnatal care (PNC), visits. Concerning source of drinking water, 178(43%) of the households used protected well as a main source of drinking water (Table 2).

Table2;Environmental and health care characteristics of children among 6 to 59 months in Angolalla tera district, North shoa, Amhara ,Ethiopia, 2019 (N=414)

Variable, N=414		Frequency(N)	Percent (%)
ANC follow up	Yes	181	43.7
	No	233	56.3
Place of delivery	Home	163	39.4
	Institution	251	60.6
PNC Follow Up	Yes	78	18.8
	No	336	81.2
Birth weight (Kgs)	Below 2.5	50	12.1
	2.5-4	185	44.7
	Greater 4	3	0.7
Immunization status	Fully vaccinated	183	46.3
	Currently on vaccination	46	11.6
	Not Fully vaccinated	166	42
Acute febrile illness within the last two week	Yes	259	62.6
	No	155	37.4
Hadrecurrentdiarrheain the past 2 weeks	Yes	288	69.6
	No	126	30.4
Diarrheawithin 2wk	Yes	245	59.2
	No	169	40.8

Variable, N=414		Frequency(N)	Percent (%)
Respiratory infection	Yes	231	55.8
Within the last two week	No	183	44.2
Main source of water	Piped into dwelling	75	18.1
	Public pipe	123	29.7
	Protected well	178	43.0
	Unprotected well	38	9.2
Toilet facility availability	Yes	225	54.3
	No	189	45.7

5.3 Dietary characteristics

Regarding with Breast feeding practice majority,380 (91.8%),of mothers were breast feed their children. one hundred seventy six (46.3%) of children were initated breast feeding,within the first one hour. Among a total of380breast feedChildren,294(77.3%) werecolostrum.Among a total of 414 children's, 134 (32.4%) were received pre-lacteal feed.

Childrens, whowere breast fed for less than 12 months were, 167(43.9%), 12-24 months 157 (41.3%) and more than 24 month was 56(14.8%). Majority of respondents 281(67.9%) were started complementary feeding at the aged of 6 month.Concerning the method of feeding, mother who used cup to feed their children were 140 (33.8%) and 138 (33.3%) used hand to feed their children (Table 3).

TABLE 3; Dietary characteristics of children among 6 to 59 months in Angolalla tera district, North shoa, Amhara, Ethiopia, 2019 (N=414)

Variable, N=414	Category	Frequency	Percent (%)
Ever breast fed child	Yes	380	91.8
	No	34	8.2
Time for initiation ofBF(n=380)	Within 1 hour	176	46.3
	Within 24 hour	194	51.1
	> 24 hour	10	2.6
Child fed Colostrum(n=380)	Yes	294	77.3
	No	86	22.7
Prelacteal feeding	Yes	134	32.4
	No	280	67.6
Duration of breast feeding(n=380)	<12 month	174	42.0
	12-24 month	147	35.5
	≥24 month	59	14.3
	At 6 month	281	67.9
Agecomplementaryfood started	Before 6month	107	25.8
	Above6month	26	6.3
Method of child feeding	Spoon	117	28.3
	Cup	140	33.8
	Hand	138	33.3
	Bottle	19	4.6

5.4. Prevalence of under nutrition among children

Depending on the three anthropometric indices, height for-age, weight-for- age and weight-for-height, the findings of this study revealed that 163(39.4%), 66(15.9%) and 28(6.8%) of the participant children were stunted, underweight and wasted respectively(Figure3). In this study prevalence of severe stunting, severe underweight and severe wasting among the children were 94(22.7%), 25(6.0%) and 8(1.9%) respectively (Table 4). Of those male children, 55(58.5%), 17 (68.0%), and 4 (50.0%) wereseverely stunted, underweight, and wasted respectively (Table 5). In general, the prevalence of stunting, underweight and wasting was peaking at 12-23 month, 69(42.3%), 20(30.3%), 12(42%) were stunted, underweight and wasted respectively (Figure 4).

As Compared with age groups, the highest prevalence of stunting was children age12-23 months followed by children aged 6-11month. However, the lowest prevalence of stunting was seen in children aged 36-47 months as indicated below (Figure4). As indicated in table 5, the highest prevalence of underweight was also seen children aged 12-23months with prevalence of 30.3%.However, the lowest prevalence of underweight seen children aged 6-11 months with prevalence of 3.6%.The highest prevalence of wasting was also seen children aged 12-23 months at Angolalla tera district with 42.9%prevalence.The lowest prevalence of wasting was seen in children aged 6-11 months with 3.6%of prevalence (Figure4).
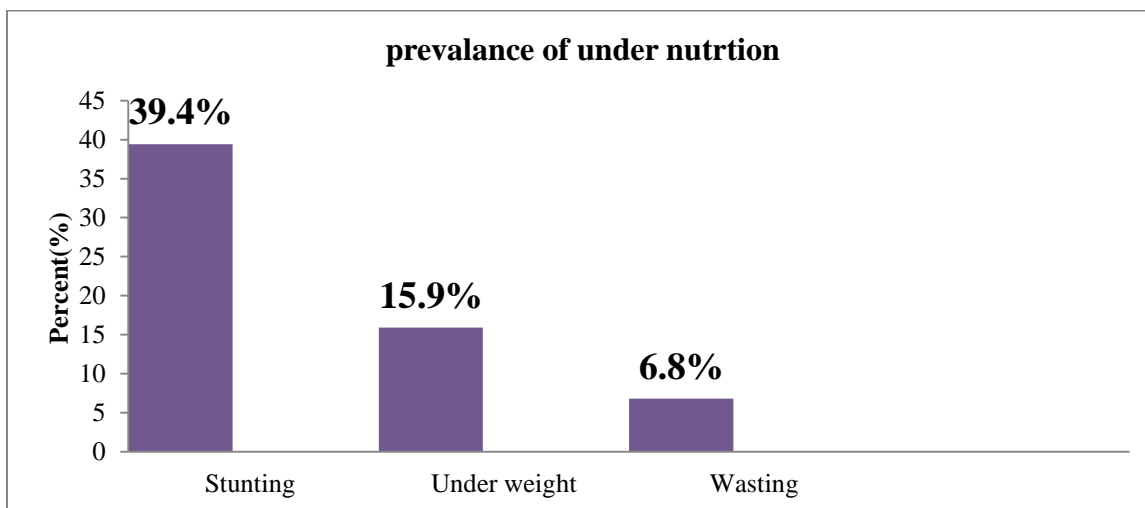
Figure3: Prevalence of under nutrition among children's age group 6-59 month in Angolalla Tera district ,in North Shoa, Ethiopia in 2019 (N=414)

Table4; prevalenceof under nutrition Among six to fifty nine months of age in Angolalla Tera district, North Shoa, Amhara, Ethiopia, 2019 (N=414)

