

**ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH
SCIENCES SCHOOL OF NURSING AND MIDWIFERY
DEPARTEMENT OF MIDWIFERY POSTGRADUATE
PROGRAM**

**ASSESMENT OF DIETARY DIVERSITY ADEQUECY AND
ASSOCIATED FACTORS AMONG PREGNANT WOMEN
ATTENDING ANTENATAL CARE AT PUBLIC HEALTH
FACILITIES IN FITCHE TOWN, OROMIYA REGION,
ETHIOPIA, 2020.**

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC-Antenatal care

AOR-Adjusted odds ratio

ARR-Adjusted relative risk

BMI-Body mass index

CI-Confidence interval

COR-Crudes odds ratio

DD-Dietary diversity

DDS-Dietary diversity score

ETB-Ethiopian birr

FANTA-Food and nutrition technical assistance

FAO-Food and agricultural organization of the United Nations

FHI360-Family health international

HEP- Health extension program

HFIAS-Household food insecurity access scale

MDD-W-Minimum dietary diversity of women

RR-Relative risk

SDG-Sustainable development goals

SPSS-Statistical Package for Social Scientists

USAID-United states agency for international developments

WHO-World health organization

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ABSTRACT

Background: Adequate consumption of diversified food during pregnancy enables adequate intake of eleven important micronutrients. Pregnant women who consumed inadequate dietary diversity during pregnancy have high percentage of delivering preterm, still birth, low birth weight, and small for gestational age newborn. Therefore, this study aims to assess dietary diversity adequacy and associated factors among pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020.

Methods: An institution-based cross-sectional study was conducted on 400 pregnant women attending antenatal care at public health facilities in Fitch town, in 2020. Study participants were selected by systematic random sampling method. Data were entered in to Epi data version 4.6 and exported to Statistical Package for Social Science version 24 for analysis. Description of means, frequencies and proportions of the given data for each variable was calculated. Results from bivariate analysis of $p < 0.25$ were moved to multivariable logistic regression model analysis. Any statistical test with the P-value < 0.05 at 95% confidence interval was considered as statistically significant.

Results: The study revealed that 55.4% of the pregnant women had adequate dietary diversity. Being urban dweller (AOR=2.4, 95% CI: 1.1, 5.18), being housewife (AOR=3.44, 95% CI: 1.37, 8.68), employed (AOR=3.69, 95% CI: 1.12, 12.16), merchant (AOR=3.43, 95% CI: 1.15, 10.24), daily laborer (AOR=3.66, 95% CI: (1.0, 13.45), low average monthly household income less than 500 Ethiopian birr (AOR=0.25, 95% CI: 0.07, 0.83), practicing home gardens (AOR=2.5, 95% CI : 1.39, 4.5), meal frequency three and above times per day (AOR=2.9, 95% CI: 1.64, 5.09), and receiving dietary counseling during antenatal care (AOR=3.56, 95% CI: 2.0, 6.35) were factors associated with pregnant women dietary diversity.

Conclusions and Recommendations: This study found that 55.4% of pregnant women consumed adequate dietary diversity. Place of residence, women's occupation, average monthly household income, practicing home gardens, meal frequency per day and receiving dietary counseling during antenatal care were strong predictors of adequate dietary diversity. Therefore, attention should be paid to pregnant women diet by health care provider during antenatal care.

Key words: micronutrient adequacy, pregnant women diet, adequate dietary diversity.

1. INTRODUCTION

1.1 Background

Dietary diversity is a consumption of a variety of foods across the number of different food groups over a given reference period which enable the safeguarding of an adequate intake of micronutrients that can promote healthy eating pattern and reduce major chronic illness(1).Dietary diversity (DD) quantifies a number of food or groups of foods in a diet that is a proxy measure of nutrient adequacy of the diet of individual particularly nutritional quality and micronutrient adequacy of foods. Dietary diversity scores (DDS) have been shown to be valid proxy indicators for dietary energy availability at household level, micronutrient adequacy of diets of young children and women of reproductive age and predictors of nutritional status(2,3).

