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COMPARISON OF CHILD DIETARY DIVERSITY AND ITS ASSOCIATED FACTORS AMONG SUSTAINABLE UNDER NUTRITION REDUCTION PROJECT COVERED AND UNCOVERED DISTRICTS IN WEST GOJJAM ZONE, NORTH WEST ETHIOPIA, 2019

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BAHIRDAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF HEALTH SYSTEM MANAGEMENT AND HEALTH ECONOMICS

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JANURY, 2020
BAHIRDAR, ETHIOPIA

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Abstract

Background: Minimum dietary diversity is the consumption of four or more food groups from the seven food groups for higher dietary quality. Currently, there are a number of studies on childhood dietary diversity practice in different parts of Ethiopia, but most of these studies deals with issues of dietary diversity practice and its associated factors within a single population. Previous findings were insufficient to compare the dietary diversity practices between communities, thus a comparative the cross-sectional study design is a more appropriate method to compare among communities.

Objective: To compare child dietary diversity and its associated factors among sustainable under nutrition reduction project covered and uncovered districts in West Gojjam zone Northwest Ethiopia.

Methods: A community-based comparative cross-sectional study was conducted. A total of 594 sample size was included. The study participants were selected using a multistage sampling technique. The data were checked for consistency, and entered into Epi-Info version 7.2 and analyzed using SPSS Version 23. Binary logistic regression model fitted to determine independent predictor of dietary diversity. In simple binary logistic regression analysis, independent variables with P_Value < 0.25 entered into multivariable logistic regression analysis. 95% confidence interval and P_Value < 0.05 considered statistically significant. Model fitness checked with Hosmer and Lemeshow test model fitness with P_value >0.05.

Result: Minimum dietary diversity practice was 34.4% in Sustainable under nutrition reduction project covered and 25.8% in Sustainable under nutrition reduction project uncovered district. Being Sustainable under nutrition reduction project covered district was 1.51 times more likely to have minimum dietary diversity practice (MDDP) compared with their counterparts (AOR=1.51, 95% CI: 1.05-2.15). In the SURE project covered district, children from mothers who had nutritional counseling during ANC was 4.76 times more likely to have MDDP than those did not have nutritional counseling during ANC (AOR=4.76, 95% CI; (1.27-11.85). Good maternal knowledge increases childhood MDD by 3.37 times (AOR=3.37, 95%CI: 1.28-8.90) and 2.38 times (AOR=2.38, 95%CI: 1.28-4.48) more likely in the SURE project covered and uncovered districts, respectively.

Conclusions: Good maternal knowledge on DDP, better household wealth quintile, lower HFIAS were the common factors in both SURE project covered & uncovered districts promoting the practice of childhood MDDP. Better educational status of the father is a promoting factor for MDDP in SURE project uncovered district, whereas maternal educational status & nutritional counseling during ANC for SURE project covered district was the factor to increase the practice of childhood minimum dietary diversity practice. Therefore, it is better to work more on promoting nutritional counseling during antenatal and postnatal cares, health facility delivery, maternal education, good maternal knowledge, better household wealth quintile, lower HFIAS.

Key words: Dietary diversity, children, West Gojjam Zone, Northwest Ethiopia

Acronyms/Abbreviation

AEW	Agricultural Extension Worker
ANC	Ante Natal Care
ANRS	Amhara National Regional State
BF	Breast Feeding
CBN	Community Based Nutrition
CSA	Central Statistical Agency
CF	Complementary Feeding
DD	Dietary Diversity
DDS	Dietary Diversity Score
ETB	Ethiopian Birr
EDHS	Ethiopian Demographic Health Survey
HC	Health Center
HEW	Health Extension Worker
HF	Health Facility
HFIAS	Household Food Insecurity Access Score
HH	Household
HP	Health Post
IYCF	Infant and Young Child Feeding
MAD	Minimum Acceptable Diet
MDD	Minimum Dietary Diversity
MDDP	Minimum Dietary Diversity Practice
MMF	Minimum Meal Frequency
NSA	Nutrition Sensitive Agriculture
PNC	Post Natal Care
SURE	Sustainable Under-nutrition Reduction in Ethiopia
VIF	Variance Inflation Factor
WHO	World Health Organization
WGZ	West Gojjam Zone

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1. INTRODUCTION

1.1. Background

Dietary diversity is a proxy of adequate micro nutrient density of food. Minimum dietary diversity assesses food intake among children age 6-23 months. Minimum dietary diversity is the consumption of four or more food groups from the seven food groups for higher dietary quality to meet daily energy and nutrient requirement from the seven recommended food groups namely: grains, roots and tubers, legumes and nuts, dairy products, flesh foods (meat, fish and poultry), eggs, vitamin A rich fruits and vegetables and other fruits and vegetables [1]

World health organization(WHO) has established guidelines with respect to Infant and young child feeding (IYCF) for children aged 6-23 months aged by considering minimum dietary diversity practices (MDDP) as one of the core eight indicators[2]

Infant and young children should be fed a minimum acceptable diet (MAD) to ensure appropriate growth and development. Without adequate diversity and meal frequency, infants and young children are vulnerable to under nutrition. The cut-off of four food groups is associated with better-quality diets for both breastfed and non-breastfed children[3]

Minimum meal frequency, a proxy for a child's energy requirements, examines the number of times children received foods other than breast milk. The minimum number is specific to the age and breastfeeding status of the child. Dietary diversity is approach of measuring food utilization and household access to a variety of foods[3]

1.2.Statement of the problem

Malnutrition is a universal problem and it affects most of the world's population at some point in the life cycle from infant to old age. Malnutrition affects all geographies, all age groups, rich people& poor people and all sexes; it is a truly universal problem. All forms of malnutrition associated with morbidity and mortality of children. Good health is not possible without good nutrition, progress has been made with many interventions implemented at scale over the last decades and now emphasis is given to the first 1000 days, which is a critical period in human life[2]

The current burden of malnutrition is unacceptably high, globally 150.8 million (22.2%) of under five children are stunted, 50.5 million (7.5%) of under five children are wasted and 383 million (5.6%) of under five children are overweight[2]

Globally the minimum dietary diversity is 25.4% in children aged 6-23 months of age, the minimum meal frequency is 51.2% and the minimum acceptable diet is 15.6%. Under nutrition explains around

45 % of death among under five years of children mainly low and middle income countries. The health consequences of overweight and obesity contributes 4 million deaths (7.1%) of all deaths[2]

According to the 2019 Mini Ethiopian Demographic and Health Survey, 36.8% of children are stunted, 7.2% are wasted, and 21.1% are underweight indicating the persistence of both acute and chronic under nutrition . Moreover, the feeding practices of only 7% of children in Ethiopia age 6-23 months meet the minimum standards with respect to all three IYCF practices (breastfeeding status, number of food groups, and times they were fed during the day or night before the survey) [3]

The government of Ethiopia design the first government led multisectoral nutrition program SURE (Sustainable Under nutrition Reduction in Ethiopia) to reduce stunting by improving dietary diversity and promoting complementary feeding practices. This program integrates health and agriculture sector services delivery for nutrition outcomes. It is a complex intervention that both incorporates and enhances the former community based nutrition (CBN) program by nutrition services and integrating services. In addition to the former CBN SURE incorporates enhanced nutrition services includes: counseling of mother and father jointly by AEWs & HEWs, Women and Men group dialogue in community 1 to 30 networks, cooking demonstration on how to prepare complementary foods and one time input of improved seeds and poultry is provided to the lowest socioeconomic households with children under 24 months age. SURE program mainly aimed to reduce stunting by promoting dietary diversity and complementary feeding. The program started 2016 in 50 districts of Ethiopia, 12 of the districts are in Amhara region and 4 of the districts are in West Gojjam zone administration[4].

Despite its tremendous trend of improvement on some child nutrition indicators, Ethiopia still remains one of the high burden countries in child under nutrition. Only about 14 percent of 6-23 months aged children got minimum dietary diversity, and 45% had been fed the minimum number of times appropriate for their age in Ethiopia[3]

Minimum dietary diversity significantly has positively associated with mother's education, household income ,nutritional knowledge on dietary diversity, child feeding, , residency, number of children, ANC follow up, mothers participation on cooking demo, exposure to IYCF information on mass media, husbands involvement on In IYCF, birth in health facility, access to growth monitoring, access to cow milk and mothers being house wife[5-8]

Currently there are a number of studies on childhood dietary diversity practice in different parts of Ethiopia, but most of these studies deals with issues of minimum dietary diversity practice and its

associated factors within a single population. The findings of those studies are insufficient to compare the dietary diversity practices between communities with nutrition intervened and none intervened.

Thus a comparative cross-sectional study design is more appropriate method to compare that nutrition intervened and non-intervened communities.

Therefore this study aimed to compare childhood dietary diversity and its associated factors among sustainable under nutrition project covered and uncovered districts in West Gojjam Zone, Northwest, Ethiopia.

1.3. Significance of the study

Primarily, this study may help for generating evidence for decision making for planners and Program evaluators on nutrition in West Gojjam Zone Health department and Amhara regional health bureau.

Secondly, the study may help partners who work on nutrition to contribute evidences for the decision.

Furthermore, the study will serve as a reference for future studies.

2. LITERATURE REVIEW

2.1. Dietary diversity practices

Globally minimum dietary diversity practice, the minimum meal frequency, and the minimum acceptable diet are 25.4% ,51.2% and 15.6% respectively in children aged 6-23 months of age[2]

A community based cross sectional study done in different countries on dietary diversity showed that the minimum dietary diversity was 23% in India and 57.8% , 52.3% in Moramanga and Morondava districts respectively in Madagascar,2.98% in Zambia,26.8% in Tanzania Bahi Dodoma region in 6-23 months old children[9-12]

In Ethiopia 7% of children aged 6-23 months had minimum acceptable diet and 14% of children had an adequately diverse diet in which they had been given foods from the appropriate number of food groups, and 45% had been fed the minimum number of times appropriate for their age[3]

Another community based cross sectional study done on dietary diversity revealed that the minimum dietary diversity score is 43.2% in Wolayta zone ,23.3% in Kemba, 10.6 % in Gorchi district southern Ethiopia,38%in Benchi Maji zone south west Ethiopia, and 59.9%in Addis in 6-23 months old children[5-8, 13]

A community based cross sectional study done on dietary diversity showed that the minimum dietary diversity score was 30.8%in afar regional state, and 25.2% in Haromaya town in infants and young children aged 6-59 months old[14, 15]

Another community based cross sectional study done in Amhara region East Gojjam Zone on dietary diversity revealed that the minimum dietary diversity score was 13.6% in Dejen district in fasting season and 13% and in Sinan district in children aged 6-23 months age[16, 17]

Secondary data analysis of EDHS 2016 revealed that proportion of inadequate minimum dietary diversity in Ethiopia is 85.1% i.e. The MDD was 14.9% [18]

1.2 Factors associated with dietary diversity

1.2.1 Socio-demographic related factors

A cross sectional study done in 42 countries of West China in less than 3 years' children revealed variation of MDD is associated with age, birth order, and caregiver's educational status. Children aged 6-11 months age had higher proportion of MDD compared with older children[19]

A qualitative study done in Tanzania revealed dietary diversity all participants in the in-depth interview reported that dietary diversity is good to maintain and enhance appetite. The benefit of changing diet is that food should not bore, so that no one does not lose his/her appetite for eating[20]

Analytical cross sectional study done in Ghana Wenchi municipality, Brong Ahafo region in 6-36 months aged children showed that maternal education level, age of children, and sex of house hold head had significant association for low and high DDS, Minimum dietary of orphans children were 7.491 more likely to have low dietary diversity than non orphan children[21]

Another study done in Adea district, in Oromia region in 6-23 months old children to assess level of knowledge and practice of mothers & its associated factors revealed that maternal age, husband's education status and marital status has significant association with dietary diversity practice[22]

According to the Study done in Addis Ababa on 2017 mother's education, and knowledge on dietary diversity and child feeding were considerably related with minimum dietary diversity feeding practices. The minimum dietary diversity to child's age 6-23 months was significantly associated and higher among mothers who had attained secondary, and college and above level of education, as compared to those who had no formal education[8]

A Cross sectional study done in Haromaya town in infants and young child showed that the minimum DD practiced was more in male child 28.6% than female child 21.6%[14]

A longitudinal study done in rural Tigray in 2019 explained that nutritional status, and feeding practices of 6-23 month old children are affected by maternal fasting during the fasting period[23]

2.2.2 Economic& food security related factors

A review of measurement issue in 10 countries by international food policy research institute, Washington D.C revealed that there is a strong association between DD and socio economic status/per capita of once country[24]

Analytical cross sectional study done in Ghana Wenchi municipality, Brong Ahafo region in 6-36 months aged children showed that wealth index had significant association for low and high DDS.