Under nutritionindicators	Frequency(%)
Stunting	251(60.6)
Normal (HAZ.≥-2SD)	
Moderate (HAZ≥-3SD&,<-2SD)	69(16.7)
Sever (HAZ<-3SD)	94(22.7)
Underweight	348(84.1)
Normal (WAZ>-2SD)	
Moderate (WAZ≥-3SD&<-2)	41(9.9)
Severe (WAZ<-3SD)	25(6)
Wasting	386(93.2)
Normal (WHZ>-2SD)	
Moderate was(WHZ≥-3SD&<-2SD)	20(4.9)
Sever wasting(<-3 SD)	8(1.9)
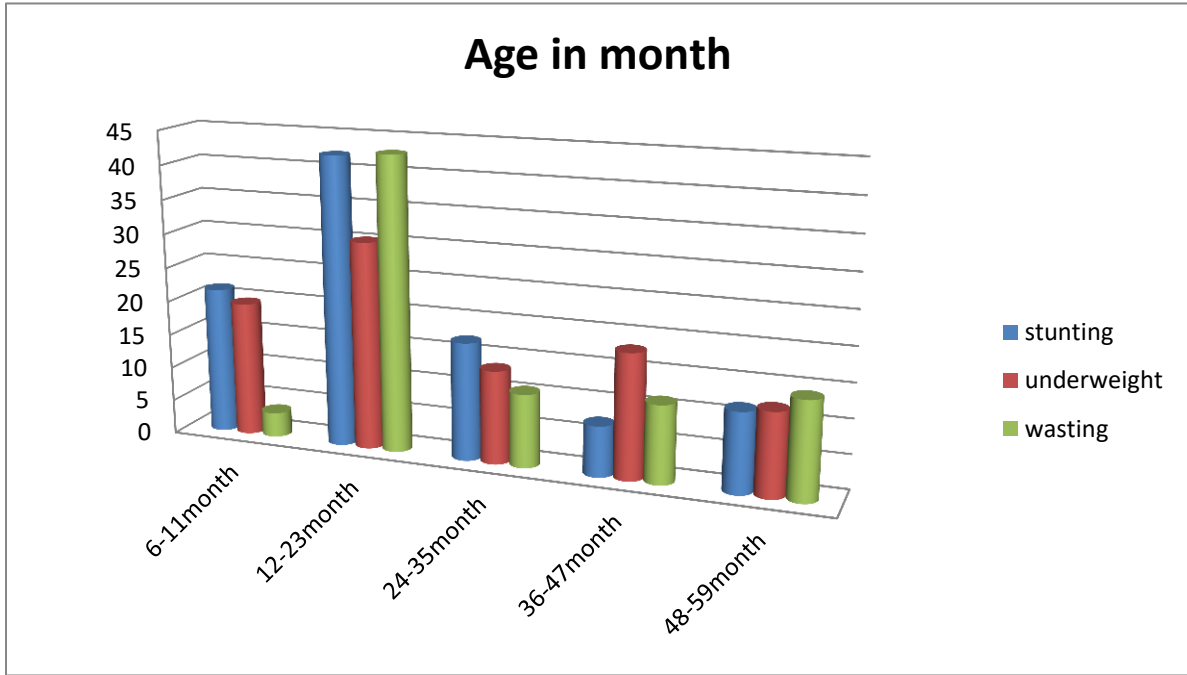
Figure 4 :Nutritional status of children by age Among six to fifty nine months of age in Angolalla Tera district, North Shoa, Amhara, Ethiopia, 2019 (N=414)
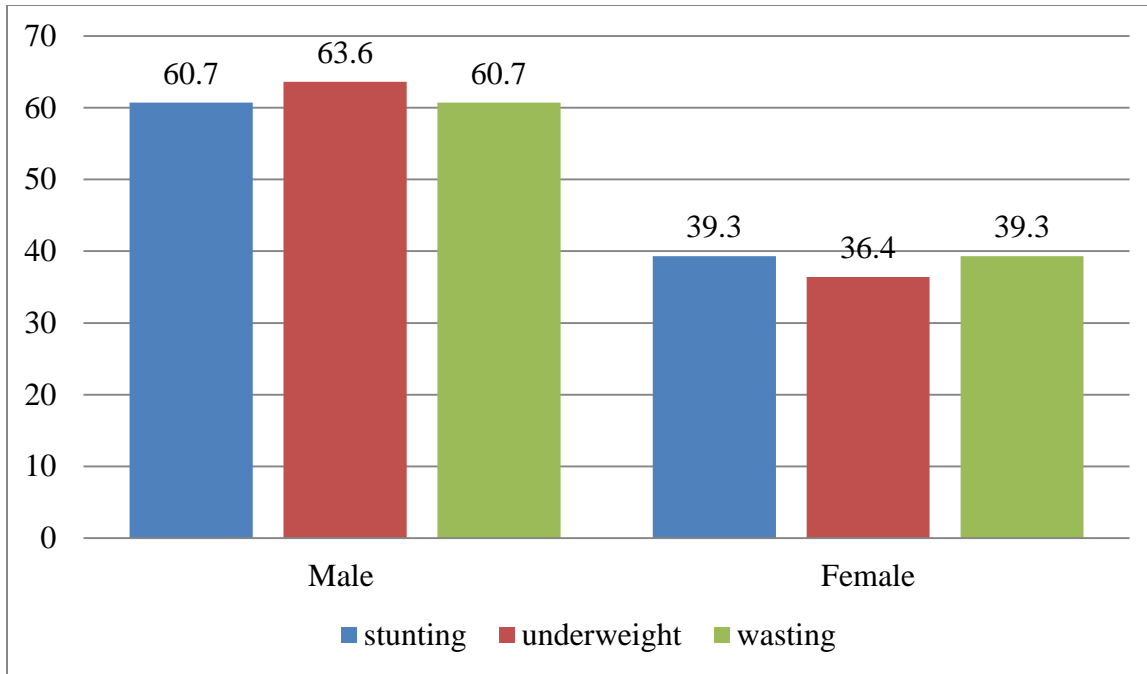
Figure 5:Nutritional status of children by sex Among six to fifty nine months of age in Angolalla Tera district, North Shoa, Amhara, Ethiopia, 2019 (N=414)
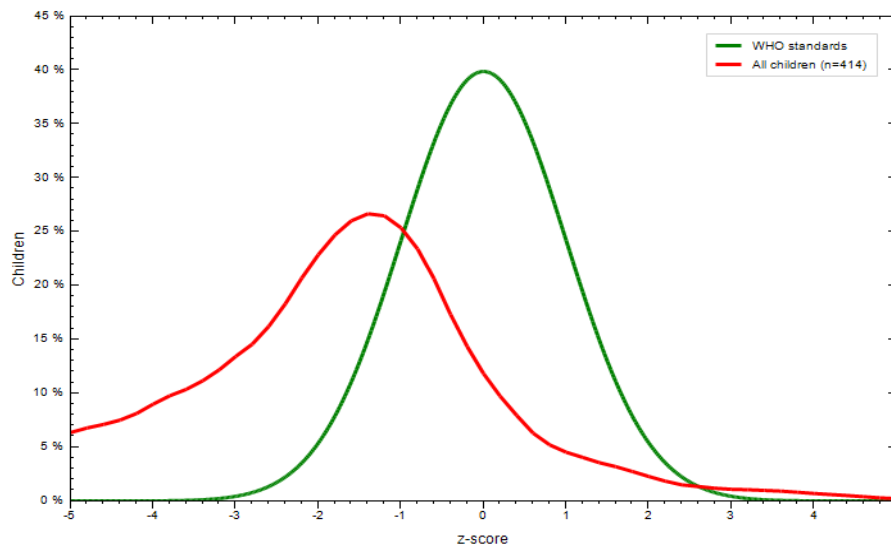
Figure 6: Height for age z score distribution of children as compared to the WHO standard reference curve for 6-59month at Angolalla tera district, 2019(N=414)
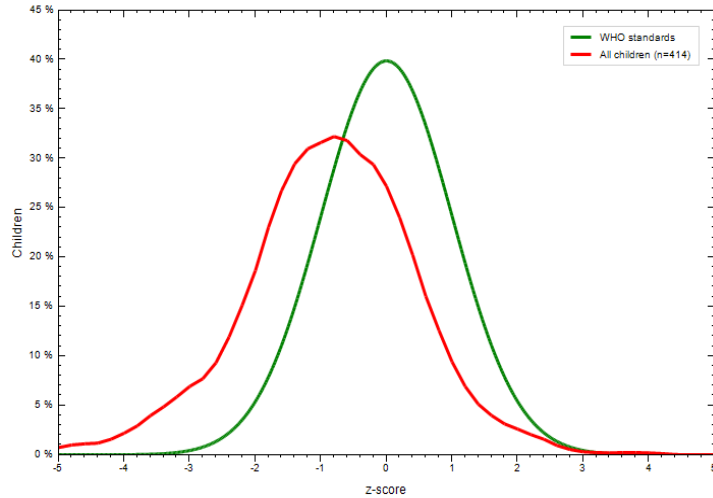
Figure 7: Weight-for-age: z-score distribution of children as compared the WHO standard reference curve for 6-59month at Angolalla tera district, 2019(N=414)
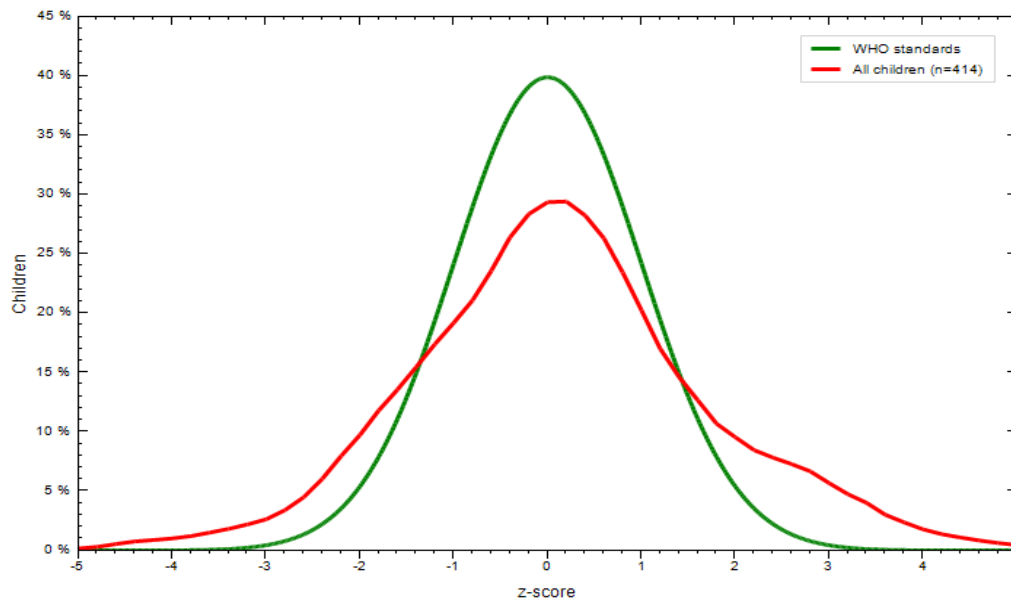
Figure 8: weight for length/height z-score distribution of children as compared to the WHO standard reference curve for 6-59month at Angolalla tera district, 2019(N=414)