A healthy diet during pregnancy contains adequate energy, protein, vitamins and minerals, obtained through the consumption of a diversified diet, including green and orange vegetables, meat, fish, beans, nuts, whole grains and fruit (4).The food or food groups which are included in the minimum dietary diversity of women (MDD-W) mostly reflect the diet quality with the probability of minimum micronutrient adequacy of the women's diets summarized across 11 important micronutrients which are vitamin A, vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B6, vitamin B12, vitamin C, folate, calcium, iron, and zinc(2).

A woman who has been well nourished before conception begins her pregnancy with reserves of several nutrients so that the recurrent needs of the growing foetus can be met without adversely affecting her health. Infants, who have been well nourished in the womb, have an improved chance of entering life in very good health(5). There is growing recognition of the significance of maternal nutrition interventions as part of antenatal care (ANC) to improve maternal and infant health outcomes (6). In 2016, the World health organization (WHO) issued new recommendation on ANC for a positive pregnancy experience, with high priority given to nutrition through dietary interventions and micronutrient supplementation, together with health system interventions to improve the use and quality of ANC(7).In Sub-Saharan Africa the consumption of monotonous (undiversified) and plant-based diet is a major reason forwidespread malnutrition and associated consequence due to inadequate nutrient intake during pregnancy(8).

Findings from four low-middle income countries (Guatemala, India, Pakistan, and Democratic Republic of the Congo) reported that pregnant women dietary patterns varied widely among countries, with only less than a fifth (20%) of Pakistani women consumed a diet with adequate dietary diversity, 25% in Democratic Republic of the Congo, 50% in Guatemala, and 70% in India. More than 80% of women in all sites had inadequate intakes of folate, vitamin B12, and choline during pregnancy(9).

Data from 52 low-and middle-income countries (including Ethiopia) taking part in the world health survey showed that 78.4% of women consumed less than the minimum recommended fruits and vegetables. The prevalence of low fruits and vegetables consumption ranged from 38% in Ghana, 64.1% in Ethiopia to 99.3% in Pakistan for women. The study identified the role income in influencing women dietary diversification(10).

According to world health organization report, inadequate fruit and vegetable consumption contributes to approximately 1.7 million deaths worldwide. It ranks low vegetables and fruit consumption as among the top 10 selected risk factors global mortality(11).

Although the level of dietary diversity vary across the world, food security, household/individual income and income generating activity, Agro biodiversity, educational level of head of household, knowledge about nutrition and nutrient content of foods where the major factors influencing children and women nutritional status(12).

1.2 Statement of problem

Adequate intake of diet during pregnancy is essential for the growth and development of the fetus in addition to women nutrient requirements. Malnutrition is universally the most important risk factor for morbidity and mortality of hundreds of millions of pregnant women(12).

Globally in 2018, 9.7% (153.8 million) of women (aged 20–49) and 5.7% (16.2 million) of adolescent girls (aged 15–19) are underweight, 32.8 % (613.2 million) women of reproductive age and 35.3 million of pregnant women are anemic(12). In developing countries dietary diversity is given greater importance especially to address nutritional deficiencies and there is widespread recognition that low dietary diversity is associated with chronic nutritional deficiencies(13). Ethiopia is no exception in this regard as roughly one out of every four women aged 15-49 years are undernourished (body mass index (BMI) <18.5 kg/m²)(14).

Lack of dietary diversity and micronutrient dense food intake is a particularly severe problem among poor populations like Ethiopia. According to Ethiopian national nutritional end line survey in 2015, it was found that only 20.3% (general extremely low) adult women consumed five or more food groups out of ten food groups(15). Ethiopia scored lowest among 187 countries for fruit consumption among women and second lowest (above Vanuatu) for vegetable consumption(8). Also, compared to the WHO recommendations of vegetable and fruits consumption, the average Ethiopian vegetable and fruits consumption meet only 36.4% of the recommendation(16).

A national based survey conducted in Ethiopia indicates that cereals or grains contribute to the highest proportion of women's diet which is low in quality, diversity and micronutrient content. A diet dominated by staple foods with little diversity can contribute to the burden of micronutrient deficiencies and malnutrition which is already high in the country(17).