Agricultural biodiversity (animals kept and food groups produced) is associated positively with dietary diversity of children, and the relationship is moderated by socio-economic status [21]

According to a study made in rural Northern Ghana, 6-36 months old children showed that agricultural biodiversity (variety of animal kept and plant grown) had a positive relationship with child's diet [25]

Another study done in Kenya Nairobi regarding the association between food security and feeding practices revealed that infants living in food secure households were more likely to achieve appropriate infant feeding practices than those in food insecure households [26]

According to the study done in Addis Ababa on 2017 household income, it was considerably related with minimum dietary diversity feeding practices. Children of mothers who had a household monthly income of greater than 3000 Ethiopian Birr were more likely to feed the minimum dietary diversity as compared to those from a family of a monthly income ≤ 1500 Ethiopian Birr. Economic status of the household is significantly associated with minimum dietary diversity [8, 12, 14, 27]

Secondary data analysis of EDHS 2016 revealed that those wealth indexes are positively associated with MDD, there was a high rate of MDD in all age classifications of breastfed children [18]

In addition, a community-based cross-sectional study done in South Gondar showed that households having a mobile phone and a bank account are 3 and 1.6 times more likely to have dietary diversity than those who do not have it respectively [27]

2.2.3 Maternal health service utilization related factors

Recent study done in Bench Maji zone, south west Ethiopia in 2018 revealed that ANC follow-up was a significant determinant of dietary diversity score [6]

Study made in Gorchis and Kemba districts in Ethiopia showed that mothers' participation in cooking demo, exposure to IYCF information on mass media, husband's involvement in IYCF, birth in a health facility, and access to growth monitoring, were significantly associated with dietary diversity [5, 7]

Another study done in Shashemene district, Oromia revealed that birth weight of children and information towards IYCF had significant associations with dietary diversity and meal frequency [28].

Additionally, a study done in Sinan district, East Gojjam, North west Ethiopia showed that institutional delivery, receiving post-natal care, and distance far from health center were associated with dietary diversity [17]

Additionally, a study done in Oromia Arsi Zone and Amhara East Gojjam zone, Awabel explained that dietary diversity is associated with food taboos, mothers' fear of a bigger baby, and not eating dairy products

like milk, yogurt, and cheese considering harmful to the child and fear of abortion. Age of the mother, income, and previous ANC were significantly associated with food taboos[[29](#), [30](#)]

2.2.4 Mother knowledge related factors

A cross sectional study made in Wollega zone Oromia region showed 41.92% of mothers or caregivers had awareness that 6-23 months aged children should consume 4-6 meals in a day and 58.85 of mothers or caregivers believed that child's porridge is made from one type of flour[[31](#)]

According to study done in 2018 in Woreilu South Wollo zone the prevalence of good knowledge in mothers were 66.4%, knowledge of mothers associated with educational status and nutritional information[[32](#)]

Additionally a cross sectional study done west Gojjam Dembecha district revealed 89.4% of mothers or caregivers of children had education on DD and meal frequency, 97.2% of mothers had knowledge on feeding their children with DD, and 14.9% of mothers know frequency of feeding based on specific age of children[[33](#)]

3 CONCEPTUAL FRAMEWORK

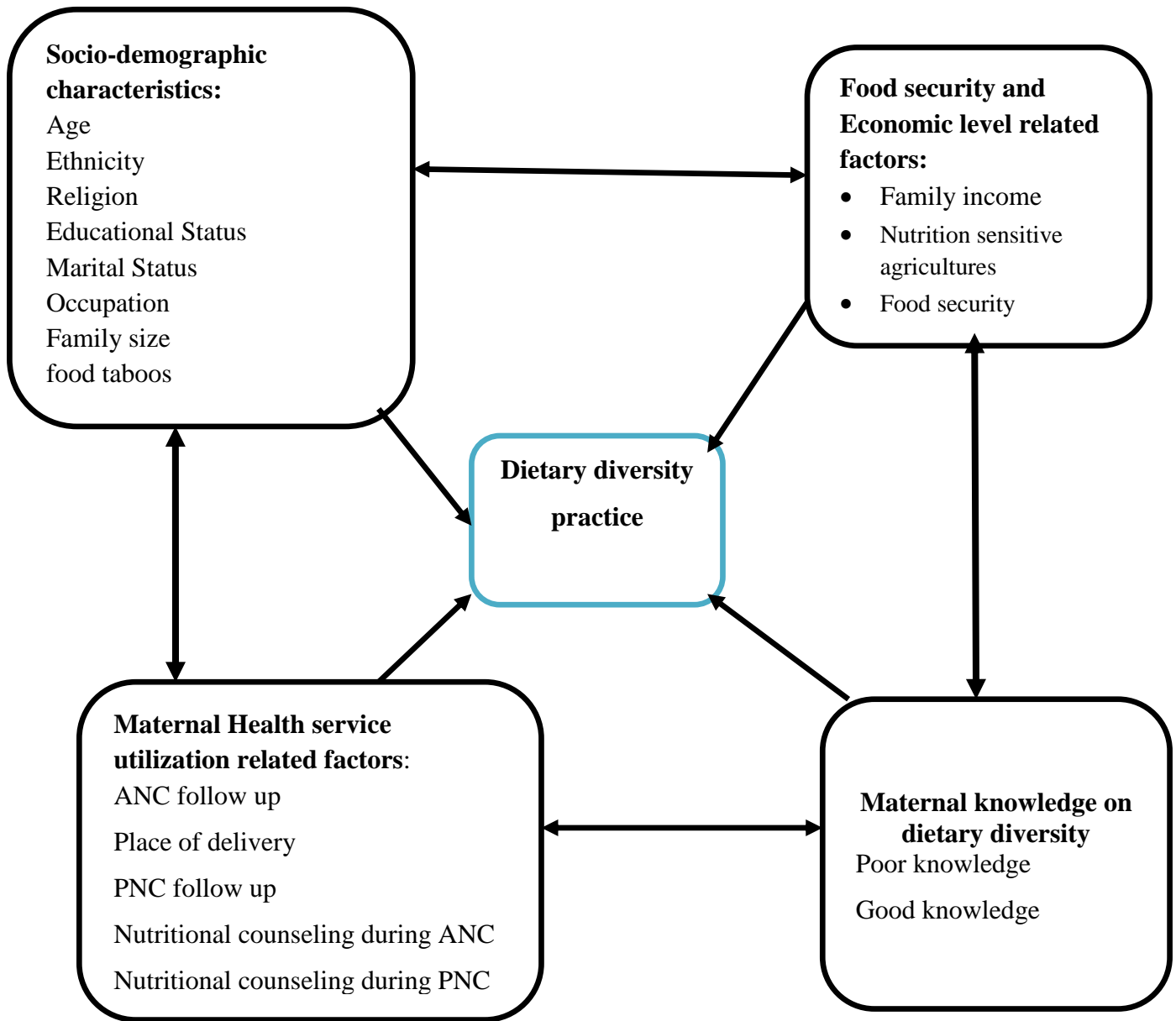


Figure 1: Conceptual framework of child dietary diversity and its associated factors

4 OBJECTIVE

4.2 General objective

The aim of this study was:

- To assess child dietary diversity practice and its associated factors among children aged 6-23 months in sustainable under nutrition reduction project covered and uncovered districts in West Gojjam Zone, Northwest Ethiopia, 2019.

4.3 Specific objectives

- To compare child dietary diversity practice among sustainable under nutrition reduction project covered and uncovered districts in West Gojjam Zone, Northwest Ethiopia, 2019.
- To identify factors associated with child dietary diversity practices among sustainable under nutrition reduction project covered and uncovered districts in West Gojjam Zone, Northwest Ethiopia, 2019.

5 METHODS

5.1 Study Settings

The study was carried out in West Gojjam zone, northwest Ethiopia. West Gojjam Zone is located 185km far from the capital city of Amhara region Bahirdar and 355 Km from Addis Ababa. Based on the central statistical agency (CSA) population projection from the 2011 population and housing census, the WGZ catchment population is about 2,699,498 of which 1,311,956 are males and 1,387,542 are females, 365,512 are Under Five children and 118,508 ,Under two children and 83,954 under 1 children. And 86 % of the populations are rural residents. West Gojjam Zone has 13 rural districts, 5 town administrations 400 rural and 44 urban kebeles. From these districts 4 of the districts namely (Sekela, Mecha, South Achefer, and Goni Kolela) had nutrition Intervention. Currently Sustainable under nutrition reduction in Ethiopia support four districts (Dega Damot, Dembecha, Quarit and Yilmana Densa) and five of the districts have no intervention (Bahirdar Zuria, Bure Zuria, North Achefer, Wonberma and Jabi Tehenan). The climatic variations divided in to three 6% are dega, 78% are woyna dega and the remaining 14% are kola[34]

The study was conducted in two districts of West Gojjam Zone, namely Jabi Tehenan and Yilmana Densa districts. The selected districts better represents West Gojjam Zone. Based on the central statistical agency (CSA) population projection from the 2011 population Jabi Tehenan has a population of 225,558 and Yilmana Densa has a population of 279,767[3]VS [35, 36]

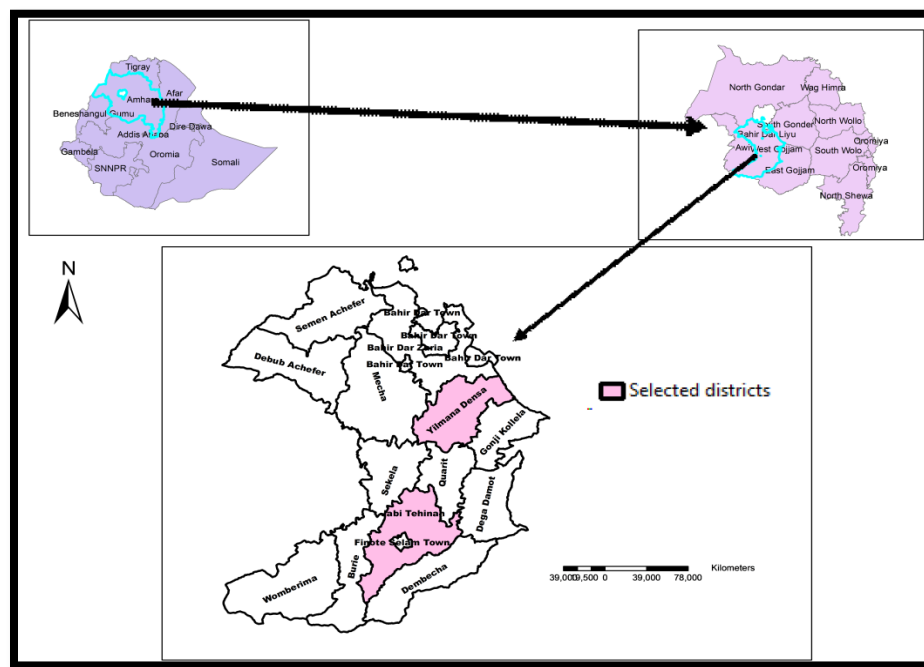


Figure 2: Map of Study area, West Gojjam zone, ANRS, Northwest Ethiopia, 2019

5.2 Study Design and Period

Community based comparative cross-sectional study design was conducted from 15 August to 15 September, 2019

5.3 Population

5.4.1. Source population

- Families have children aged 6-23 months in west Gojjam zone, Northwest, Ethiopia.

5.4.2. Study population

- Families have Children aged 6-23 months in the randomly selected kebeles of Jabi-Tehenan and Yilmana Densa Districts in west Gojjam zone.

5.5. Eligibility Criteria

5.5.1. Inclusion criteria:

Families have 6-23 months old child in West Gojjam Zone

5.5.2. Exclusion criteria:

Mothers/caregivers who were seriously ill or could not respond due to physical disabilities (e.g., deaf and dumb) and mother/caregivers who had children who were sick are excluded.

Mothers/caregivers who were not permanent residents to the area) were excluded.

5.6. Sample size determination and sampling procedure

5.6.1. Sample size determination

The sample size was determined using double population formula with the assumptions of 90% power and 95% confidence level. A minim dietary diversity of 31% for Sustainable under nutrition reduction in Ethiopia project uncovered district[15]and 50% for project covered district were used (because no specific study and since it gives the possible maximum sample size). The number of samples required in each group was given by:

$n = \frac{f(\alpha, \beta)(p_1 q_2 + p_1 q_2)}{(p_1 - p_2)^2}$, where $f(\alpha, \beta) = 10.5$ at the power of 90% and 5% level of significance, α = type I error (level of significance), β = type II error ($1 - \beta$ = power of the study).

$$n = \frac{f(\alpha, \beta)(p_1 q_1 + p_2 q_2)}{(p_1 - p_2)^2}$$
$$n = \frac{(z_{\beta} + \frac{z_{\alpha}}{2})^2 (p_1 q_1 + p_2 q_2)}{(p_1 - p_2)^2}$$
$$n = \frac{(1.28 + 1.96)^2 [(0.31)(0.69) + (0.5)(0.5)]}{(0.31 - 0.5)^2} = 135$$

Hence, the total expected sample size for one group was 135 and so the total sample size was 270. Considering a design effect of 2 and non-response rate of 10%, the final sample size was 594.