Table 5;Prevalence of severe and moderate malnutrition in sex and age among six to fifty nine months of age in Angolalla tera district, NorthShoa, Amhara ,Ethiopia, 2019 (N=414)

	HAZ (Stunting)		WAZ (underweight)		WH Z(Wasting)	
	Moderate N (%)	Severe N (%)	Moderate N (%)	Severe N (%)	Moderate N (%)	Severe N (%)
Sex						
Male	44(63.8)	55(58.5)	25(61.0)	17(68.0)	13(65.0)	4(50.0)
Female	25(36.2)	39(20.2)	16(39.0)	8(32.0)	7(35.0)	4(50.0)
Age in month						
6-11	16(23.2)	19(20.2)	9(22.0)	4(16.0)	0(0.0)	1(12.5)
12-23	29(42.0)	40(42.6)	10(24.4)	10(40.0)	9(45)	3(37.5)
24-35	8(11.6)	20(21.3)	5(12.2)	4(16.0)	2(10.0)	1(12.5)
36-47	5(7.2)	7(7.4)	9(22.0)	3(12.0)	6(30.0)	2(25.0)
48-59	11(15.9)	8(8.5)	8(19.5)	4(14.0)	3(15.0)	1(12.5)
Total	69(16.7)	94(22.7)	41(9.9)	25(6.0)	20(4.8)	8(1.9)

5.5.Factors Associated with under nutrition

5.5.1 Factors associated with stunting

Data were analyzed using binary logistic regression analysis. Statistical associations were checked by 95% CI and odds ratio. Those variables which had p value less than 0.2 in binary logistical regression analysis were eligible for multivariable logistic regressions. Finally, adjusted odds ratio was checked and the significant variables p value<0.05 were considered as associated factors for under nutrition.

Based on the multivariable logistic regression analysis of this study, child sex, child age, children having diarrheain the last two week, diarrhea incidence before 2week and maternal ANC follow up were significantly associated with stunting.Male children were 1.85 times (**AOR=, 95% CI: 1.23- 2.82**) more likely to be stunted than females children(Table 6).

Regarding the association of age with stunting, children's age12-23 month were 2.1times more likely to be stunted than those children'sage 48 month-59 month24 month (AOR= 2.16, 95%CI=1.22-4.28).Children having diarrhea in the past two weeks prior to the data collection were 2.56 times (AOR =2.56, 95% CI: 1.54-4.24) more likely to develop stunted than children without diarrheal disease.Children having diarrhea within two week priorto the data collection were 1.8times (AOR =1.86, 95% CI: 1.22-2.18) more likely to develop stunted than children without diarrheal disease.Children's mothers who had ANC follow up wereless likely to be stunted than who had not ANC follow up(AOR=0.31; 95%CI=0.21-0.45).