In fact, pregnant woman who consumed adequate dietary diversity during pregnancy had a low risk of maternal anaemia, preterm delivery, and low birth weight(18). However, compared to adequate consumption, poor or inadequate consumption of dark green leafy vegetables, dairy products, and fruits and vegetables during pregnancy were associated with higher risk of preterm birth, still birth and low birth weight (19).

Pregnant women who consumed diet with low grains, meat, dairy, fruits, vegetables and inadequate total diversity intake during last trimester of pregnancy have higher percentage of delivering small for gestational age and low birth weight newborn(20).

Some studies explored factors influencing maternal dietary diversity adequacy in different parts of the country. For instance, socio demographic and socio economic factors, dietary intake counseling during antenatal care, household food security status, and maternal education were explored as predictors of maternal dietary diversity during pregnancy in Ethiopia (21,22).

Different qualitative study found that various forms of taboos, misconceptions, and cultural beliefs towards certain foods prevent pregnant women from consuming diversified diet during pregnancy in Ethiopia. For example, dairy (like yogurt, cheese), fruits and vegetables (like green leafy vegetables, banana, pimento, cabbage, and sugarcane), cereals and nuts (like linseed, pumpkin, wheat, and groundnut), drinks (like coffee, tea, coca, and porridge), and salty diets were the most taboo foods during pregnancy by pregnant women(23,24).

To address nutrition-related health problem, the government of Ethiopia endorsed various intervention programs such as integrating maternal care with free micronutrient supplementation (iron and folate) to pregnant and lactating women, delivering nutritional education such as diversified and fortified diet intake and implementing packages of Health Extension Program (HEP) with various international initiatives. However, still inadequate dietary diversity and nutritional status of pregnant women is prominent problem (25).

Despite the well-recognized importance of dietary diversity, little is known about dietary diversity of pregnant women in Ethiopia particularly in the study area. Furthermore, the available dietary data focused on diets of young children. Therefore, this study was aimed to assess dietary diversity adequacy and associated factors among pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia, 2020.

1.3 Significance of study

The government of Ethiopia is working to end hunger, achieve food security and improve nutrition and promotes sustainable agriculture through current five-year Growth and Transformation Plan (GTP II) (2015/16-2019/20) and Sustainable Development Goals (SDGs) by 2030. However, Sustainable Development Goals cannot be achieved without improving maternal and child nutrition.

- ✓ The result of study could be used by program managers and policy makers working on maternal health and diet to design and organize actions aimed at reducing the burden of pregnant women's micronutrient deficiency and inadequate dietary diversity intake.
- ✓ This study helps Fitcha town health office in designing appropriate nutrition interventions among pregnant women.
- ✓ Health care providers and other concerned bodies will be getting a proper feedback from the outcome of this research. They use the result of this research as base line in their health education activity, policy making and other activities to improve pregnant women dietary diversity.
- ✓ This study will help in creating awareness about dietary diversity, factors affecting dietary diversity, counselling and education among pregnant women.
- ✓ This study will also act as a basis for future research for those who may want to do a similar research.

2. LITERATURE REVIEW

2.1 Measurement of dietary diversity

Dietary diversity is defined as the number of individual food items or food groups consumed over a given period of time (26). Dietary diversity can be measured at household level (household dietary diversity) or at individual level (women dietary diversity or child dietary diversity). Based on the intended purpose and level of measurement of the survey the number and type of foods or food groups included in the questionnaire and subsequent analysis methods varied among different measurement(27).

The 2016 guideline, which was developed and released by the Food and Agricultural organization of the United Nations (FAO) and Family Health International (FHI360) proposed the use of minimum dietary diversity for women (MDD-W) to measure the dietary diversity of reproductive age women (15-49 years) over the past 24 hours. MDD-W is a dichotomous indicator based on a ten food groups recommends the consumption of at least five out of ten defined food groups as indicator of a high probability of eleven micronutrient adequacy of women's diet(2).