5.6.2 Sampling procedure

A multistage sampling technique was used. West Gojjam Zone has 13 rural districts and 5 town administrations, the town administrations were not included in the study since, SURE project is implemented in the presence of agriculture and health extension workers, but there are no agricultural extension workers in urban structure. From the 13 rural districts 4 of the districts namely (Sekela, Mecha, South Achefer, and Goni Kolela) had previous nutrition intervention not included in the study. Whereas Sustainable under nutrition reduction in Ethiopia currently support four districts (Dega Damot, Dembecha, Quarit and Yilmana Densa) and five of the districts have no any intervention (Bahirdar Zuria, Bure Zuria, North Achefer, Wonberma and Jabi Tehenan), from these strata we considered 4 SURE covered districts and five SURE uncovered districts. From the 9 districts, considering 20% representation two districts were selected randomly one from covered having 35 rural kebeles and 1 from uncovered having 39 rural kebeles using 20% each. From this 20% of the kebeles were selected 7 kebeles from covered and 8 from SURE uncovered districts through a simple random sampling technique. Then sample size was proportionally allocated to the randomly selected kebeles. Households were selected using systematic random sampling technique with 10th interval in the district covered with SURE project, (the interval was determined by dividing the study population by the total sample size in the district $2817/297=9.48\approx 10$) and 7th interval in district uncovered with SURE project,(the interval was determined by dividing the study population by the total sample size in the district $1955/297=6.58\approx 7$).In case of households with more than one eligible child one was selected randomly, where as if a household with no eligible children selected the next household to the right was considered until we get a household with eligible child.

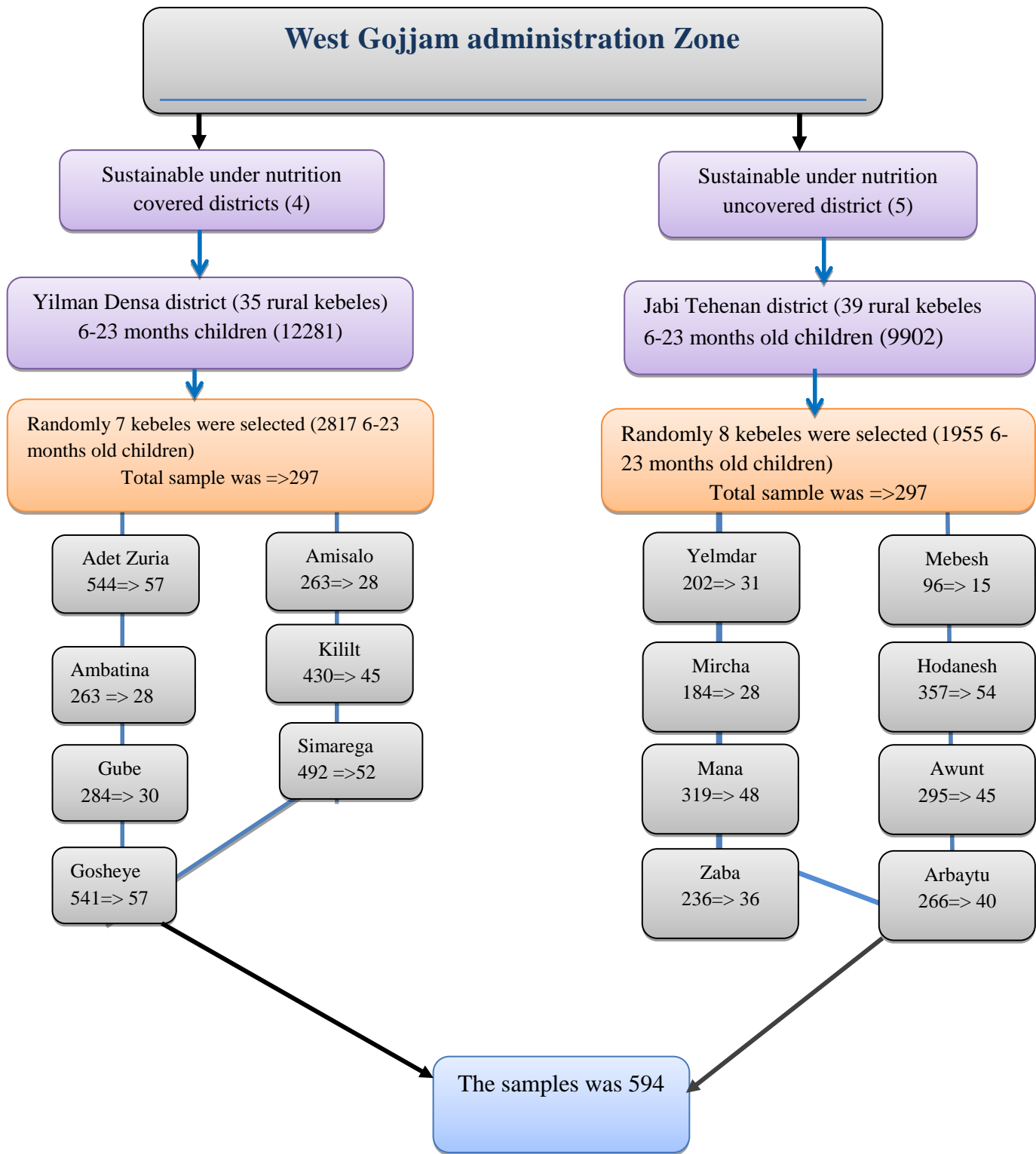


Figure 3: Schematic presentation of the sampling procedure in child dietary diversity and its associated factors among sustainable under nutrition reduction project covered and uncovered districts in West Gojjam zone Northwest Ethiopia, 2019

5.7. Study Variables

5.7.1. Dependent variable

Child dietary diversity practice

- Inadequate minimum dietary diversity practice
- Adequate minimum dietary diversity practice

5.7.2. Independent variables

Socio-demographic characteristics:

- Age
- Ethnicity
- Religion
- Educational Status
- Marital Status
- Occupation
- Family size

Economic& food security related factors:

- Family income
- Nutrition sensitive agricultures
- Food security

Maternal health service utilization related factors:

- ANC follow up
- Place of delivery
- PNC follow up
- Nutritional counseling during ANC
- Nutritional counseling during PNC

Maternal knowledge on dietary diversity

- Poor knowledge
- Good knowledge

5.8. Operational definition and definition of terms

Adequate minimum dietary diversity: Adequate minimum dietary diversity is the consumption of four or more food groups from the seven food groups [1].

Inadequate minimum dietary diversity: Inadequate minimum dietary diversity is the consumption less than four food groups from the seven food groups[1].

Poor knowledge: Those mothers who answered 6 and below 6 knowledge questions out of the ten questions specific to maternal knowledge on dietary diversity.

Good knowledge: Those mothers who answered 7 and above knowledge questions out of the ten questions specific to maternal knowledge on dietary diversity.

Low food insecurity access score: low HFIAS is households' food insecurity accesses who score below the mean score of the nine food security related questions.

High food insecurity access score: high HFIAS is households' food insecurity accesses who score above the mean score of the nine food security related questions.

5.9. Data collection procedures

5.9.1. Data collection instruments and data collection

Data was collected using a structured questionnaire adapted from different guidelines, EDHS 2016 and similar researches that were done previously and modified accordingly, and it was developed in English then translated in to local language Amharic version and back to English by two independent translators. The questionnaires contained open- ended and closed- ended questions that cover the demographic characteristics, socio-economic health service utilization and knowledge related factors. The dietary diversity data was collected from mothers or care givers of children aged from 6-23 months by using 24 hour dietary recall. Data was collected using a pre-tested and structured interviewer administered questionnaire. Face-to-face interview was conducted with the local language, Amharic.

5.10. Data Quality Control

To assure the quality of data, eight data collectors and one supervisor who have experience on the field of nutrition employed and orientation on data collection, data handling and recording were given prior to data collection. To assure the quality of data supervisors and investigator were closely supervised data collection procedure daily. Each questionnaire and data sheets were checked prior to the entry of the data. Incorrectly filled questionnaires that miss dependent and independent variable questions were not included in the study. The questionnaire was pre- tested and revised accordingly to ensure internal validity of the study. Interviewers were undertaken pre- test on 60 women who had 6-23 months aged child in the same target population at Quarit and Wonberma Districts, out of the study area. The interviewers and the investigator had discussion on issues and resolve questionnaire problems.

5.11. Data management and statistical analysis

The data was checked for consistency, entered and cleaned with Epi-Info Version 7.2, and then exported to SPSS version 23 for statistical analysis. Descriptive summaries such as frequency, percentage, proportion, mean and standard deviation were computed to present the data using texts, table, graph and chart. Binary logistic regression model was fitted to identify factors associated with dietary diversity for children. Simple binary logistic regression analysis was carried out and each independent variable with p-value less than 0.25 were entered into multivariable logistic regression analysis[37] to identify factors associated with dietary diversity practice of children. Adjusted odds ratios with 95% confidence intervals were used to declare statistical significance. Model fitness was assessed with Hosmer and Lemeshow test, and multicollinearity was diagnosed using variance inflation factor (VIF).

In the multivariable logistic regression analysis, a p-value less than 0.05 were considered statistically significant.

5.12. Ethical consideration

Ethical clearance and approval were obtained from the ethical review committee of Bahirdar University and Amhara Public Health Institute. Prior to data collection, informed verbal consent was obtained from mothers/caregivers of children after a detailed clarification of the study purpose for protecting autonomy and to ensure confidentiality. Participation was on a voluntary basis and the data was kept anonymous.

6. Results

6.1 Socio demographic characteristics

A total of 580 with the response rate were 97.6% (295 SURE uncovered and 285 SURE covered) women/ caregivers were participated in the study. Two hundred eighty nine (49.8%) of children were males and 291(50.2%) of children were females. The mean age of children was 14.8 months (± 5.2 SD). Fifty six percent of birth interval of children was 2 to 3 years, mothers/caretakers was (± 5.4 SD).

Among participants 295(100%) in SURE project uncovered district, and 279(97.8%) in SURE project covered district were orthodox Christian religion followers. The majority of the women 281(95.2%) and 268(94%) were married in SURE uncovered and covered districts respectively.

Out of 580 women/caregivers 129(22.2%) had primary education and 69(11.9%) of women had secondary and above education. Two hundred twenty seven (39.1%); 88(29.8%) from SURE project uncovered & 139(48.8%) from SURE project covered district) were can not read and write. One hundred fifty seven (27%) of fathers; 92(31.2% from SURE project uncovered & 65(22.8%) from SURE project covered district) were can not read and write. Four hundred twenty four (73%) of mothers/caregivers were house wives and 537(92.6%) fathers were farmers. Three hundred seventeen (54%) of the household had a family size between 2 to 4 and 263(45.3%) of the households had a family size of 5 and above family members (Table 1).

Table 1: Distribution of study participants by socio demographic characteristics in West Gojjam Zone Northwest, Ethiopia, 2019

Background characteristics	SURE project uncovered district		SURE project covered district		Total study participants	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Child age(in months)						
6-11	71	24.1	106	37.2	177	30.5
12-23	224	75.9	179	62.8	403	39.4
Sex of the child						
Male	154	52.2	135	47.4	289	49.8
Female	141	47.8	150	52.6	291	50.2
Birth order						
First	60	20.3	74	26.0	134	23.1
Second	120	40.7	78	27.4	198	34.1
Third	46	15.6	59	20.7	105	18.1
Four and above	69	23.4	74	26.0	143	24.7
Birth interval						
<2	25	9.5	1	0.5	26	5.5
2-3	177	67.0	88	42.5	265	56.3
4 and above	62	23.5	118	57.0	180	38.2
Age in years						
20-24	34	11.5	57	20.0	91	15.7
25-29	73	24.7	106	37.2	179	30.9
30-34	102	34.6	64	22.5	166	28.6
35+	86	29.2	58	20.4	144	24.8
Religion						
Orthodox Christian	295	100.0	279	97.9	574	99.0
Muslim	0	0.0	6	2.1	6	1.0
Ethnicity						
Amhara	295	100.0	285	100.0	580	100.0
Marital status						
Single	0	0.0	2	0.7	2	0.3
Married	281	95.3	268	94.0	549	94.7
Divorced	11	3.7	14	4.9	25	4.3
Widowed	3	1.0	1	0.4	4	0.7
Education status						
Can't read and write	88	29.8	139	48.8	227	39.1
Read and write	98	33.2	57	20.0	155	26.7
Primary	73	24.7	56	19.6	129	22.2
Secondary and above	36	12.2	33	11.6	69	11.9
Occupation						
Farmer	122	41.4	13	4.6	135	23.3
House wife	157	53.2	267	93.7	424	73.1
Merchant	8	2.7	3	1.1	11	1.9
Government employ	8	2.7	2	0.7	10	1.7
Education status of partner						
Can't read and write	92	31.2	65	22.8	157	27.1

Read and write	109	36.9	98	34.4	207	35.7
Primary	72	24.4	99	34.7	171	29.5
Secondary and above	22	7.5	23	8.1	45	7.8
Occupation of the partner						
Farmer	280	94.9	257	90.2	537	92.6
Merchant	8	2.7	16	5.6	24	4.1
Government employee	7	2.4	12	4.2	19	3.3
Family size						
2 – 4	163	55.3	154	54.0	317	54.7
5+	132	44.7	131	46.0	263	45.3

6.2 Economic & food security related factors

From 580 households 122(41.4%) in SURE uncovered, and 108(37.9%) in SURE covered district were poor households. Overall only 133(22.9%) households were rich, 66(22.4%) in SURE uncovered district and 67(23.5%) were in SURE covered district (Figure 4).