Table 6; Bivariable and multivariable logistic regression analysis of Factors associated with stunting among children from six to fifty nine months of age in Angolalla tera district, North Shoa, Amhara, Ethiopia, 2019 (N=414**)**

| Variable	Stunted	Non stunted	COR(95%CI)	AOR(95%CI)
Sex				
Male	99(60.7%)	113(45%)	1.88(1.12-2.47)	1.85(1.23-2.82)*
Female	64(39.3%)	138(55%)	1	1
Child age				
6-11 month	35(21.5%)	56(22.3%)	1.52(0.76-2.99)	1.64(0.82-3.29)
12-23 month	69(42.3%)	73(29.1%)	2.29(1.22-4.28)	2.16(1.18-4.16)*
24-35month	28(17.2%)	36(14.3%)	1.88(0.91-3.89)	1.99(0.951-4.16)
36-47 month	12(7.4%)	40(15.9%)	0.726(0.31-1.67)	0.727(0.31-1.70)
48-59 month	19(11.7%)	46(18.3%)	1	1
Diarria within the last two week				
Yes	117(71.8%)	128(51%)	2.44(1.61-3.72)	1.86(1.19-2.91)*
No	46(28.2%)	123(49%)	1	1
ANC				
Yes	46(28.2%)	135(53.8%)	0.33(0.22-0.51)	0.31(0.21-0.45)*
No	117(71.8%)	116(46.2%)	1	1
Diarria before 2 week				
YES	135(82.8%)	153(61.0%)	3.08(1.91-4.98)	2.56(1.55-4.25)*
NO	28(17.2%)	98(39.0%)	1	1

Variable	Stunted	Non stunted	COR(95%CI)	AOR(95%CI)
Birth order				
First child	39(23.9%)	79(31.5 %)	0.57(0.29-1.12)	0.59(0.29-1.19)
2-3 child	58(35.6%)	79(31.5%)	0.85(0.45-1.63)	0.87(0.44-1.70)
4-5 child	42(25.8%)	65(25.9%)	0.75(0.38-1.47)	0.73(0.36-1.47)
>6and above	24(14.7%)	28(11.2%	1	1
Birth interval				
First child	38(23.3%)	80(32.0%)	0.78(0.47-1.29)	0.786(0.469-1.319)
<24 month	65(39.9%)	72(28.7%)	1.49(0.93-2.36)	0.990(0.61-1.607)
≤24 month	60(36.8%)	99(39.6%)	1	1

N.B; 1=reference group   ***=significantat p-value<0.05**

5.5.2Associated factors of underweight

Based on the multivariable logistic regression analysis of this study, child sex, birth interval, family income, children having diarrhea within two weekand diarrhea incidence before two week of data collection were significantly associated with underweight.Male children were 1.81 times (**AOR=1.81;95% CI: 1.33- 3.15**) more likely to be under weight than females children.Another association found in this study result, children those family monthly income less than1596 birr were3.7 times(**AOR=3.74;95%CI:2.04-6.86**) more likely to be underweight than those family income greater than1596ETB. (**Table7**).

Regarding the association of birth interval with underweight, mothers whose birth space less than 24month were 3.2times more likely to be under weight than those birth space more than 24 month (**AOR=3.27;=95%CI;1.59-6.71**).Children having diarrhea in the past two weeks prior to the data collection were 9times (**AOR =9.06; 95% CI: 2.97-23.55**) more likely to develop underweight than children without diarrheal disease. Children having diarrhea with in two week prior to the data collection were 2.06 times (**AOR =2.06, 95% CI: 1.07-3.96**) more likely to develop underweight than children without diarrheal disease. (Table 7)

Table 7:Bivariable and multivariable logistic regression analysis of Factors associated with underweight among children from six to fifty nine months of age in Angolalla tera district, North Shoa, Amhara, Ethiopia, 2019 (N=414)

Variable	Underweight Yes	No	COR(95%CI)	AOR(95%CI)
Sex				
Male	42(63.6)	170(48.9)	1.83(1.06-3.156)	1.81(1.04-3.16)*
Female	24(36.4)	178(51.1)	1	1
Residence				
Rural	58(87.9)	282(81.0)	1.69(0.77-3.72)	1.64(0.72-3.71)
Urban	8(12.1)	66(19.0)	1	1
Birth interval				
1first child	18(27.3)	100(28.7)	2.02(0.94-4.31)	1.68(0.75-3.74)
<24month	35(53.0)	102(29.3)	3.85(1.94-7.72)	3.27(1.59-6.71)*
≥24 month	13(19.7)	146(42.0)	1	1
Income				
<1596	44(66.7)	307(88.2)	3.74(2.04-6.86))	4.97(2.53-9.76)*
≥1595ETB	22(33.3)	41(11.8)	1	1
Ill Diarra with in two week				
Yes	53(80.3)	192(55.2)	3.31(1.74-6.29)	2.06(1.07-3.96)*
No	13(19.7)	156(44.8)	1	1

| Variable | Underweight | | COR(95%CI) | AOR(95%CI) |
	Yes	No		
Diarra before 2week				
Yes	62(93.9)	226(64.9)	8.36(2.97-23.55)	9.06(3.14-26.12)*
No	4(6.1)	122(35.1)	1	1
ANC				
YES	19(28.8)	162(46.6)	0.46(0.26-0.83)	0.554(0.31-1.01)
NO	47(71.2)	186(53.4)	1	1
Water source				
Piped into dwelling	16	59	0.59(0.27-1.25)	1.60(0.47-5.45)
Public Pipe	17	106	0.71(0.36-1.41)	1.11(0.33-3.66)
Protected Well	29	149	0.43(0.13-1.41)	1.68(0.54-5.22)
Un Protected well	4	34	1	1

N.B; 1=reference group   *=significant p-value<0.05

5.5.3Associated factors of wasting

Children having diarrhea with in two week during the data collection were 4.5times (**AOR =4.59, 95% CI: 1.22-17.17**) more likely to develop wasted than children without diarrheal disease. Children who had born at home were4.4times (**AOR=4.48, 95%CI; 1.72-11.59**) more likely to be wasted than children born at health institution (Table 8).

Regarding to the associated factor of wasting with respiratory infection, Children having respiratory infection in the past two weeks prior to the data collection were 4.7times (**AOR = 4.71; 95% CI: 1.58-13.96**) more likely to be wastedthan children without respiratory

infection.Children who received prelacteal feeding were 3.1times (AOR=3.12, 95%CI;1.39-6.66)more likely to develop wasting as compared to children who didn't not receive(Table 8).