The association between probability of adequate micronutrient intake and individual dietary scores was determined by study conducted in Iran among reproductive age women. Grain diversity score was correlated with probability of Vitamin B2 ($r = 0.33$, $p 0.05$), Protein ($r = 0.33$, $p 0.05$), and carbohydrate adequacy ($r = 0.22$, $p 0.05$). Vegetable diversity score was correlated with vitamin A ($r = 0.32$, $p 0.05$), potassium ($r = 0.19$, $p 0.05$) and vitamin C adequacy ($r = 0.44$, $p 0.05$). Fruit diversity score was associated with the probability of vitamin A ($r = 0.32$, $p 0.05$), vitamin C ($r = 0.44$, $p 0.05$) and potassium ($r = 0.39$, $p 0.05$) adequacy. Dairy diversity score was associated with calcium ($r = 0.54$, $p 0.05$), phosphorus($r = 0.32$, $p 0.05$), protein ($r = 0.34$, $p 0.05$), vitamin B2 adequacy ($r = 0.44$, $p 0.05$) and zinc adequacy ($r = 0.24$, $p 0.05$). Meat diversity score was associated with the probability of vitamin B6 ($r = 0.22$, $p 0.05$), B12 ($r = 0.24$, $p 0.05$), iron ($r = 0.24$, $p 0.05$), phosphorus ($r = 0.23$, $p 0.05$) and protein adequacy ($r = 0.34$, $p 0.05$) (28).

2.2.Dietary diversity adequacy

An institutional based cross sectional study conducted in Pakistan showed that around 89% of pregnant women had medium, while only 5% had low and high dietary diversity score (DDS) respectively(29). Assessment of India's third national family health survey showed that one-third of the countries' mothers (31.1%) consumed an adequately diversified diet(30). A similar study design conducted in Iran during third trimester of pregnancy showed that 2.60 ± 0.73 total dietary diversity score and the highest diversity was seen in the dairy group (0.45 ± 0.19) whereas the lowest diversity of food was observed in grains group (0.20 ± 0.10) (31). Another urban community based cross sectional study design conducted in Burla indicates 47.3 % of reproductive age women attain minimum dietary diversity. Furthermore, cereals was a dominant food group consumed by all women of reproductive age (100%) whereas eggs (21%), nuts and seeds (8.66%) were least consumed food groups (32).

Another study conducted in Northern Ghana showed that the proportion of pregnant women who consumed adequate dietary diversity (consumed eight food groups out of eleven food groups) during pregnancy were 85.5% with the mean dietary diversity score of 9.1 ± 1.4 SD(33). Additional study conducted in three town of South Africa reported that majority of reproductive age women in the town were dominated by starchy staples, predominantly maize meal. Only 25% of women consumed adequate dietary diversity with the mean dietary diversity score all town were less than four (3.78 ± 0.07 SD in Richards Bay town, 3.21 ± 0.08 SD for Dundee town and 3.36 ± 0.07 SD for Harrismith town) out of ten food groups (34).

According to a cross-sectional analytic study conducted in Kenya, 60.6% of pregnant women in the country were consumed adequate dietary diversity with the mean dietary diversity of around seven food groups (6.84 ± 1.6 SD) out of fourteen food groups. In regard to consumption of food by groups, the most commonly consumed foods were cereals (starchy staples) (99.2%), other vegetables (92.9%) while foods of animal origin were the least consumed food groups(35).

An institutional based cross-sectional study conducted at Bale Zone, Southeast Ethiopia indicates only 44.8% of pregnant women had adequate DD during pregnancy. Concerning the consumption of food by food groups starchy staples (cereals) 87.9% and pulses (legumes) 75% were the most commonly consumed food groups by pregnant women while only 8.2% of them

reported consuming fish or fish products in the past 24 hours(36). Another similar study conducted at Dire Dawa city indicates more than half of pregnant women 57% (95%CI, 51.0, and 60.1) had poor dietary diversity during pregnancy. The study also reports grains, white roots, and tubers were the food groups consumed by all pregnant women (100%) whereas only 16.3 % of pregnant women consumed eggs (37).