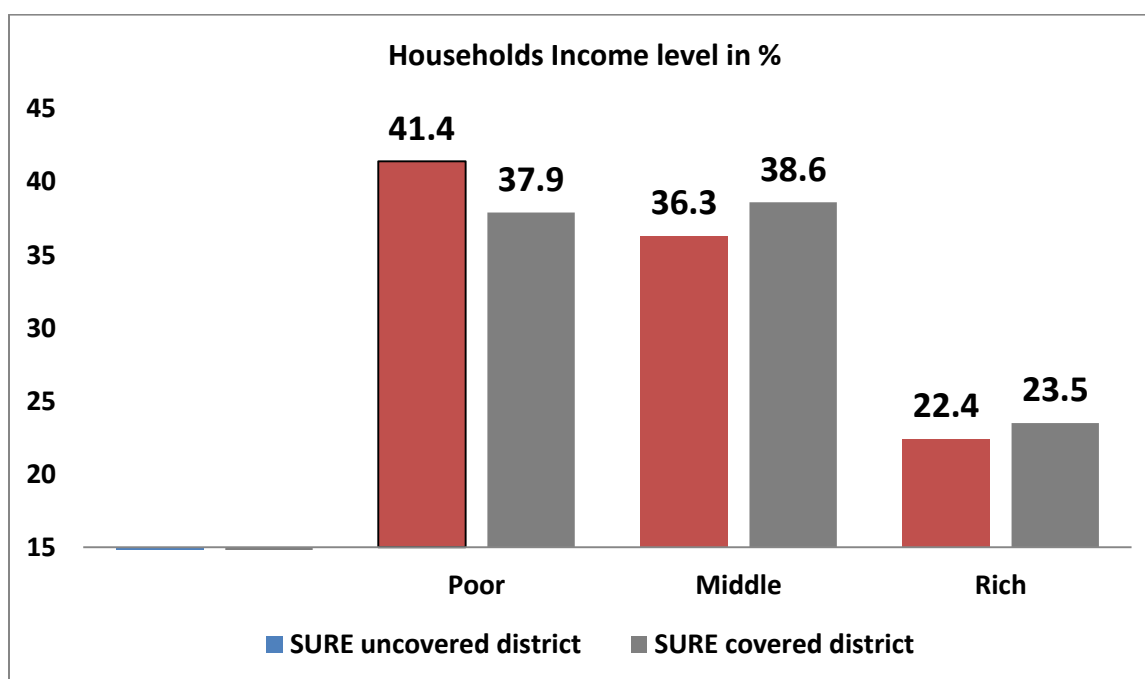


Figure 4: Income level of households' children in project covered and uncovered districts West Gojjam Zone Northwest, Ethiopia, 2019

A total of 329(56.7%) households had low food insecurity access score. One hundred seventy six (59.6%) and 153(53.6%) households had low food insecurity access score in SURE uncovered & covered districts respectively. The remaining 251(43.3%), 119(40.3%) in SURE uncovered and 132(46.3%) SURE covered districts had high food insecurity access score (Figure 5).

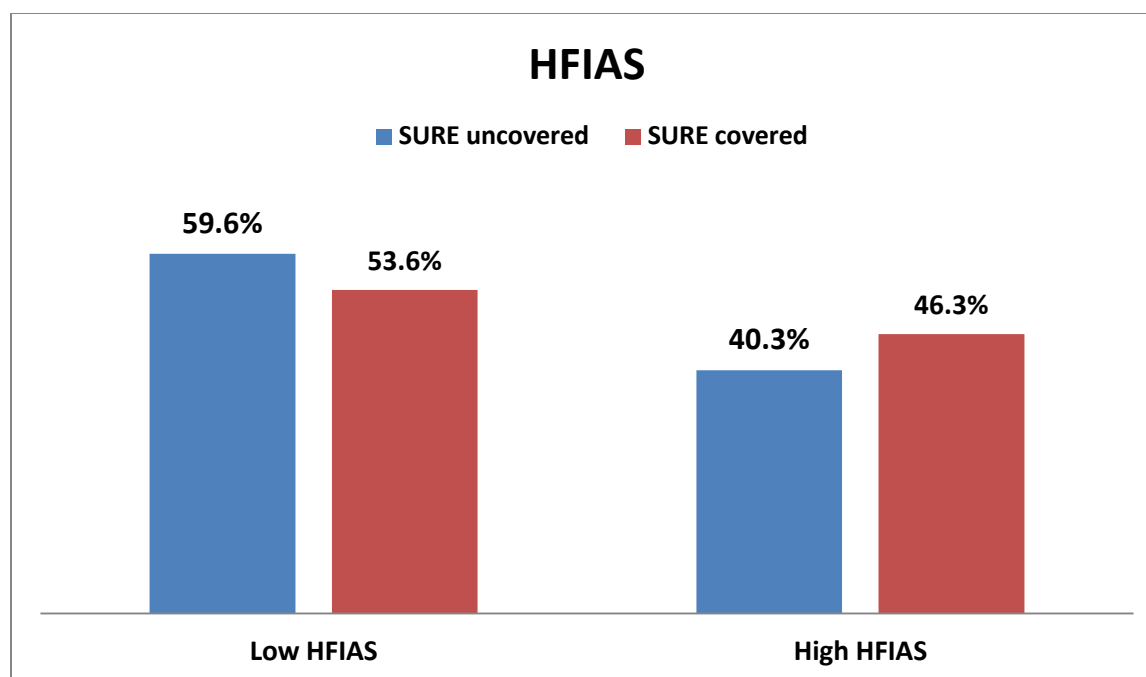


Figure 5: Households food insecurity access score in SURE covered & uncovered districts in West Gojjam, Northwest, Ethiopia, 2019

6.3 Maternal health service utilization

Out of 580 women 53.5% had ANC visit 4 and above visits and 85.3% women attended their ANC) at health center. Out of 580 women 100(17.7%) had no nutritional counseling during ANC visits, 37(12.5%) from SURE project uncovered district & 63(23.2%) from SURE covered district. Eighty six (14.8%) women delivered at home 42(14.2%) from SURE project uncovered district & 44(15.4%) from SURE covered district, 494(85.2%) women delivery attended by health professionals. Four hundred forty five (90.3%) had nutritional counseling during PNC follow up 259(87.8%) from SURE project uncovered & 186(93.0%) from SURE covered district.

Out of 580 women/caregivers 316(54.5%) women/caregivers had good maternal dietary diversity practice knowledge. One hundred twenty six (42.7%) from SURE uncovered and 190(66.7%) from SURE covered district had good maternal dietary diversity practice knowledge.

Table 2: Maternal knowledge and health services utilization in SURE covered & uncovered districts in West Gojjam, Northwest, Ethiopia, 2019

Maternal Health services	SURE uncovered		SURE covered		Total	
	Frequenc y	Percent	Frequenc y	Percen t	Freque ncy	Perce nt
Women who had ANC visit						
No	-	-	14	4.9	14	2.5
Yes	295	100.0	271	95.1	566	97.5

Health facility types for ANC						
Hospital	53	18.0	27	10.0	80	14.1
Health center	242	82.0	242	90.0	486	85.8
Number of ANC visits						
One	6	2.0	6	2.2	12	2.1
Two	10	3.4	20	7.4	30	5.3
Three	110	37.3	111	41.0	221	39.0
Four and Above	169	57.3	134	49.4	303	53.5
Nutritional counseling during ANC visit						
No	37	12.5	63	23.2	100	17.7
Yes	258	87.5	208	76.8	466	82.3
Place of delivery						
Home	42	14.2	44	15.4	86	14.8
Health center	178	60.3	194	68.1	372	64.1
Hospital	75	25.4	47	16.5	122	21.0
Delivery assistants						
Traditional birth attendant	27	9.2	21	7.4	48	8.3
HEWs	2	0.7	1	0.4	3	0.5
Health professionals	252	85.4	242	84.9	494	85.2
Other family members	14	4.7	21	7.4	35	6.0
Mode of Delivery						
Spontaneous vaginal delivery	269	91.2	243	85.3	512	88.3
Assisted vaginal delivery	21	7.1	40	14.0	61	10.5
Cesareans section	5	1.7	2	0.7	7	1.2
PNC follow up						
No						
Yes	293	99.3	203	100.0	496	100.0
Place of PNC follow up						
Hospital	66	22.4	35	17.2	101	20.4
Health center	154	52.2	152	74.9	306	61.7
Private clinic	0	0.0	2	1.0	2	0.4
Home	73	24.7	13	6.4	86	17.3
Health post	0	0.0	1	0.5	1	0.2
Got nutritional counseling during PNC visit						
No	34	11.5	14	7.0	48	9.7
Yes	259	87.8	186	93.0	445	90.3
Time of PNC visits						
Within the first two days	228	77.3	128	63.1	356	71.8
From 3 to 6 days	57	19.3	37	18.2	94	19.0
After 7 days	8	2.7	38	18.7	46	9.3
Maternal Knowledge status						
Poor	169	64.1	95	33.3	264	45.5
Good	126	39.9	190	66.7	316	54.5

6.4 Dietary diversity practices

Out of 580 women and care givers who participated in the study only 174(30%) of women/care givers fed 4 and above food groups for children. While comparing with the program 76(25.8%) of children fed 4 and above food groups in SURE uncovered district and 98 (34.4%) of children fed 4 and above food groups in SURE covered district. The majority of children 560(96.6%) fed grain roots and tubers, 280(96.9%) were from SURE uncovered districts and 274(96.1%) were SURE project covered district. Only 57(9.8%) children fed flesh food, 23(7.8%) children were from SURE uncovered and 34(11.9%) children were from SURE covered district (Table 3).

Table 3: Dietary diversity practice in children aged 6 to 23 months among SURE covered and uncovered districts of West Gojjam Zone, Northwest, Ethiopia, 2019

Food groups given within 24 hours	SURE project uncovered district		SURE project covered district		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Grain roots and tubers						
No	9	3.1	11	3.9	20	3.4
Yes	286	96.9	274	96.1	560	96.6
Legumes and nuts						
No	53	18.0	38	13.3	91	15.7
Yes	242	82.0	247	86.7	489	84.3
Dairy products						
No	194	65.8	167	58.6	361	62.2
Yes	101	34.2	118	41.4	219	37.8
Flesh food						
No	272	92.2	251	88.1	523	90.2
Yes	23	7.8	34	11.9	57	9.8
Eggs						
No	196	66.4	154	54.0	350	60.3
Yes	99	33.6	131	46.0	230	39.7
Vit A rich fruits and vegetables						
No	186	63.1	169	59.3	355	61.2
Yes	109	36.9	116	40.7	225	38.8
Fed other fruits & vegetables						
No	192	65.1	203	71.2	395	68.1
Yes	103	34.9	82	28.8	185	31.9
Dietary diversity practice						
In adequate MDDP	219	74.2	187	65.6	409	70
Adequate MDDP	76	25.8	98	34.4	174	30

There was a significant difference between dietary diversity practices in SURE covered district than SURE uncovered district in mothers of children aged 6 to 23 months children ($X^2= 5.3, P<0.02$).

Table 4: Dietary diversity practice in SURE covered and uncovered districts in West Gojjam zone, Northwest Ethiopia, 2019

District Category	Dietary Diversity practice			P_value
	Yes	No	Chi	
SURE Covered	98(34.4)	187(65.6)		
SURE uncovered	76(25.8)	209(74.2)	5.13	0.02

Statistically significant at $p < 0.05$

Factors associated with childhood dietary diversity

As table 5 below depicted that, better educational status of the father, good maternal knowledge, better household wealth quintile, lower HFIAS were the factors to increase the practice of childhood minimum dietary diversity practice in the SURE project uncovered district.

Fathers of children aged 6 to 23 months who had primary and secondary and above educational status were 3 times (AOR=3.02, 95% CI (1.17-7.77)) and 5.9 times (AOR=5.93, 95% CI (1.69-20.77)) more likely to have MDDP compared with those counterparts.

Good maternal knowledge increases childhood minimum dietary diversity practice by 2.38 times (AOR=2.38, 95%CI: 1.28-4.48) more likely compared with poor maternal knowledge.

Children from households in the middle wealth index were 2.4 times (AOR=2.24, 95%CI: 1.18-4.97) more likely to have dietary diversity practice compared with children in the poor wealth households. This childhood dietary diversity practice was also 4 times (AOR=4.05, 95%CI: 1.77- 9.27) more likely in the rich wealth index households.

As the Household food insecurity access score decreases by one unit, the childhood dietary diversity practice increases by 0.1 in SURE uncovered district.