Table 8; Bivariable and multivariable logistic regression analysis of Factors associated with wasting among children from six to fifty nine months of age in Angolalla tera district, North shoa, Amhara, Ethiopia, 2019 (N=414)

Variable	Wasting			
	YES	NO	COR(95%CI)	AOR(95%CI)
Child Age				
6-11 month	1(3.6%)	90(23.3)	0.16(0.01-1.55)	0.18(0.19-1.68)
12-23 month	12(42.8%)	130(33.7)	1.40(0.43-4.54)	1.68(0.50-5.64)
24-35month	3(10.7%)	61(15.8%)	0.75(1.61-3.49)	0.72(0.15-3.43)
36-47 month	8(28.6%)	44(11.4%)	2.77(0.78-9.78)	2.26(0.62-8.24)
48-59 month	4(14.3%)	61(15.8%)	1	1
ANC				
Yes	8(28.6)	173(44.8)	0.49(0.21-1.14)	0.74(0.29-1.83)
No	20(71.4)	213(55.2)	1	1
Place of delivery				
Home	17(60.7)	141(36.5)	2.68(1.22-5.89)	4.48(1.72-11.59)*
Institution	11(39.3)	245(63.5)	1	1
Diarra within 2week				
Yes	25(89.3)	220(57.3)	6.29(1.86-21.18)	4.59(1.23-17.17)*
No	3(10.7)	166(42.7)	1	1
Diarra before 2week				
Yes	24(85.7)	264(68.4)	2.77(0.942-8.16)	1.79(0.57-5.55)
No	4(14.3)	122(31.6)	1	1

Variable	Wasting		COR(95%CI)	AOR(95%CI)
	YES	NO		
Respiratory tract infection with in two week	24(85.7)	207(53.6)	5.18(1.76-15.23)	4.71(1.58-13.96)*
Yes	4(14.3)	179(46.4)	1	1
NO				
Prelacteal feeding				
Yes	17(60.7)	117(30.3)	3.55(1.61-7.82)	3.12(1.39-6.96)*
NO	11(39.3)	269(69.7)	1	1

N.B; 1=reference group   *=Significantat p-value<0.05

6. Discussion

This study revealed high prevalence of child under nutrition in the study area. The finding showed that 39.4% of the children were stunted. Prevalence of underweight and wasting was found to be 15.9% and 6.8% respectively. This finding is in line with A cross-section study conducted on Beta-Israel children in Amhara region, 37.2%, 14.6% and 4.9% of children age 6-59 months were stunted, underweight and wasted, respectively(54).Also in line with study conducted in Hawasa 39.3%, 15.8% and 6.3% of children were stunted, underweighted and wasted respectively(12).

The finding of our study indicated lower prevalence of underweight and wasting in comparison with the 2016 EDHS report in which 24% and 10% of the children underweight and wasted respectively, but prevalence of stunting is almost similar which was38%(18). This study also indicated lower prevalence of under nutrition among children than a number of studies conducted in different parts of the country Bulehora 47.6%, 29.2% and 13.4% were stunted, underweight, and wasted respectively (35),West Gojjam zone Underweight 49.2%(16), Lalibela The prevalence of stunting, underweight and wasting were 47.3% , 25.6% , and 8.9% , respectively(66).

Also lower than study conducted in Aynalem village in Tigray region, the overall prevalence of stunting, underweight and wasting were 45.7%,43.1% and 7.1% ,respectively (56). This variation might be due to the difference in study area, period, and socio economical difference of each study area.

The prevalence of under nutrition in our study was also lower than a comparative cross sectional study conducted in Nepal (except for stunting) in which prevalence of underweight, stunting and wasting was reported as 27%, 37% and 11% ,respectively (84).

But Research finding showed higher prevalence of under nutrition thanMongolia in which the prevalence of stunting, wasting and underweight were 15.6%, 1.7% and 4.7%, respectively(47)**.**Also higher than study conducted at westernKenya , the prevalence of stunting, and wasting were 30%,and 4%, But underweight is lower than Kenya which was 20%(52).

As observed from these literatures, there were improvements of undernutrition over time. This could be attributed to the efforts of the health sector to enhance good nutritional practices through health education and provision of micronutrients to the most vulnerable group. In addition, the health extension programme has included nutrition as one part of its packages. The finding of this study showed that the prevalence of undernutrition increases with age. Prevalence of all forms of under nutrition in the younger age group was lower as compared with older children peaking at the age groups of 12–23 months. Our finding is consistent with a study conducted in northern part of Ethiopia in which undernutrition was found to be peak (66.7%) at the age of 12–23 months (54).

It is inconsistent with the study conducted at Butajira where under nutrition was reported to be peaking at 12 months (21.2% underweight, 48.1% stunted and 8.4% wasted) than 6 months (21.7% underweight, 26.7% stunted and 16.7% wasted) (54). It is also consistent with the results of researches in other African countries Congo (87)and South Africa where underweight was associated with age less than 12 months (88). This might be due to the poor habit of breast-feeding, against malnutrition.

Birth interval was independently associated with underweight as children born within 24 months of the preceding siblings were more likely to be underweight than those who born after 24 months. This study also identified that children born to a household with a low family income were more likely to be underweight when compared to children from a high family income family. This finding is in line with the study conducted in Vietnam and Bangladesh (87, 89)

The children's individual factors were also found to be independently associated with under nutrition among children. Male Sexwas found to be significantly associated with stunting and underweight. Similarly, many studies in Ethiopia and elsewhere have reported that under five male children are more likely to become stunted than their female counterparts (89-92).This could be because boys are more influenced by environmental stress than girls. Presence of diarrheal morbidity in the last two week prior to data collection period was significantly associated with stunting and underweight. But Diarrheal morbidity within two week were significantly associated for all form of under nutrition. The results of this study are in agreement with the results of studies conducted in different developing countries (90, 93). This is because diarrhea may result in lower appetite and poor digestion and mal-absorption.

7 .Limitation of the Study

The potential limitation of this study is the cross sectional nature of the design that poses difficulty to examine causal relationship among variables. Secondly, much of the data were obtained via self-report which can lead to a potential recall bias to the events happened in the past about child's history of illness and patterns of breastfeeding. Finally, information on some important confounders such as parasitic infection, HIV status and maternal nutritional status during pregnancy were not collected which can affect nutritional status of the children.

8.Conclusion

This study revealed high prevalence of under nutrition (stunting, underweight and wasting) among children aged six to fifty nine months in the study area. The finding of our study showed that child sex, diarrheal morbidity, family income, preceding birth interval, lack of ANC follow-up, home delivery, morbidity of respiratory infection and prelacteal feeding practice were found to be significant predictors of under nutrition.

9. Recommendations.

Based on the findings of the study, the following recommendations are forwarded:

For Federal ministry of health

❖ Needtoexpandprogrammerswhichlinksnutritioninterventionsandsocialprotectionin

Lowincomeurbancommunitiesinordertoreachyoungchildrenandpregnantor

Breast feeding mothers

For Angolalla tera woreda Health office

❖ Need to enhance awareness and resource mobilization for health care providers towards ANC follow up, diarrhea prevention, educating mothers and exclusive breast feeding.

❖ Woreda administration should strengthen and established income generation active and saving at households like credit and saving process with collaborate of stake holders to improve family income.

❖ Strengthening the health extension program to improve and provide necessary education on ANC follow up, Diarrhea prevention, breast feeding, and weaning practices.

For Health care providers

❖ Need to strengthen participatory nutrition education to create awareness and to develop behavior change communication for better feeding and caring practices among the community.

For the community

❖ Educate the community to give equal attention for both male and female while feeding the child.

❖ Exclusive breast feeding up to six months and at six months of age needs integration with appropriate complementary feeding.

❖ Strict antenatal care follows up and implements advices which are provided from health care providers.

For researchers

❖ Further study should be done to see other an explored associated factors that were not included in the present study such as parasitic infection, HIV status and maternal nutritional status during pregnancy, specific nutrient intake of children's.