A community based cross-sectional study conducted in East Gojjam, Northwest Ethiopia indicates slightly more than half (55%) of pregnant women had inadequate dietary diversity during pregnancy. In regard to consumption of foods by food groups, commonly consumed food groups were legumes, nuts, and seeds (85.5%) followed by starchy staples (64.%) (21). Similarly a community based cross sectional study conducted on rural household in South Gonder Zone specifies only 16.2 % of household had adequate dietary diversity (38).

2.3 Factors affecting dietary diversity

2.3.1 Socio-demographic factors

Several studies report the association between women dietary diversity and socio-demographic factors. Study conducted in Burla identified that age ≥ 25 years had 1.78 times higher odds of attaining MDD-W compared to those with <25 years. Similarly those who are unmarried have 0.097 times higher odds of attaining MDD-W as compared to those who are married (32).

Another study conducted in rural Bangladesh found that women who completed secondary or higher level of education (OR 2.58 CI 95% (1.27-5.24); $P < .001$), whose husbands' occupation had business (OR 1.85 (1.09-3.14 CI 95% ; $P < .001$) and who live in households of 4 or more family members (OR (95% CI) of 1.77 (1.08-2.90 $P < 0.03$) had showed positive association with attaining higher dietary diversity (39). According to study conducted in Tanzania educational level of head of house hold showed significant effect ($\beta = 0.211$; $p < 0.001$) on household dietary diversity(40).

2.3.2. Socio-economic factors

Health survey conducted in Ghana indicates source of drinking water and household livestock production, as significant socioeconomic determinants of dietary diversity among reproductive age mothers (33).

An institutional based cross-sectional study conducted in Tigray region, Ethiopia showed that lactating mothers whose their source of drinking water is from protected well (AOR=4.5, 95% CI (1.1-18.2) and who were not practicing home gardening (AOR= 2.1, 95% CI: 1.01, 4.2) were significantly associated with low dietary diversity to those who reported tap water as main source of drinking water and practice home gardening. Also, household monthly income of 501 to 1500 Ethiopian birr (AOR = 3.0, 95 % CI (1.4, 6.3) and less than 501 Ethiopian birr (AOR = 2.3, 95 % CI: 1.2, 4.6) were more likely to have low dietary diversity than those who had household monthly income above 1500 ETB(41). Similarly having a latrine (AOR 5.06 (2.90, 8.84 95% CI, P<0.05), and home garden practice (adjusted OR 2.34(1.39, 3.94) 95% CI, P<0.05 were associated with achievement of higher dietary diversity among pregnant women in Bale Zone, Ethiopia (36).

2.2.3 Food security factors

Dietary diversity has been positively linked with household food security status. A cross sectional study design conducted in two rural central Malawi showed that pregnant women with household food insecurity had a 0.36 times less likely to have a lower adequate dietary diversity (P<0.05) and more than threefold higher risk (OR; 95% CI (3.19; CI 1.68, 6.03) of not consuming meat/fish. Also the risk of not consuming egg increased by almost four times (OR=3.77; P=0.04) among pregnant women reporting moderate food insecurity (42).

Another longitudinal analysis in rural Bangladesh showed that maternal dietary diversity decreases with decreased household food security. Compared with women from food-secure households, women from mild food unsecured household were less likely to have consumed dairy products (AOR= 0.73, 95% CI: (0.69, 0.78), meat (AOR=0.83, 95% CI: 0.79, 0.88), egg (AOR=0.81, 95% CI:0.76, 0.85), fish and fish products AOR=0.87, 95% CI: 0.80, 0.94 and legumes and nuts (AOR= 0.88, 95% CI: 0.83, 0.93) compared to women from food secured households. Similarly, women from moderate food unsecured household were less likely to have consumed dairy products (AOR=0.62, 95% CI: 0.58, 0.66), meat (AOR= 0.73. 95% CI: 0.69, 0.78), eggs (AOR=0.73, 95% CI: 0.68, 0.77), vegetables and fruit (AOR=0.78, 95% CI: 0.73, 0.84) whereas women from severe food unsecured household were less likely to have consumed dairy products (AOR=0.52, 95% CI: 0.48, 0.55), eggs (AOR=0.61, 95% CI:0.57, 0.65),

meat(AOR=0.60, 95%CI:0.56, 0.64), fish (AOR=0.76, 95% CI: 0.70, 0.83) vegetables and fruit (AOR= 0.72, 95% CI:0.67, 0.78) compared to women from food secured households(43).