Table 5: Dietary diversity and its associated factors in children aged 6 to 23 months for SURE uncovered district in West Gojjam Zone, Northwest, Ethiopia, 2019

Variables	DD practice		COR (95%CI)	AOR (95%CI)
	No	Yes		
Child age				
6-11 months	52(73.2)	19(26.8)	1.00	1.00

12-23 months	167(74.6)	57(25.4)	0.93(0.51-1.71)	0.85(0.45-1.59)
Health Facility type for ANC				
Hospital	41(77.4)	12(22.6)	1.00	1.00
Health center	178(60.3)	64(39.7)	1.20(0.61-2.49)	
Maternal age category				
15-19 years	20(58.8)	14(41.2)	1.00	1.00
20-29 years	51(69.9)	22(30.1)	0.62(0.26-1.44)	0.56(0.20-1.58)
30-34 years	81(79.4)	21(20.6)	0.37(0.16-0.85)	0.46(0.16-1.32)
35 years and above	67(77.9)	19(22.1)	0.41(0.17-0.95)	0.60(0.21-1.74)
Educational status of the father				
Can't read & write	79(85.9)	13(14.1)	1.00	1.00
Read & write	80(73.4)	29(26.6)	0.21(1.07-4.54)	3.14(1.30-7.55)*
Primary	48(66.7)	24(33.3)	3.03(1.42-6.50)	3.02(1.17-7.77)*
Secondary& above	12(54.5)	10(45.5)	5.06(1.81-14.09)	5.93(1.69-20.77)*
Nutritional counseling during ANC				
No	32(86.5)	5(13.5)	1.00	1.00
Yes	187(72.5)	71(27.5)	2.42(0.91-6.48)	2.45(0.92-6.55)
Nutritional counseling during PNC				
No	29(85.3)	5(14.7)	1.00	1.00
Yes	188(72.6)	71(27.4)	2.19(0.82-5.88)	1.89(0.69-5.18)
Place of Delivery				
Home	34(94.4)	2(5.6)	1.00	1.00
Health facility	185(71.4)	74(28.6)	6.8(1.5-29.02)	0.82(0.24-2.81)
Educational status of the women				
Can't read and write	74(84.1)	14(15.9)	1.00	1.00
Read & write	82(83.7)	16(16.3)	1.07(0.47-2.25)	0.89(0.42-1.37)
primary	42(57.5)	31(42.5)	3.90(1.87-8.14)	2.19(0.92-5.18)
secondary& above	21(58.3)	15(41.7)	3.78(1.57-9.05)	2.22(0.79-6.22)
Maternal knowledge				
Poor	138(81.7)	31(18.3)	1.00	1.00
Good	81(64.3)	45(35.7)	2.47(1.45-4.21)	2.38(1.28-4.48)*
HH income Level				
Poor	103(84.4)	19(15.6)	1.00	1.00
Middle	74(69.2)	33(30.8)	2.41(1.258-4.58)	2.42(1.18-4.97)*
Rich	42(63.6)	24(36.4)	3.09(1.51-6.24)	4.05(1.77-9.27)*
HFIAS_score			0.87(0.84-0.93)	0.90(0.85-0.96)*

***Statistically significant at p <0.05**

AS table 6 below showed that, in the SURE Project covered district nutritional counseling during ANC, primary and above maternal educational status, good maternal knowledge, middle and rich household wealth quintile, and lower HFIAS were the factors increasing the practice of childhood

minimum dietary diversity practice. In the SURE project covered district, children from mothers who had nutritional counseling during ANC was 4.76 times (AOR=4.76, 95% CI; (1.27-11.85) more likely to have minimum dietary diversity practice than those did not have nutritional counseling during ANC.

Women who had primary, secondary and above educational status were 4.4 and 5.2 times more likely to have children minimum children dietary diversity practice than those who did not have formal education (AOR=4.47, 95% CI(2.84-9.36) and (AOR=5.24, 95% CI(4.94-12.83) ,respectively, in the SURE project covered district.

Good maternal knowledge increases childhood MDD by 3.37 times (AOR=3.37, 95%CI: 1.28-8.90) more likely in the SURE project covered district compared with their counterparts.

Children in middle households of SURE project covered district were 2.7 times (AOR=2.71, 95%CI: 1.05-6.97) more likely to have dietary diversity practice than children in the poor wealth quintile households. In this SURE project covered district, households in rich wealth quintile were 3.1 times (AOR=3.13, 95%CI: 1.01- 9.71) times more likely to have children with dietary diversity than households with poor wealth quintile

In addition, as the HFIAS decreases by one unit, the childhood dietary diversity practice increases by 0.06, in the SURE project covered district.

Table 6: Dietary diversity and its associated factors in children aged 6 to 23 months for SURE covered district in West Gojjam Zone, Northwest, Ethiopia, 2019

Variables	DD practice		COR(95%CI)	AOR(95%CI)
	No	Yes		
Child age				
6-11 months	79(74.5)	27(25.5)	1.00	1.00
12-23 months	108(60.3)	71(39.7)	1.91(1.13-3.27)	2.11(0.88-5.04)
Health Facility type for ANC				
Hospital	23(77.8)	6(22.2)	1.00	1.00
Health center	158(65.3)	84(34.7)	2.03(0.79-5.19)	1.43(0.62-4.12)
Maternal age category				
15-19 years	38(66.7)	19(33.3)	1.00	1.00
20-29 years	73(68.9)	33(31.1)	0.90(0.45-1.79)	0.70(0.35-1.09)
30-34 years	42(65.6)	22(34.4)	1.05(0.49-2.23)	0.64(0.25-1.11)
35 years and above	34(58.6)	24(41.4)	1.41(0.66-3.02)	0.70(0.40-3.82)
Educational status of the father				
Can't read & write	55(84.6)	10(15.4)	1.00	1.00
Read & write	66(67.3)	32(32.7)	2.67(1.20-5.91)	2.00(0.63-6.32)

Primary	59(59.6)	40(40.4)	3.73(1.70-8.17)	2.31(0.66-8.08)
Secondary& above	7(30.4)	16(69.6)	12.57(4.12-38.33)	8.37(0.98-64.13)
Nutritional counseling during ANC				
No	57(90.4)	6(9.6)	1.00	1.00
Yes	121(58.2)	87(41.8)	6.83(2.81-16.55)	4.76(1.27-11.85)*
Nutritional counseling during PNC				
No	14(100)	0	1.00	1.00
Yes	93(50.0)	93(50.0)	2.18(0.83-5.93)	
Place of Delivery				
Home	34(77.3)	10(22.7)	1.00	1.00
Health facility	153(63.5)	88(36.5)	1.95(0.92-4.14)	0.48(0.12-1.89)
Educational status of the women				
Can't read and write	119(85.6)	20(14.4)	1.00	1.00
Read & write	40(70.2)	17(29.8)	2.53(1.21-5.29)	1.00
primary	21(37.5)	35(62.5)	9.91(4.83-20.35)	4.47(2.84-9.36)*
Secondary& above	7(21.2)	26(78.8)	22.21(8.46-27.69)	5.24(4.94-12.83)*
Maternal knowledge				
Poor	76(80.0)	19(20.0)	1.00	1.00
Good	111(58.4)	79(41.6)	2.85(1.59-5.08)	3.37(1.28-8.90)*
HH income Level				
Poor	88(81.5)	20(18.5)	1.00	1.00
Middle	70(63.6)	40(36.4)	0.32(0.16-0.65)	2.71(1.05-6.97)*
Rich	29(43.3)	38(56.7)	0.78(0.41-1.50)	3.13(1.01-9.71)*
HFIAS_score			0.94(0.91-0.98)	0.94(0.87-0.99)*

***Statistically significant at p <0.05**

AS table 7 below depicted that, in pooled analysis, nutritional counseling during antenatal and postnatal cares, health facility delivery, better maternal education, good maternal knowledge, better household wealth quintile, lower HFIAS were the factors promoting the practice of childhood minimum dietary diversity practice.

In in pooled analysis, (SURE covered and uncovered districts) the odds of dietary diversity practice in children delivered in health facility was 68% higher than those children who delivered at home (AOR=0.32, 95% CI (0.13, 0.79)).

Women who had primary, secondary and above educational status were 3.6 times (AOR=3.67, 95% CI(1.84-7.31) and 4.4 times (AOR=4.40, 95% CI(1.94-9.97) more likely to have children minimum children dietary diversity practice than those who did not have formal education ,in pooled analysis.

Children with good maternal knowledge were 2.84 times (AOR=2.84, 95%CI: 1.71-4.74) more likely to have minimum dietary diversity practice compared with their counterparts.

In pooled analysis, children from households in the middle wealth index were 1.9 times (AOR=1.92, 95%CI: 1.06-3.46) more likely to have dietary diversity practice compared with children in the poor wealth households. This childhood dietary diversity practice is also 4.2 times (AOR=4.23, 95%CI: 2.13- 8.40) more likely in the rich wealth index households.

Overall (pooled analysis), as the HFIAS decreases by one unit, the childhood dietary diversity practice increases by 0.06.

Being SURE project covered district was 1.51 times more likely to have minimum dietary diversity practice compared with SURE project uncovered district(AOR=1.51,95% CI:1.05-215).

Table 7: Dietary diversity and its associated factors in children aged 6 to 23 months a combined result of West Gojjam Zone, Northwest, Ethiopia, 2019

Variables	DD practice		COR(95%CI)	Total(pooled)95%CI
	No	Yes		
Child age				
6-11 months	131(74.0)	46(26.0)	1.00	1.00
12-23 months	275(68.2)	128(31.8)	1.33(0.89-1.97)	1.51(0.84-2.71)
Health Facility type for ANC				
Hospital	62(77.5)	18(22.5)	1.00	1.00
Health center	338(69.4)	148(30.6)	1.51(0.86-2.63)	1.34(0.51-3.50)
Birth Interval of child				
<2 years	13(50.0)	13(50.0)	1.00	1.00
2-3 years	182(69.2)	81(30.8)	0.45(0.19-1.00)	1.05(0.36-3.28)
4 and above years	133(74.7)	45(25.3)	0.37(0.16-0.86)	1.12(0.34-3.71)
Maternal age category				
15-19 years	58(63.7)	33(36.3)	1.00	1.00
20-29 years	124(69.3)	55(30.7)	0.78(0.46-1.33)	0.69(0.23-2.07)
30-34 years	123(74.1)	43(25.9)	0.61(0.35-1.06)	0.68(0.22-2.16)
35 years and above	101(70.1)	43(29.9)	0.75(0.43-1.31)	0.92(0.29-2.94)
Educational status of the father				
Can't read & write	134(85.4)	23(14.6)	1.00	1.00
Read & write	146(70.5)	61(29.5)	2.43(1.43-4.15)	1.90(0.43-4.86)
Primary	107(62.6)	64(37.4)	3.48(2.03-5.98)	1.62(0.23-4.60)
Secondary& above	19(42.2)	26(57.8)	7.91(3.81-16.68)	3.34(0.52-11.63)
Nutritional counseling during ANC				
No	92(92.0)	8(8.0)	1.00	1.00

Yes	308(66.1)	158(33.9)	5.88(2.79-12.45)	3.27(1.23-8.85)*
Nutritional counseling during PNC				
No	42(87.5)	6(12.50)	1.00	1.00
Yes	281(63.1)	164(36.9)	4.08(1.69-9.81)	3.61(1.02-12.82)*
Place of Delivery				
Home	68(85.0)	12(15.0)	1.00	1.00
Health facility	338(67.6)	162(32.4)	2.71(1.42-5.15)	0.317(0.13-0.79)*
Educational status of the women				
Can't read and write	193(85.0)	34(15.0)	1.00	1.00
Read and write	122(78.7)	33(21.3)	1.54(1.90-2.61)	0.64(0.89-1.34)*
primary	63(48.8)	66(51.2)	5.94(3.59-8.92)	3.67(1.84-7.31)*
secondary& above	28(40.6)	41(59.4)	8.31(4.55-15.19)	4.4(1.94-9.97)*
Maternal knowledge				
Poor	214(81.1)	50(18.9)	1.00	1.00
Good	192(60.8)	124(39.2)	2.76(1.89-4.05)	2.84(1.71-4.74)*
HH income Level				
Poor	191(83.0)	39(17.0)	1.00	1.00
Middle	144(66.4)	73(33.6)	2.48(1.59-3.87)	1.92(1.06-3.46)*
Rich	71(53.4)	62(46.6)	4.27(2.63-6.94)	4.23(2.13-8.40)*
HFIAS_score				0.94(0.91-0.98)*

***Statistically significant at p <0.05**

7. Discussion

The aim of this study was to compare child dietary diversity and its associated factors among sustainable under nutrition reduction project covered and uncovered districts in West Gojjam zone. Good maternal knowledge on DDP, better household wealth quintile, lower HFIAS were the common factors in both SURE project covered & uncovered districts promoting the practice of childhood minimum dietary diversity practice. Better educational status of father, was the factor to increase the practice of childhood minimum dietary diversity practice in the SURE project uncovered district, whereas nutritional counseling during ANC was the factor increasing the practice of childhood minimum dietary diversity practice in the SURE Project covered district. However in pooled analysis, nutritional counseling during antenatal and postnatal cares, health facility delivery, better maternal education, good maternal knowledge, better household wealth quintile, lower HFIAS were the factors promoting the practice of childhood minimum dietary diversity practice. Being SURE project covered district was 1.51 times more likely to have minimum dietary diversity practice compared with SURE project uncovered district.

The finding of this study revealed that the minimum dietary diversity score was 30 % (SURE uncovered 25.8% & SURE covered district 34.4%). The finding is nearly similar with studies done in afar region which was 30.8%, Haromaya town was (25.2%), and Tanzania Bahi Dodoma region was 26.8%)[[11](#), [14](#), [15](#)]

But the finding of this minimum dietary diversity score is higher than studies done in Amhara region, East Gojjam zone, Dejen district, which was (13.6%), Sinan district, which was (13%)[[16](#), [17](#)], and Southern Ethiopia studies done in Kemba (23.3%), and Gorchi (10.6%), EDHS study 2016 which was (14%), and India (23%)[[3](#), [5](#), [7](#), [9](#)]. The difference might be due to the variation in time, culture and economic status of the community.