❖ Need to conduct further studies to determine the predictors of undernutrition with qualitative and longitudinal studies.

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11. ANNEXES

Annex-I. Information sheet and consent form

Title: Prevalence of under nutrition and associated factors among 6-59 months children in Angolalla tera district, North shoa zone, North Ethiopia.

Name of Principal Investigator: Leweyehu Alemaw

Name of the Organization: Bahir Dar University

Information sheet and consent form prepared for mothers of under-five children prior to the study to participate in this research project.

Introduction:- this information sheet and consent form is prepared with the aim of assessing magnitude of under nutrition and associated factors among under five children in Angolalla tera district Town, north shoa zone, Amhara Ethiopia,2018. The research group includes the principal investigator, four data collectors, onesupervisors, and one advisor from Bahir Dar University.

Purpose of the study: - the aim this study is to assess magnitude of under nutrition and associated factors among 6-59 months.

Procedure: - the study involves 6-59 months children and mothers pair in Angolalla tera district. You are selected to be one of the study participants if you are willing to participate. We are so happy finally you are kindly requested to give your genuine response in the questionnaires.

Benefits, risk and/or discomfort: - by participating in this research project you may feel some discomfort in wasting your time (a maximum of 30 minutes). However, your participation is definitely important to assess the magnitude of under nutrition and associated factors among under five children in Angolalla tera district , North shoa zone , Amhara Ethiopia, 2018. There is no risk or direct benefit in participation in this research project.

Incentives/payments for participating: - you will not provide any incentives or payment to take part in this project.

Confidentiality: - we will keep the confidentiality by using codes instead of any personal identifiers and is meant only for the purpose of the study.

Right to refusal or withdraw: - you will not be forced to participate; you have the full right to refuse and have the right to discontinue the process at any point in this research.

Person to contact: - this research project will be reviewed and approved by the ethical committee of the Bahir Dar University. If you have any question you can contact any of the following individuals and you may ask at any time you want.

Name: Leweyehu Alemaw

Tele: 0918541682

E-mail: lewisbrsh@gmail.com

If you have read the document and you have been given the chance to ask any questions now or at a later time or if the document has been read and explained to you agree to be in this study, may I continue?

YES ☐   NO ☐

Annex-II . Amharic Version Information sheet and Consent form
የስምንትማብራሪያቅጽ

የጥናቱርዕስ፡በአንጎላዋረዳዕድሜያቸውከ659ወራትበሆኑህጻናትላይሆኖምግከሚፈለገውመጠንበታችየተመገቡህጻናትመጠንእናተጓዳኝክንያቶችንለመለየተተዘጋጀነው።

የአጥኚውስም፡- ለወየሁአለማው

የዩኒቨርስቲውስም፡- ባህርዳርዩኒቨርስቲ።

መግቢያ፡-
ይህየስምምነትቅጽአሁንእርስዎእንዲሳተፉበትየምንጠይቅዎትንየጥናቱንዐላማየሚያብራራነው፡በዚሁጥና ትለመሳተፍከመወሰንዎበፊትይህንንቅጽበጥንቃቄበማንበብጥያቄዎችካሉዎትይጠይቁ።በዚህጥናትመሳተ ፍከጀመሩበኃላምቢሆንማንኛውምጊዜጥያቄዎችካሉዎትመጠየቅይችላሉ።

የጥናቱአላማ፡-የዚህጥናትእናምርምርአላማዕድሜያቸውከ6-59
ወራትበሆኑህጻናትላይሆኖምግከሚፈለገውመጠንበታችየተመገቡህጻናትመጠንእናተጓዳኝክንያቶችነለመ ለየትነው።

የአሰራርሂደት፡-ጥናቱዕድሜያቸውከ6-
59ወራትየሆኑህጻናትንእናእናቶቻቸውንያካትታል።የጥናቱተሳታፊእንዲሆኑበመመረጥዎተሰማንንደስ ታየገለጽንብጥናቱለመካፈልፈቃደኛከሆኑየሚጠየቁትንጥያቄዎችበታማኝነትእንዲመልሱልንበትህትናእንጠይ ቃለን።

የሚጠበቁጥቅሞች፡አደጋዎትወይምአለመመቸት፡በዚህጥናትበመሳተዎከ30ደቂቃበማይበልጥየጊዜእኽሚያ ምክንያትአነስተኛየምቾትመጓደልሊከሰትብዎከመቻሉስትቀርበርስዎምሆነበልጅዎላይምንምአይነትጉዳት የማያደርስመሆኑንእናበተሳትፎዎምቀጥተኛየሆነትቅምየሚያገኙመሆኑንአረጋግጣለሁ።

የተሳትፎክፍያንበተመለከተ፡- በዚህጥናትበመካፈልዎትምንምየሚከፈልዎትነገርየለም።

ሚስጥርመጠበቅ፡-
በዚህጥናትከእርስዎየሚሰቡትምላሾችሚስጥራዊነታቸዉየተጠበቀእንደሄሄሆንእየገለጽኩ፣ለዚህምአላማሲ ባልየእርስዎየልጅዎስምበመጠይቁላይየማይጸፍናበተለየኮድየሚቀመጥሲሆንየጥናቱየመጨረሻውጤ ትከየእርስዎምሆነከልጅዎየግልማንነትጋርማይገናኝመሆንከወዲህአረጋግጣለው።

የሚገናኙትሰው፦-

ይህጥናትየጥናቱተሳታፊዎችከጉዳትመጠበቃቸውንበሚያረጋግጠውበባህርዳርዩኒቨርስቲየስነ-ምግባርኮሚቴታይቶድጋፍአግኝቷል፡፡ከጥናቱጋርበተያያዘለሚከሰቱማንኛምዓይነትጉዳዮችከዚህበታችበተቀመጠውአድራሻሊያገኙንይችላሉ፡፡

ለወየሁአለማውሞባይል፤ 09 18541682

ይህንንቅፅአንብበውከሆነእናሁንምሆነሴላጊዜጥያቄለመጠየቅእድልተሰጥቶዎትከሆነወይምይህቅድተነቦ እናተብራርቶሎትከሆነእርስዎበጥናቱለመሳተፍወይምላለመሳተፍመስማማትእናለመስማማትዎንይግለጹ ልኝ?

እስማማለሁአልስማማም

Annex III .English Questionnaires

Our study focuses on to assess magnitude of under nutrition and associated factors among 6-59 months children in Angolalla tera district north shoa Zone, Amhara Region, Ethiopia.

Hello, my name is _____ I am working in a research team of Bahir Dar University College of Food Science and Engineering. This questionnaire is prepared to conduct a study the magnitude of under nutrition and associated factors among 6-59 months population to complete the questionnaire designed by the researcher because you fulfill requirement for sampling. The finding of this study will help provide timely and proper nutritional and health care services to yours and other children's. The data that I will obtain using this interview will be used only for research purpose and your response will kept confidential. For this purpose your name will not be written here and there is no way of linking our individual responses to the final result of the study findings. The study has no risk to you and your child except sparing a maximum of 30 minutes of your time and if you face any problem in relation to the research you can contact responsible person based on the address below. You have the right not to respond at all or to withdraw in the meantime, but your participation is highly valuable for the success of our research objectives. Therefore, I politely request our cooperation to participate in this interview.