2.3.4 Pregnancy and feeding pattern factors

Study conducted in Hossana town, South Ethiopia indicates that, a pregnant women who consumed meal three times per day were 8.3 times (AOR =8.3; 95% CI: 4.5, 15.6) and those who consumed meal four and greater times per day were 12.9 times (AOR=12.9; 95%: 3.1, 52) more likely to had adequate dietary diversity compared to those who had less than two times meal per day Also, pregnant women who had got health education about consuming additional meals, source of iron rich foods and dietary diversity intake during pregnancy had 2.3 times folds (AOR = 2.3, 95% CI: 1.2, 4.4) of more likely to have adequate dietary diversity as compared to those who didn't get the information (44).

A community based cross-sectional study conducted in Dessie town, northeastern Ethiopia showed that a pregnant women with no history of illness two weeks before the date of data collection were 0.42 times less likely to have poor dietary diversity practice compared to those who had no history of illness(AOR = 0.42; 95% CI: 0.22, 0.80).Also a pregnant women at herfirst trimester of pregnancy were 0.46 times less likely to have poor dietary diversity practice as compared to those in third trimester of pregnancy(AOR = 0.46; 95%CI = 0.26, 0.80)(21).

Conceptual Framework

The conceptual framework of this study is developed from literature review through understanding capacity factor which affect women dietary diversity (figure -1). It is summarized as maternal socio-demographic factor, socio economic status; pregnancy and feeding factors and house hold food insecurity.