In addition the result of this study was lower than studies done in Benchi Maji zone (38%), Wolayta Zone(43.2%) Addis Ababa 59.6%, Maramanaga (57.8%) Morondava district (52.3%) in Madagascar[[6](#), [8](#), [12](#), [13](#)]. This might be due to differences in background characteristics of study settings such as urbanization, economic status and cultural food habits.

In the SURE project covered district, women who had primary and secondary and above educational status were 4.4 and 5.2 times more likely had children minimum children dietary diversity practice than those who did not have formal education. In pooled analysis, mothers who had primary and

secondary and above educational status were 3.6 and 4.4 times more likely to have MDDP compared with those who did not have formal education respectively. This study result supported by other studies conducted in Addis Ababa, Oromia region, Adea district , analytical study done in Ghana Wenchi municipality Brong, Ahafo region and cross sectional studies done in 42 countries of West China [8, 19, 21, 22]

In the SURE project uncovered district, fathers who had primary and secondary and above educational status were 3 and 5.9 times more likely had MDDP compared with those who did not have formal education. This study supported by study done in Adea district, Oromia region[22]

Unlike study done in Adea district, in Oromia region in 6-23 months old children, the result of this study did not have significant association with maternal age, and marital status with dietary diversity practice [22]. In addition on this study being male did not have any significant association with minimum dietary diversity practices, unlike a Cross sectional study done in Haromaya town in infants and young child showed that the minimum DD practiced was more in male child 28.6% than female child 21.6%[15]

In the SURE project covered district, mothers who had nutritional counseling during ANC was 4.76 times more likely to have children minimum dietary diversity practice than those did not have nutritional counseling during ANC. This current study finding was comparable with studies done in Sinan &Awable district, East Gojjam zone, Amhara region, Benchi Maji zone Southwest, Ethiopia and Arsi zone Oromia region[6, 17, 29, 30]

In pooled analysis, mothers who had nutritional counseling during antenatal and postnatal cares were 3.3 and 3.6 times more likely to have dietary diversity practice than their counterparts, respectively. This post natal care and minimum dietary diversity practices association were similar with studies done in Sinan district, East Gojjam zone, Amhara region, in Addis Ababa, 2017 and Adea district, Oromia region[8, 17, 22]

In addition, in pooled analysis, the odds of dietary diversity practice in children delivered in health facility were 68% higher than those children who delivered at home. This institutional delivery and minimum dietary diversity practices association were similar with study done in Sinan district, East Gojjam zone, Amhara region and study done in Gorchi and Kemba district[5, 7, 17]

Our study showed that 54.5 % (66.7% SURE covered & 42.7% SURE uncovered district) of women had good knowledge on children minimum dietary diversity practices of children aged 6 to 23 months of age. Good maternal knowledge increases childhood MDD by 3.37 and 2.38 times more likely in the SURE project covered and uncovered districts, respectively. In pooled analysis, mothers who had good knowledge were 2.84 times more likely to have minimum dietary diversity practice compared with their counterparts. Maternal knowledge was considerably related with children minimum dietary diversity practices. This study is supported by other studies conducted in Woreilu South Wollo Zone & West Gojjam zone Dembecha district [[32](#), [33](#)]

In SURE project uncovered district, households in the middle wealth index were 2.4 times more likely to have dietary diversity practice compared with children in the poor wealth households. This childhood dietary diversity practice is also 4 times more likely in the rich wealth households. Whereas, children in middle households of SURE project covered district were 2.7 times more likely to have dietary diversity practice than children in the poor wealth quintile households. In this SURE project covered district, households in rich wealth quintile were 3.1 times more likely to have children with dietary diversity than their counterparts. In pooled analysis, children in the rich wealth households were 4.2 times more likely to have MDDP in both SURE project covered and uncovered districts. These finding was supported by research done in Addis Ababa 2017, EDHS 2016 secondary data analysis, analytical cross sectional study in Ghana and a review of measurement issue in 10 countries by international food policy research institute Washington D.C[[8](#), [12](#), [18](#), [21](#), [24](#)]

As the HFIAS decreases by one unit, the childhood dietary diversity practice increases by 0.1, and 0.06 in the SURE uncovered, covered districts respectively. Overall, As the HFIAS decreases by one unit, the childhood dietary diversity practice increases by 0.06. This research result is similar with study conducted in Madagascar Moramanga and morondava districts[[12](#)]

8. Strength and limitation of the study

Strength

- Comparative cross sectional study, it can compare two rural districts in West Gojjam zone.
- Calculating the minimum dietary diversity scores is a straightforward and can provide an idea of what types of foods are consumed.

Limitations

- This study could not address the community level habit factors that could affect the MDD (like mothers/caregivers may respond as fed their child, without feeding their child).
- Minimum dietary diversity score do not deliver complete information on quantitative dietary consumption and is not a direct measure of nutrient adequacy.

9. Conclusion

Dietary diversity practice in SURE project covered district was higher than SURE project uncovered district.

Good maternal knowledge on DDP, middle & rich household wealth quintile, lower HFIAS were the common factors in both SURE project covered & uncovered districts promoting the practice of childhood minimum dietary diversity practice.

Primary, higher and above educational status of father, was the factor to increase the practice of childhood minimum dietary diversity practice in the SURE project uncovered district.

Nutritional counseling during ANC was the factor increasing the practice of childhood minimum dietary diversity practice in the SURE Project covered district.

In pooled analysis, nutritional counseling during antenatal and postnatal cares, health facility delivery, Primary, higher and above maternal education, good maternal knowledge, middle & rich household wealth quintile, lower HFIAS were the factors promoting the practice of childhood minimum dietary diversity practice.

10. Recommendations

Based on this finding we recommend the following:

- It is better if West Gojjam Zone Health department and other concerned nutrition programmers expand the SURE project to the other districts by convincing the project coordinators, since the higher childhood diversity practice in SURE project covered district higher than the uncovered district calls for projects on nutrition program to improve the dietary diversity practice.
- Yilmana Densa Health office would work more on promoting nutritional counseling during antenatal and postnatal cares, health facility delivery, primary, maternal education, good maternal knowledge, better household wealth quintile, lower HFIAS to improve the minimum childhood dietary diversity practice.
- To improve the minimum childhood dietary diversity practice ,Jabi Tehenan district health office, it is required to work more on promoting nutritional counseling during antenatal and postnatal cares, health facility delivery, better maternal education, good maternal knowledge, better household wealth quintile, lower HFIAS.
- Jabi Tehenan district health office call nutrition program projects and work closely to improve the minimum childhood dietary diversity practice

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ANNEXES II ENGLISH VERSION

I: Participant Information Sheet

Good morning/ good afternoon?

My name is _____. Currently, I am a graduate student at Bahirdar University, College of Medicine and Health Sciences, School of public health, Department of health system management and health economics. And now I am conducting a research on assessing childhood dietary diversity and its associated factors in West Gojjam Zone

Title of the research: comparison of child dietary diversity and its associated factors among sustainable under nutrition reduction project covered and uncovered districts in West Gojjam Zone, Northwest Ethiopia.

Objective: To assess childhood dietary diversity and its associated factors among sustainable under nutrition reduction project covered and uncovered districts in West Gojjam Zone, Northwest Ethiopia, 2019

Participants: Randomly selected mothers or caregivers having children aged 6 to 23 months of old in West Gojjam Zone districts.

Potential Risks: There is no foreseen risk by being participating in this study.

Benefits: No financial benefits are related to this study. But by participating in this study, you will acquire or increase knowledge related to the practice of child dietary diversity. I would like to ask you a few questions. Your honest response to the questions can make the study to achieve its objective. All the information that you give will be kept confidential and private. Only the principal investigator and interviewer will have access to the information. You are kindly requested to respond voluntarily. You can also choose not to participate in this study or if you become uncomfortable during the study, you will be allowed to leave the study at any time. At any time if you have questions, you can contact me by using the following addresses.

Aemero Tenagne Mobile: 0918713550/0975551366,**E-mail:** aemero.tenagne@gmail.com

II: Informed consent Bahirdar University, College of Medicine and Health Sciences, School of public health, Department of health system management and health economics. I here with declare that:

- ✓ The objectives of this study is explained to me and is clear.
- ✓ The contents of the consent are verified to me to participate in the study. I understand that

participation in this study is completely voluntary and that I may withdraw at any time without supplying reasons. I agree to participate in this study to be interviewed, provided my privacy is guaranteed. When signing this consent form to participate in the study, I promise to answer honestly to all reasonable questions and not provide any false information or in any other way purposely mislead the researcher.

Signature of the participant _____ date _____

Signature of the investigator _____ date _____

Annex II: Interview questionnaires (English version)

The questionnaires are adapted from guidelines, EDHS 2016 and similar researches that were done previously and modified accordingly

Section I: Socio-demographic characteristics related questionnaires [circle the answer & fill blanks].

S.N	Questions	Answers with codes	Skip to Q No. ..
101	Age of the mother/care givers	-----years	
102	Age of the child	-----months	
103	Sex of the child	1. Male 2. female	
104	Number of children	-----	
105	Residence of the mother	1. urban 2. rural	
106	What is your ethnicity	1. Amhara 2. Oromo 3. Tigrie 4. If others specify	
107	Religion of the mother	1. Orthodox 2. Muslim 3. Protestant 4. if Other (Specify)	
108	Occupation of the mother	1. farmer 2. Housewife 3. merchant 4. government employ 5. if Other specify -----	
109	Marital status:	1. Single 2. Married 3. Divorced 4. Widowed 5. Other (specify)---	
110	Educational status of the mother:	1. Can't read & write 2. Can read & write 3. Primary (1-8) 4. Secondary (9-12) 5. Certificate & Above	
111	Age of the father	-----	
112	Occupation of the father	1. farmer 2. merchant 3. government employ 4. if Other specify -----	
113	Educational status of the father	1. Can't read & write 2. Can read & write 3. Primary (1-8) 4. Secondary (9-12)	

		5. Certificate & Above	
114	Religion of the father	1. orthodox 2. Muslim 3. Protestant 4. if Other (Specify)	
115	Is there a type of food not eaten in the house	1. Yes 2. No	If no skip to the next question
116	Which type of food not eaten in the house?	1. Banana 2. Soft drinks/mirinda,cokacola 3. Porridge 4. Oil 5. Sugarcane 6. Cabbage 7. Wheat/bread made from wheat 8. Pumpkin 9. Ground nut 10. Salty diets 11. If any other specify.....	
117	Family size	-----in number	

Section II: Questions on health service utilization related questionnaires

S.N	Questions	Answers with codes	Skip to Q No...
201	What is the birth order of this infant?	<ol style="list-style-type: none"> 1. First 2. Second 3. Third 4. Fourth and above 	
202	If your infant is not the first what is the age difference between the two?	-----year-----month	
203	When you were pregnant do you have ANC follow up?	<ol style="list-style-type: none"> 1. Yes 2. No 	If your answer is no skip to question No 206
204	If you had ANC follow up where you get ANC follow up?	<ol style="list-style-type: none"> 1. Hospital 2. Health center 3. Private health institution 	
205	Number of ANC follow up?	<ol style="list-style-type: none"> 1. Only one visit 2. 2 visits 3. 3 times 4. 4 and above visits 	
206	Have you had nutrition counseling during ANC?	<ol style="list-style-type: none"> 1. Yes 2. No 	
207	Where did you deliver your child?	<ol style="list-style-type: none"> 1. Home delivery 2. Health post 3. Health center 4. Hospital 	
208	Who assisted you during delivery	<ol style="list-style-type: none"> 1. Traditional birth attendant 2. HEWs 3. Health professionals 4. Other family members 	
209	Mode of delivery	<ol style="list-style-type: none"> 1. Spontaneous vaginal delivery 2. Assisted vaginal delivery(forceps& vacuum) 3. Cesarean section 	

210	Have you had PNC follow up within 45 days of delivery?	<ol style="list-style-type: none"> 1. Yes 2. No 	If your answer is no skip to question No301
211	When did you get PNC follow up?	<ol style="list-style-type: none"> 1. 1-2 days 2. 3.6 days 3. After 7 days of delivery 	
212	Where did you get PNC follow up?	<ol style="list-style-type: none"> 1. Hospital 2. Health center 3. Private clinic 4. In the home 	
213	Have you had nutrition counseling during PNC?	<ol style="list-style-type: none"> 3. Yes 4. No 	