Do you agree to participate in this study?

If yes, _____ continue.   If No_____ thank you!!!

Name of the data collector_____ signature_____ Data_____
Questionnaire code_____

No	Questions	Response and coding category	Skip
1 Demographic and socio economic factor			
Characteristics of the child			
101	How many months old is your child?	_____(months)	
102	What is the sex of your child?	1. Male 2. Female	
103	What is the birth order your child?	_____	
104	How many months does your child have between the preceding birth intervals?	_____	

2 Characteristics' of the parent and household		
201	How old are you?	…………………..(yrs)
202	What is your marital status?	1. Married 2. Divorced 3. Widowed 4. un married
203	What is your ethnicity	1. Amhara 2. Oromo 4.Other specifies
204	What is your religion?	1. Protestant 2. Orthodox 3. Muslim 4. Catholic 5. Others(specify) …………
205	What is your main occupation?	1. House wife 2. Government employee 3.Non-government employee 4. Merchant 5. Self-employee 6. Others (specify) ………
206	What is your husband's main occupation?	1. Government employee

S.No	Questions	Response and coding category	Skip		
		2.Non-Government employee 3. Merchant 4. Self-employee 5. Others (specify)…..			
207	What is your educational	1. No formal education 2. Primary education (1-8) 3. Secondary (9-12) 4. Above secondary			
208	What is your husband's educational level?	1. No formal education 2. Primary education (1-8) 3. Secondary (9-12) 4. Above secondary			
209	How much is your monthly income in birr?	………….. birr			
3 .Environmental factors					
301	What is the main source of drinking water for members of your household?	1. Piped into dwelling 2. Public tap/stand pipe 3. Protected well 4. Unprotected well . Others (Specify)………..			

S.No	Questions	Response and coding category	Skip
302	Do you have functional toilet facility in our house? (if possible observe it)	1. Yes 2. No	

4. Health care factors

S.No	Questions	Response and coding category	Skip
401	Do you have Antenatal care follow up in health institution when you are pregnant of this child?	_____	
402	Where did you deliver your child?	3. Public health facility 4. Private health facility 5. Home	
403	Did you attend post natal care service after delivery of your child?	1. Yes 2. No	
404	How much is your child's weight or size at birth?	---------------------	
405	Did your child received vaccination?	1. Yes 2. No	If no skip to 407
406	If yes did your child took all vaccination? If card available check	1. Fully Vaccinated 2. Currently on vaccination 3. Not-fully vaccinated	

S.No	Questions	Response and coding category	Skip
407	Did your child have been ill with diarrhea in the last two weeks	1. Yes 2. No	
408	Did you child have recurrent episodes of diarrhea (2times and more) in the past two weeks?	1. Yes 2. No	
409	Respiratorytractinfectioninthela sttwo week	1.yes 2.NO	

S.No	Questions	Response and coding category	Skip
	5 .**Dietary factors**		
501	Have you ever breast fed your child?	1. Yes 2. No	If no skip to 506
502	When did you start breast feeding after delivery?	--------------------	
503	Did your child receive the first milk (colostrums)?	1. Yes 2. No	
504	Did your child receive any food or liquids other than breast milk during the first three days of life?	1. Yes 2. No	
505	For how long the child breast fed?	………………..	

		(months)
506	When did you start giving complementary foods to your child?	……………….. (months)
507	What method did use for feeding your child? 1. Spoon 2. Cup 3. Hand 4. bottle	More than one answer is possible

Sr.NO	Anthropometric measurement	Measurement in cm	Remark
6	Length or height measurement		
601	Length or height	_____(cm)	
602	Weight	_____(kg)	

Thank you for your participation!!

Annex IV. Amharic Questionnaires (የአማርኛመጠይቅ)

ይህ የጡናት መጠይቅ የሚያተኩረው በ አንጎልላ እና ጠራ ወረዳ ዕድሜያቸው ከ6-59 ወራት በሆኑ ህጻናት ላይሆኖ ምግከ ሚፈለገው በታች የተመገቡህጻናትመጠንእናተጓዳኝ ምክንያቶችን ለመለየት የተዘጋጀነው።።

ጤናይስጥልኝስሜ .... የተባልኩኝ በበሀርዳር ዩኒቨርስቲ በስነ ምግብእና ኬሚካልኢንጅነሪንግ ኮሌጅ ውስጥ የጡናትእናምርምርባለደረባነኝ።።ከላይእንደጠቀስኩት ይህ ጡናት መጠይቅ የሚያተኩረው በአንጎልላና ጠራ ወረዳ፤ዕድሜያቸውከ6-59 ወራት በሆኑ ህጻናት ላይሆኖ ምግብ ከሚፈለገውመጠንበታችየተመገቡህጻናትመጠንእናተጓዳኝምክንያቶችንለመለየትየተዘጋጀሲሆንእርስዎለጥ ናቱየሚያስፈልጉ መስረቶችን አሟልተው በመገኘትዎ የጡናቱአካላአድረገንመርጠንዋታል።ስለሆነም የጡናቱግኝት ለርስዎ እናለሌሎችም ልጆችወቅታዊየስነ-ምግብ እና የጤና እንክብካቤ እንዲያገኙ ይረዳል።።በመሆኑም ይህ መጠይቅ ሲዘጋጅ ተገቢ የሆኑ መረጃዎችን ለማግኘት ሲሆን ከእርስዎ የሚገኘው መረጃም ለጡናት እና ምርምሩ ተግባር ብቻ የሚውል ነው።።ከእርስዎ የሚሰቡት ምላሾች ሚስጥራዊነታቸዉ የተጠበቀ እንደሚሆን እየገለትኩኝ ለዚህም አላማ ሲባል የእርስዎም ሆነየልጅዎ ስም በመጠይቁ ላይ የማይጻፍ እና የጡናቱ የመጨረሻ ውጤት ከእርስዎም ሆነ ከልጅዎ የግል ማንነት ጋር የማይገናኝ መሆኑን ከወዲሁ አረጋግጣለሁ።።

በተጨማሪም ይህ መጠይቅ ከ20ደቂቃ ያልበለጠ ጊዜ ከመሻማት ያለፈ በእርስዎም ሆነ በልጅዎ ላይ አይነት ጉዳት የማያደርስ ሲሆን ከጡናቱ ጋርበተያያዘለሚከሰቱ ማንኛውም ዓይነት ጉዳዮች ከዚህ በታች በተቀመጠው አድራሻ ሊያገኙን የሚችሉ መሆኑን እያስገነዘብኩ በጡናትላይያለመሳተፍ እናየማቋረጥመብትዎ የተጠበቀነው።።የእርስዎ መሳተፍ ግንከምንም በላይ ለጡናቱ ዓላማመሳካትወሳኝ በመሆኑ በመጠይቁ እንዲተባበሩኝ ስል በታላቅ አክብሮት እናትህትናእጠይቃለሁ።።

በጡናቱለመሳተፍፈቃደኛነዎት?   አዎ -----------

አይደለም-------------------።።

አመሰግናለሁ!!!