Section III:Economic and food security related questionnaires

Sr.No	Questions	Answers with codes	Skip to Q No...
301	Type of house	1. Tin roof 2. Grass 3. If other specify	
302	Presence of electric power in the house	1. yes 2. No	If the answer is No you should skip to question no 304
303	What is the source of light at night	1. Spirit lamp 2. Lamp lantern 3. Solar power	
304	Presence of television in the family?	1. Yes 2. No	
305	Family has radio?	1. Yes 2. No	
306	Presence of mobile in the family?	1. Yes 2. No	
307	Presence of bank account	1. Yes 2. No	
308	Availability of farmland	3. Yes 4. No	
309	Amount of land	-----hectares/kada	
310	Amount of grain cultivated in a year	-----quintal	
311	Did you cultivate vegetables and/or fruits ?	1. Yes 2. No	
312	Do fed your child vegetables and/or fruits?	1. Yes 2. No	
313	Presence cattle's/Horse in the house	1. Yes 2. No	
314	Presence of cow milk?	3. Yes 4. No	If No skip to question 316
315	Do you feed your child cow milk?	1. Yes 2. No	
316	Do you have small animals like chicken?	1. Yes 2. No	
318	Do fed egg your child?	1. Yes 2. No	
319	How much is the average Family income annually?	-----ETB	
Food security related questions			
320	In the past 4 weeks you and your family member bother about availability of food?	1. Yes 2. No	If no skip to question No322
321	How long it occurred	1. Rarely (once or twice in the past 4 weeks)	

		<ol style="list-style-type: none"> 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (more than 10 times) 	
322	In the past 4 weeks you and your family member interested to feed but do not feed due to lack of food and equipment's?	<ol style="list-style-type: none"> 1. Yes 2. No 	If no skip to question No <u>324</u>
323	How long it occurred	<ol style="list-style-type: none"> 1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (more than 10 times) 	
324	In the past 4 weeks you and your family member obliged to feed similar food items?	<ol style="list-style-type: none"> 1. Yes 2. No 	If no skip to question No <u>326</u>
325	How long it occurred	<ol style="list-style-type: none"> 1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (more than 10 times) 	
326	In the past 4 weeks you and your family member obliged to feed out of interest food items?	<ol style="list-style-type: none"> 1. Yes 2. No 	If no skip to question No <u>328</u>
327	How long it occurred	<ol style="list-style-type: none"> 1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (more than 10 times) 	
328	In the past 4 weeks you and your family member obliged to feed food less than required amount of food?	<ol style="list-style-type: none"> 1. Yes 2. No 	If no skip to question No <u>330</u>
329	How long it occurred	<ol style="list-style-type: none"> 1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often (more than 	

		10 times	
330	In the past 4 weeks you and your family member obliged to feed food less than required amount of diet in the day?	1. Yes 2. No	If no skip to question No <u>332</u>
331	How long it occurred	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often(more than 10 times)	
332	In the past 4 weeks you and your family member food is not available in the house?	1. Yes 2. No	If no skip to question No <u>334</u>
333	How long it occurred	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often(more than 10 times)	
334	In the past 4 weeks you and your family member sleep with hunger due to lack of food in the home?	1. Yes 2. No	If no skip to question No <u>336</u>
335	How long it occurred	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often(more than 10 times)	
336	In the past 4 weeks you and your family member do not eat day and night due to lack of food in the home?	1. Yes 2. No	If no skip to question No <u>401</u>
337	How long it occurred	1. Rarely (once or twice in the past 4 weeks) 2. Sometimes (3-10 times in the past 4 weeks) 3. Often(more than 10 times)	

Section IV: Mother knowledge on dietary diversity questionnaires

Sr.No	Questions	Answers with codes	Skip to Q No...
401	Heard about importance of feeding diversified foods to a 6–23 month child	1. Yes 2. No	
402	Do you know complementary feeding should start at 6 months of child age?	1. Yes 2. No	
403	Do you know a 6–23 month child should eat four or more food groups?	1. Yes 2. No	
404	Do you know One cause of childhood malnutrition is not having diversified foods?	1. Yes 2. No	
405	Do you know giving meat is advisable for 6–23 month child?	1. Yes 2. No	
406	Do you know didn't feel hungry doesn't mean that the nutritional need of a child is fulfilled?	1. Yes 2. No	
407	Have you heard One cause of childhood malnutrition is not starting complementary feeding at 6 months of child age?	1. Yes 2. No	
408	Do you have information feeding only animal products are not enough/adequate for 6–23 month child?	1. Yes 2. No	
409	Do you know a 6–23 month child should feed organ meat, like liver, kidney?	1. Yes 2. No	
410	Do you know a 6–23 month child should feed egg	1. Yes 2. no	

Section V: dietary diversity practices related questionnaires

These questions will be answered with 24 hours feeding recall

Sr.No	Food groups	Examples	Yes	No
501	Grains, roots and tubers	Porridge, bread, rice, noodles or other foods made from grains White potatoes, white yams, manioc, cassava or any other foods made from roots		
502	Legumes and nuts	Any foods made from beans, peas, lentils, nuts or seeds		
503	Dairy products (milk, yogurt, cheese)	Infant formula, such as Milk, such as tinned, powdered or fresh animal milk Yogurt or drinking yogurt Cheese or other dairy products		
504	Flesh foods (meat, fish, poultry and liver/organ meats)	Liver, kidney, heart or other organ meats Any meat, such as beef, pork, lamb, goat, chicken or duck Fresh or dried fish, shellfish or seafood Grubs, snails or insects		
505	Eggs	Eggs		
506	Vitamin A rich fruits and vegetables	Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside Any dark green vegetables Ripe mangoes (fresh or dried [not green]), ripe papayas (fresh or dried), musk melon Foods made with red palm oil, red palm nut or red palm nut pulp sauce		
507	Other fruits and vegetables	other vegetables (e.g. tomato, onion, eggplant),& including wild vegetables other fruits, including wild fruits		

You have finished

Thank you!

Annex III Amharic version

1. የተሳታፊዎች መረጃ መስጫ ቅጽ-በአማርኛ

እንደምን አደሩ/ዋሉ? አእምሮ ተናኘ እባላለሁ። በባህርዳር ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ፣ የህብረተሰብ ጤና ትምህርት ክፍል በአጠቃላይ የህብረተሰብ ጤና የ2ኛ ዓመት የማስትሬት ድግሪ ተመራቂ ተማሪ ነኝ። በአሁኑ ሰዓት በምዕራብ ጎጃም ዞን በይልማና ዴንሣ ወረዳ እና በጃቢ ጠህናን ወረዳ ከ6 ወር እስከ 23 ወራት ልጅ ባላቸው እናቶች ወይም የህጻናት ተንከባካቢዎች ላይ የምግብ ስብጥር ትግበራና ተዛማጅ ችግሮችን በማጥናት ላይ እገኛለሁ።

የጥናቱ ርዕስ:- የህጻናት የምግብ ስብጥር ትግበራና ተዛማጅ ችግሮች ፣ ምዕራብ ጎጃም ዞን በይልማና ዴንሣ ወረዳ እና በጃቢ ጠህናን ወረዳ በአማራ ብሔራዊ ክልላዊ መንግስት፣ ኢትዮጵያ፣ 2011 ዓ.ም።

የጥናቱ ዓላማ:- የህጻናት የምግብ ስብጥር ትግበራና ተዛማጅ ችግሮች ማወቅ

ተሳታፊዎች:- ከ6 እስከ 23 ወር ልጆች ያሏቸውና በቋሚነት የሚኖሩ እናቶች/የህጻናት ተንከባካቢዎች ይሆናሉ።

የጎንዮሽ ጉዳት:- በዚህ ጥናት መሳተፍ ምንም አይነት ጉዳት የለውም።

ጥቅማ ጥቅም:- በዚህ ጥናት መሳተፍ ምንም አይነት ገንዘብ አያስገኝም። ነገር ግን በዚህ ጥናት መሳተፍ ስለ ምግብ ሥብጥር እውቀት ያገኛሉ ወይም ያለዎትን እውቀት ያዳብራሉ። ስለዚህ የተወሰኑ ጥያቄዎችን ልጠይቅዎት እፈልጋለሁ። የእርስዎ በእውነት ላይ የተመሰረተ መልስ ለዚህ ጥናት መሳካት ጉልህ አስተዋፅኦ ያደርጋል። እርስዎ የሚሰጡት መረጃ ከጥናት አድራጊውና ቃለመጠይቅ አድራጊው በስተቀር በማንኛውም መልኩ ለሌላ 3ኛ ወገን ተላልፎ አይሰጥም። በሙሉ ፈቃደኝነት እንዲሳተፉ እየጠየቅሁ፣ ያለመሳተፍ ወይም በማንኛውም ጊዜ ራስዎን ከጥናቱ የማግለል ሙሉ መብት አለዎት። ማንኛውም ግልጽ ያልሆነ ጥያቄ ካለዎት በሚከተለው አድራሻዬ ማግኘት ይችላሉ።

አእምሮ ተናኘ ስ.ቁ:-0918713550/975551366 ኢ.ሜይል :aemero.tenagne@gmail.com

2. የስምምነት መግለጫ ፎርም - በአማርኛ

በባህርዳር ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል በአጠቃላይ የህብረተሰብ ጤና ዲፓርትመንት ድህረ ምረቃ ፕሮግራም እኔ ስሜ ከዚህ በታች የተገለጸው፤ የዚህ ጥናት ዓላማ በደንብ የተብራራልኝ ሲሆን የጥናቱንም ዓላማ ተረድቻለሁ። በዚህ ጥናት ላይ መሳተፍ በሙሉ ፈቃደኝነት ላይ የተመሰረተ መሆኑን በሚገባ የተረዳሁ ሲሆን በማንኛውም ጊዜ ከጥናቱ ራሴን የማግለል መብት እንዳለኝ አውቄአለሁ። ስለሆነም የምስጠው መረጃ እስከተጠበቀ ድረስ በዚህ ጥናት ለመሳተፍ ተስማምቻለሁ። በዚህ ጥናት ለመሳተፍ ስምምነቴን ስገልፅ ለምጠየቀው ጥያቄ በእውነት ላይ የተመሰረተ መልስ ለመስጠት የተስማማሁ መሆኔን አረጋግጣለሁ።

ስም-----

ፊርማ -----

ቀን-----

የጥናቱ ተሳታፊዎች በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ መጠይቁን ይጀምሩ።

የጥናቱ ተሳታፊ ፈቃደኛ መሆናቸውን የሚያረጋግጥ የመረጃ ሰብሳቢው/አጥኚው

ስም-----

ፊርማ-----

ቀን-----

መጠይቅ - አማርኛ ቅጽ

በባህርዳር ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል በአጠቃላይ የህብረተሰብ ጤና ዲፓርትመንት ይህ መጠይቅ የተዘጋጀው የህጻናት የምግብ ስብጥር ትግበራንና ተዛማጅ ችግሮችን በተመለከተ መረጃ ለማሰባሰብ ነው።

ክፍል አንድ :- ሥነ- ህዝብና ማህበራዊ ጉዳዮችን በተመለከተ የተዘጋጁ ጥያቄዎች

ተ.ቁ	ጥያቄዎች	አማራጭ መልሶች	ይለፉ
101	የእናት ዕድሜ ወይም የአሳዳጊ ዕድሜ	-----ዓመት	
102	የህጻኑ/ኗ ዕድሜ በወር	-----ወራት	
103	የህጻኑ/ኗ ጾታ	1. ወንድ 2. ሴት	
104	የህጻናት ብዛት	-----	
105	የእናት መኖሪያ ቦታ	1. ገጠር 2. ከተማ	
106	ብሔርሽ ምንድን ነው?	1. አማራ 2. ኦሮሞ 3. ትግሬ 4. ሌላ ክሆነ ይጠቀስ----	
107	ሀይማኖትዎ ምንድን ነው?	5. ኦርቶዶክስ ክርስቲያን 6. ሙስሊም 7. ፕሮቴስታንት 8. ሌላ (ይጠቀስ) ----	
108	የእናት የስራ ሁኔታ	1. የቤት እመቤት 2. የመንግስት ሰራተኛ 3. ነጋዴ 4. የቀን ሰራተኛ 5. ሌላ ካለ የገለጹ.....	
109	የጋብቻ ሁኔታ	1. ያላገባች 2. ያገባች 3. የፈታች 4. የሞተባች 5. ሌላ ካለ ይገለጹ	
110	የእናት የትምህርት ሁኔታ	1. ማንበብና መፃፍ የማትችል 2. ማንበብና መፃፍ የምትችል 3. አንደኛ ደረጃ (1-8ኛክፍል) 4. ሁለተኛ ደረጃ ከ9-12 ክፍል) 5. ስርተፍኬትና ከዚያ በላይ	
111	የአባት ዕድሜ	----- ዓመት	
112	የአባት የስራ ሁኔታ	1. አርሶ አደር 2. የመንግስት ሰራተኛ 3. ነጋዴ 4. የቀን ሰራተኛ 5. ሌላ ካለ የገለጹ.....	