መጠይቁን የሚሰበስበው ሰው ስም ------------------------ ፊርማ -------------- ቀን--------------------

የመጠይቁ ኮድ--------------- ----   የተጠያቁ ኮድ ------------------   የቤት .ቁጥር--------------

ተ.ቁ	ጥያቄዎች	ምላሽእናኮድ		እልፍ
1.	ማህበራዊ፣ኢኮኖሚያዊእናስነ-ህዝባዊመረጃንበተመለከተ			
1.1.	ልጅንበተመለከተ			
101	የልጅዎእድሜስንትነው?			------------------ ወር
102	የልጅዎፆታ?			1. ወንድ 2. ሴት
103	ይህልጅስንተኛልጅዎነው/ ናት?			1. የመጀመሪያ 2. ከ2-3ኛ 3. ከ4-5ኛ 4. 6 እናከዚያበላይ
104	የአሁኑልጅዎከታላቁ/ቋምንያህልየዕድሜልዩነትአላቸው?			1. ከ 24 ወራትበታች 2. 24 ወራትእናከዚያንበላይ

ተ.ቁ		ጥያቄዎች	ምላሽእናኮድ	እለፍ
2			ወላጆችንእናቤተሰብንበተመለከተ	
201	ይህንልጅዎንፍሰቱርየነበሩዜዕድሜዋስንትነበር?			-------------ዓመት
202	የጋብቻሁኔታ?			1. ያገቡ 2. የተፋቱ 3. ባለቸውንበሞትያጡ 4. ያላገቡ
203	ብሄረዎምንድንነው			1. ትግራ 2. አማራ 3 .ኦሮሞ ሌላካለ ይጥቀሱ--------------

204	ሃይማኖትዎምንድንነው?	1. ፕሮቴስታንት 2. ኦርቶዶክስ 3. ሙስሊም 4. ካቶሊክ 5. ሌላካለ ይጥቀሱ-----------

205	ዋናስራዘርፍዎምንድንነው?	1. የቤትእመቤት 2. መንግስትሰራተኛ 3. መንግስታዊያልሆኑተቋምሰራተኛ 4. የንግድስራ 5. የግልሰራተኛ 6. ሌላካለ ይጥቀሱ----------------
206	የትምህርትደረጃዎስንትነው?	1. ማንበብናመጻፍአለመቻል 2. አንደኛደረጃ 3. ሁለተኛደረጃ 4. ከሁለተኛደረጃበላይ
207	የባለቤትዎየትምህርትደረጃስንትነው?	1. ማንበብናመጻፍአለመቻል 2. አንደኛደረጃ 3. ሁለተኛደረጃ 4. ከሁለተኛበላይ
208	የቤተሰብዎወርሃዊገቢስንትይሆናል?	------------------------ብር

ተ.ቁ	ጥያቄዎች	ምላሽእናኮድ	እለፍ
3.		አካባቢያዊሁኔታንበተመለከተ	
301	የመጠጥውሃአቅርቦትበዋናትየምታገኙትከየትነው?		1. የግልቧንቧ 2. የጋራቧንቧ 3. የቦኖውሃ 4. የታሸገውሃ

		5. ከተጠበቀየኑድንድውሃ
		6. ካልተጠበቀየኑድንድውሃ
		7. ሌላካላይጠቀሱ…
302	በቤትዎየሚገለገሉበትመጸዳጃቤትአልዎት?	1. አዎ 2. አይደለም

ተ.ቁ	ጥያቄዎች	ምላሽእናኮድ	እለፍ
4		የጤናእንክብካቤንበተመለከተ	
401	ልጅዎንፍሰቱርከበነበሩበትጊዜለቅድመዎሊድአገልግሎትክትትልወደጤና ተማቋትስንተጊዜሄደዋል?	1. አልሄድኩም 2. 1 ጊዜ 3. 2-3 ጊዜ 4. 4 ጊዜእናከዚያበላይ	
402	ልጅዎንየትነበርየወለዱት?	1. በመንግስትየጤናተቋም 2. በግልየጤናተቋም 3. በቤት	
403	ልጅዎንከወለዱበኋላየድህረ-ወሊድአገልግሎትበጤናተቋምትግኝተዋል?	1. አዎ 2. አይደለም	
404	ልጅዎሲወለድየነበረውክብደት/ መጠንምንያህልነበር?	------------------------	
405	ልጅዎንአስከትበውትያውቃሉ?	1. አዎ 2. አይደለም	
406	ልጅዎተከትበዋይሚውቅከሆነ፣ሁሉንምየክትባትአይነቶችወስደዋል?	1. አዎጨርሷል 2. አልጨረሰምእየወሰደነው 3. አልጨረሰምእየወሰደአይደለም	
407	ባለፉትሁለትሳምንታትውስጥልጅዎንየትኩሳትምልክትታይቶበትነበርን?	1. አዎ 2. አይደለም	
408	ልጅዎን 2 ጊዜእናከዚያበላይበተደጋጋሚ (በመካከልከተቅማጥነፃ 2		

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	ቀናትልዩነት) ተቀማጥያጠቃዋል?		1. አዎ 2.አይደለም
409	ባለፉትህለትሳምንተትውስጥልጅዋየተቀማጥምልክትታይቶበትነበር?		1. አዎ 2. አይደለም

ተ.ቁ	ጥያቄዎች	ምላሽእናኮድ	እለፍ
5		የአመጋገብሁኔታንበተመለከተ	
501	ልጅዋንጡትአጥብተውያውቃሉን?	1. አዎ 2. አይደለም	አላውቅምከሆነሙልሱ ወደ 506 ይለፉ
502	ከወሊድበኂላከስንትሰዓትበኂላነውልጅዋንጡትያጠቡት?	1. በ1 ሰዓትውስጥ 2. በ24 ሰዓትውስጥ 3. ከ 24 ሰዓትበላይ	
503	ልጅዋንየመጀመሪውንቢጫመልክያለውንየጡትወተት /እንገር/ አጥብተውታል?	1. አዎ 2. አይደለም	
504	ከወሊድእስከሶስትቀንባለውጊዜለልጅዋከጡትወተትሌላተጨማሪምግብ ወይንምፈሳሽነገርሰጥተውታል?	1. አዎ 2. አይደለም	
505	ልጅዋንለምንያህልጊዜያጠባሉ?	------------------------------ወር	
506	ለልጅዋተጨማሪምግብመስጠትየጀመሩትመቼነው?	------------------------------ ወር	
507	ልጅዋንለመመገብየተጠቀሙበትመመገቢያዘዴምንድንነው?	1. ማንኪያ 2. ኩባያ 3.ሌላካለይጠቀስ	

ተ.ቁ	ጥያቄዎች	ምላሽእናኮድ
6	የሰውነትአቋምልኬት	
601	ቁመትወይምርዝመት?	_____-ሴንቲሜትር
602	ክብደት	_____ኪ.ግ

======ለነበረንቆይታአመሰግናለሁ======!!!!!!

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