113	የአባት የትምህርት ደረጃ	1. ማንበብና መጻፍ የማትችል 2. ማንበብና መጻፍ የምትችል 3. አንደኛ ደረጃ (1-8ኛክፍል) 4. ሁለተኛ ደረጃ ከ9-12 ክፍል) ስርተፍኬት ከዚያ በላይ	
114	የአባት ሀይማኖት ምንድን ነው?	9. ኦርቶዶክስ ክርስቲያን 10. ሙስሊም 11. ፕሮቴስታንት 12. ሌላ (ይጠቀስ) ----	
115	በቤት ውስጥ የማይበላ ምግብ አለ?	1. አዎ 2. የለም	መልስዎ የለም ከሆነ ወደ ጥያቄ ቁጥር 116 ይለፉ
116	የትኛው የምግብ ዕይነት ነው በቤት ውስጥ የማይበላው ?	1. ሙዝ 2. ነስላሳ መጠጦች 3. ገንፎ 4. ዘይት 5. የሽንኩር አገዳ 6. የስንዴ ዳቦ 7. ለውዝ 8. ጨዋማ ምግብ 9. ሌላ ካለ ይጠቀስ-----	
117	ጠቅላላ የቤተሰብ ብዛት በቁጥር ስንት ነው ?	-----	

ክፍል ሁለት :- የእናቶችና ህፃናት ጤና አገልግሎትን በተመለከተ የተዘጋጁ ጥያቄዎች

ተ.ቁ	ጥያቄዎች	አማራጭ መልሶች	ይለፉ
201	ይቺ ህጻን/ይህ ህጻን ስንተኛ ልጅዎ ናት/ነው?	1. የመጀመሪያ 2. ሁለተኛ 3. ሶስተኛ 4. አራተኛና በላይ	
202	የመጀመሪያ ልጅዎ ካልሆነ/ች ከዚህ በፊት ከነበረዎት ልጅ ጋር ምን ያህል የዕድሜ ልዩነት አላቸው?	-----ዓመት----- ወር	
203	ይህን/ችን ህፃን ነፍሰጡር እያሉ በጤና ተቋም የቅድመወሊድ ክትትል አድርገው ነበር?	1. አዎ 2. የለም	መልስዎ የለም ከሆነ ወደ ጥያቄ ቁጥር 206 ይለፉ
204	የቅድመ ወሊድ ክትትል ጤና አገልግሎት አግኝተው ከሆነ፣ አገልግሎቱን ያገኙት የት ነበር?	1. ሆስፒታል 2. ጤና ጣቢያ 3. ጤና ተቋም	
205	ምን ያህል ጊዜ የወሊድ ክትትል አድርገው ነበር ?	1. አንድ ጊዜ 2. ሁለት ጊዜ 3. ሶስት ጊዜ 4. አራት ጊዜና በላይ	

206	በቅድመ ወሊድ ክትትል ወቅት ስለ ህጻኗ/ኑ አመጋገብ የምክር አገልግሎት አግኝተው ነበር ?	1. አዎ 2. የለም	
207	ልጅሽን የት ነበር የወለድሽ?	1. በቤት ውስጥ 2. በጤና ኬላ 3. በጤና ጣቢያ 4. በበሆስፒታል	
208	ህጻኑ/ኗ እንዴት ነበር የተወለደው/የተወለደችው?	1. በብልት በኩል 2. እግ ተደርጎ በብልት በኩል 3. በቀዶ ጥገና	
209	ልጅሽን በማን አማካኝነት ወለድሽ?	1. በልምድ አዋላጅ 2. በጤና ኤክስፐርት/ሽን ባለሙያ 3. በጤና ባለሙያ 4. በቤቴሰብ እግ	
210	ከወለዱ በኋላ በ45 ቀን ጊዜ ውስጥ የድህረ ወሊድ ክትትል አድርገው ነበር?	1. አዎ 2. የለም	መልስዎ የለም ከሆነ ወደ ጥያቄ ቁጥር 301 ይለፉ
211	የድህረ ወሊድ አገልግሎቱን መቼ አገኙት?	1. ከወለድኩ 1-2 ቀናት 2. ከወለድኩ 3-6 ቀናት 3. ከ7 ቀናት በኋላ	
212	የድህረ ወሊድ ክትትል ካደረጉ አገልግሎቱን ያገኙት የት ነበር?	1. ሆስፒታል 2. ጤና ጣቢያ 3. የግል ክሊኒክ 4. ቤት ውስጥ	
213	በድህረ ወሊድ ክትትል ወቅት ስለ ህጻኗ/ኑ አመጋገብ የምክር አገልግሎት አግኝተው ነበር ?	3. አዎ 4. የለም	

ክፍል ሶስት:- ሥርዓተ ምግብ ተኮር ግብርና፣ ኢኮኖሚያዊ ሁኔታና የምግብ ዋስትናን የሚመለከቱ ጥያቄዎች

ተ.ቁ	ጥያቄዎች	አማራጭ መልሶች	ይለፉ
301	ቤትዎ ከምን ነው የተሰራው ?	1. ከቆርቆር 2. ከሳር 3. ሌላ ካለ ይጠቀስ	
302	በቤት ውስጥ የኤለትክትሪክ መብራት አለ ?	1. አዎ 2. የለም	መልስዎ አዎ ከሆነ ወደ ጥያቄ ቁጥር 304 ይለፉ
303	መብራት ከየት ነው እሚያገኙት?	1. ከኩራዝ 2. ከፋኖስ 3. ከሶላር ሀይል	
304	በቤት ውስጥ ቴሌቪዥን አለ?	1. አዎ 2. የለም	
305	በቤት ውስጥ ራዲዮ አለ?	1. አዎ	

		2. የለም	
306	በቤት ውስጥ ሞባይል ያለው የቤተሰብ አባል አለ?	1. አዎ 2. የለም	
307	የእርሻ መሬት አለዎት ?	1. አዎ 2. የለም	
308	የመሬት መጠን በሄክታር ወይም በቃዳ ምን የህል ነው?	----- ሄክታር ወይም -- -----ቃዳ	
309	በዓመት ምን ያህል ኩንታል እህል ያመርታሉ?	-----ኩንታል	
310	የጓሮ አትክልትና ፍራፍሬ ያለማሉ?	1. አዎ 2. የለም	
311	ልጅዎን የጓሮ አትክልትና ፍራፍሬ ይመግባሉ?	1. አዎ 2. የለም	
312	በቤት ውስጥ የላም ወተት አለ?	1. አዎ 2. የለም	
313	ለልጅዎ የላም ወተት ይመግባሉ?	1. አዎ 2. የለም	
314	በቤት ውስጥ ዶሮ አለዎት?	1. አዎ 2. የለም	
315	ለልጅዎ እንቁላል ይመግባሉ?	1. አዎ 2. የለም	
316	በዓመት ምን ያክል ገቢ ያገኛሉ?	-----ብር	
317	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል በቤት ውስጥ በቂ ምግብ አይኖርም ብለው ተጨንቀው ነበር?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 318 ይሰጡ
318	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
319	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል መመገብ የፈለገውን በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት ሳይመገብ ቀርቶ ነበር?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 320 ይሰጡ
320	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
321	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት በስብጥር ተመሳሳይ የሆኑ ምግቦችን ለመመገብ ተገዶ ያውቅ ነበር?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 322 ይሰጡ
322	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
323	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት	1. ነበር 2. አልነበረም	መልስዎ አልነበረም

	መመገብ የማይፈልገውን ለመመገብ ተገዶ ያውቅ ነበር?		ከሆነ ወደ ጥያቄ ቁጥር 324 ይሰጡ
324	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
325	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት መመገብ ከሚፈልጉት መጠን ያነሰ ምግብ ለመመገብ ተገደው ነበር?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 326 ይሰጡ
326	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
327	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት በቀን ውስጥ መመገብ ያለብዎትን የማድ ብዛት ቀንሰው ያውቃሉ ?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 328 ይሰጡ
328	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
329	ባለፈው 4 ሳምንታት ውስጥ በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት በቤት ውስጥ ማኛውም የሚበላ ምግብ ጠፍቶ ያውቅ ነበር ?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 330 ይሰጡ
330	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
331	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት እየራበው የተኛ ሰው ነበር ?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 332 ይሰጡ
332	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	
333	ባለፈው 4 ሳምንታት ውስጥ እርስዎ ወይም ሌላ የቤተሰብ አባል በምግብና ምግብ ነክ ቁሳቁሶች ዕጥረት ምክኒያት ቀንም ማታም ምግብ ያልተመገበ ሰው ነበር ?	1. ነበር 2. አልነበረም	መልስዎ አልነበረም ከሆነ ወደ ጥያቄ ቁጥር 401 ይሰጡ
334	ይህ ለምን ያክልጊዜ ነው የተፈጸመው?	1. ከ1-2 ጊዜ 2. ከ3-10 ጊዜ 3. ከአስር ጊዜ በላይ	

ክፍል አራት፡- የእናቶችን የምግብ ስብጥር ግንዛቤ የሚመለከቱ ጥያቄዎች

ተ.ቁ	ጥያቄዎች	አማራጭ መልሶች	ይለፉ
401	ዕድሜያቸው ከ6-23 ወራት ለሆኑ ህጻናት አሰባጥሮ መመገብ የሚሰጠውን ጥቅም ሰምተው ያውቃሉ?	1. አዎ 2. የለም	
402	ለህጻናት ተጨማሪ ምግብ ልክ 6 ወር ሲሞላው እንደሚጀመር ያውቃሉ?	1. አዎ 2. የለም	
403	ከ6 — 23 ወራት ዕድሜ ያላቸው ህጻናት 4 እና በላይ የምግብ ምድቦችን መመገብ እንዳለባቸው ያውቃሉ ?	1. አዎ 2. የለም	
404	አንዱ የህጻናት የምግብ ዕጥረት ችግር ሳያሰባጥሩ መመገብ እንደሆነ ያውቃሉ ?	1. አዎ 2. የለም	
405	ከ6 — 23 ወራት ዕድሜ ላላቸው ህጻናት ስጋ መመገብ እንደሚገባ ያውቃሉ ?	1. አዎ 2. የለም	
406	የረሀብ ስሜት አለመሳየት የህጻናት ስርዓተ ምግብ መሟላቱን እንደማያሳይ ያውቃሉ ?	1. አዎ 2. የለም	
407	አንዱ የምግብ ዕጠረት ችግር ለህጻናት ልክ 6 ወር ላይ ተጨማሪ ምግብ አለመጀመር መሆኑን ያውቃሉ ?	1. አዎ 2. የለም	
408	የእንስሳትን ተዋጽኦ ብቻ መመገብ ከ6-23 ወራት ላላቸው ህጻናት በቂ አለመሆኑን ያውቃሉ?	1. አዎ 2. የለም	
409	ከ6 -23 ወራት ያላቸው ህጻናት እንደ ጉብትና ኩላሊት ስጋን መመገብ እንዳለባቸው ያውቃሉ?	1. አዎ 2. የለም	
410	ከ6 -23 ወራት ያላቸው ህጻናት እንቁላል መመገብ እንዳለባቸው ያውቃሉ?	1. አዎ 2. የለም	

ክፍል አምስት፡- ከ6- 23 ወራት ለሆኑ ህጻናት በ24 ሰዓት ውስጥ የተመገቡትን የምግብ ዓይነት በማስታወስ የሚመለሱ ጥያቄዎች

ተ.ቁ	የምግብ ምድብ(1-7)	የምግብ ዝርዝሮች	አዎ	የለም
501	ከጥራጥሬ ከሥራስሮችና ክብስ ስር ያላቸው ተክሎች	ከጥራጥሬና እህል የተሰሩ ማለት-ምክስንዴ፣ ገብስ፣ ከአጃና ሌሎች የተሰሩ እንደ ዳቦ፣ ገንፎ፣ እና ሾርባ እና ሌሎች ምግቦች ድንች፣ ስኳር ድንች፣ ወይም ከስራስር የሚዘጋጁ ሌሎች ምግቦች		
502	የብር እህሎች	ባቁላ መሰል ጥራጥሬና ለውዝ (አተር፣ ባቁላ፣ ምስር) የሚዘጋጁ እንደ ሽርና ሌሎች		
503	የወተት ተዋጽኦ ምግቦች	ወተትና የወተት ተዋጽኦ ምግቦች ለምሳሌ እንደ እርጎ፣ አይብና ወገሚት		
504	ከስጋ የሚዘጋጁ ምግቦች	እንደ ጨንፈ፣ ኩላሊት፣ ልብና ሌሎች የስወነት ክፍል ስጋ ማገኛውም የከብት፣ የአሳማ፣ የፍየል፣ የበግ ስጋና የባህር ስጋ እንደ አሳ		
505	እንቁላል	እንቁላልና ከእንቁላል የሚሰሩ ምግቦች		
506	ቫይታሚን ኤ ፍራፍሬዎችና ቅጠላቅጠሎች	በቪታሚን ኤ የበለጸጉ አትክልትና ፍራፍሬዎች(ማንጎ፣ ፓፓያ፣ ሎሚ ቲማቲም፣ ዱባ፣ ካሮት፣ ጎመን፣ ሰላጣ)		
507	ሌሎች አትክልት እና ፍራፍሬ እንዲሁም ሀይል ሀጨ ምግቦች	ቀይ ስር፣ ብርቱካን... ዘይት ፣ ቅቤ፣ ሰብ የመሳሰሉት ድምር		

ጥያቄዎን ጨርሻለሁ አመሰግናለሁ።

Annex IV: Declaration form

I the undersigned declare that this is my original work, and it has never been presented in this or any other university. All source and materials used for this thesis report have been fully acknowledged.

Principal investigator: Aemero Tenagne

Signature: _____

Date _____

Advisors: Dr.Netsanet Fentahun (MPH, Double PHD, Associate professor)

Signature _____

Date _____

Mr. Getasew Tadesse (MPH in health economics)

Signature _____

Date _____