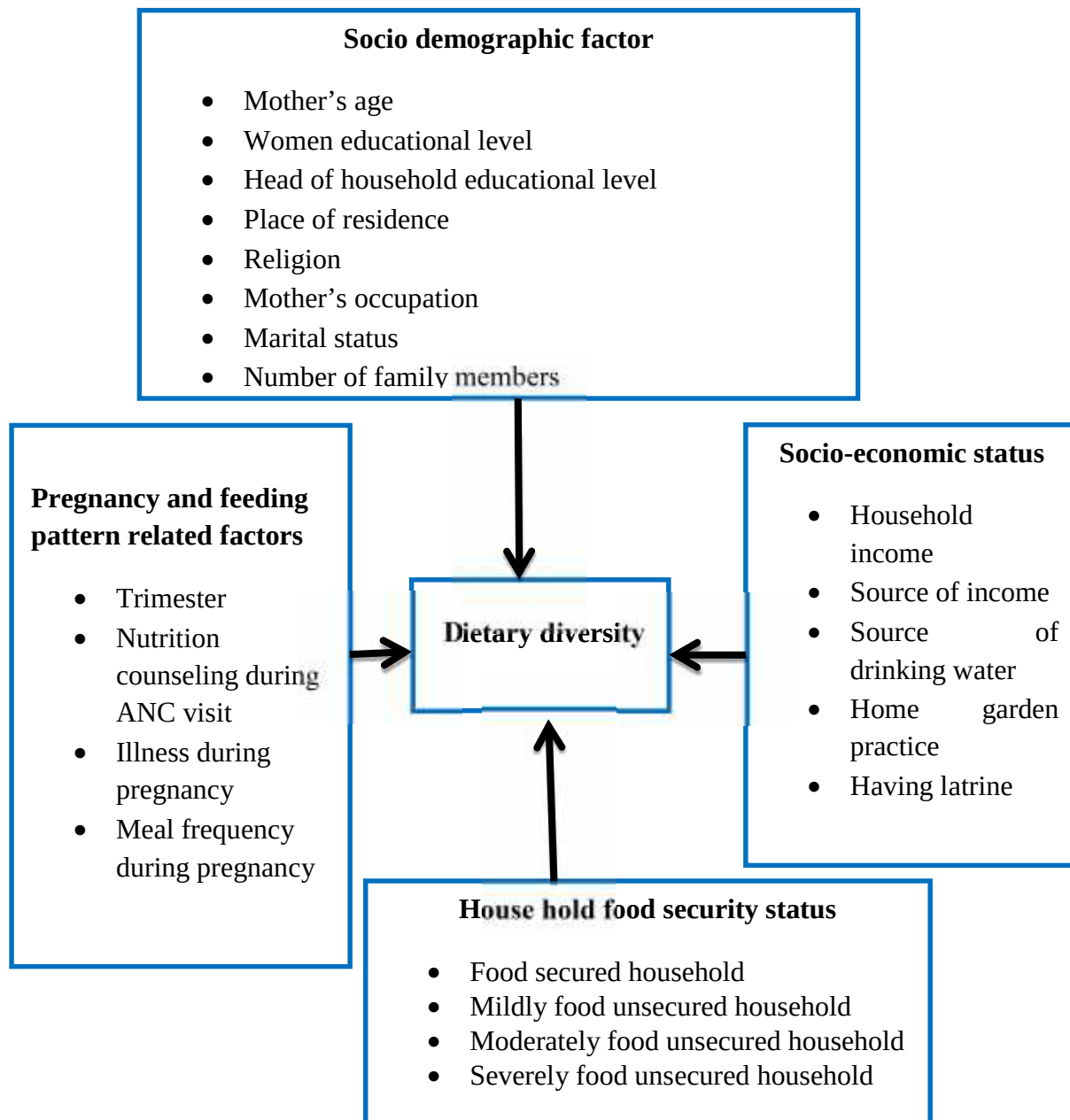


Figure 1: Conceptual framework indicating associated factors with dietary diversity(source: developed from literature review)

3. OBJECTIVE

3.1 General objective

To assess dietary diversity adequacy and associated factors among pregnant women attending antenatal care at public health facilities in Fitch town, Oromia Region, Ethiopia 2020.

3.2 Specific objectives

To assess dietary diversity adequacy among pregnant women attending antenatal care.

To identify factors associated with dietary diversity adequacy of pregnant women.

4. METHODS AND MATERIALS

4.1 Study area and study period

The study was carried out in Fitcha town found in North Shewa Zone, Oromia Region Ethiopia from April 15 to May 15, 2020. Fitcha town is found 114 Kilometers from the capital city of Ethiopia. Fitcha town has one general hospital (Fitcha general hospital) and two health centers (Fitcha health center one and two) that provide antenatal care. According to the information provided from Fitcha town administrative office, Fitcha town has the total population of 39,910, of which 21,136 are females, and from these 8,832 are in the reproductive age group. The major crops grown in North Shewa Zone include cereals, pulses and horticultural crops such as fruit, vegetables, and root crops. Cereals include teff, wheat, barley, maize and sorghum whereas; pulses include bean, peas, field pea, lentils and vetch. Besides, in a very small amount oilseeds such as linseeds and nuga (*Guizotia abyssinica*) are growing.

4.2 Study design

Institutional based cross-sectional study design was conducted.

4.3 Source of population

All pregnant women attending antenatal care at public health facilities of Fitcha town, Oromia Region, Ethiopia, 2020.

4.4 Study population

All pregnant women who were on antenatal care follow up during data collection period at public health facilities of Fitcha town, Oromia Region, Ethiopia, 2020.

4.4.1 Inclusion criteria

The pregnant women attending ANC service at public health facilities and provided informed consent to participate in the study during data collection period were included.

4.4.1.1 Exclusion criteria

A pregnant woman who had been seriously ill during data collection period was excluded from the study. Also, pregnant woman with un-usual dietary intake in previous 24 hours such as feasts at functions, fasting and celebrations was excluded from the study.

4.5 Sample size determination

The sample size was determined by using single proportion population formula as follows.

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

Where:

n= is the desired sample size

Z = Standard normal variable at 95% confidence level (1.96)

d = Margin of error (0.05)

p = Proportion of pregnant women with adequate dietary diversity that is 38.5 % (45).

q = 1-p

$$n = \frac{(1.96)^2 (0.615) (0.385)}{(0.05)^2} = 364$$

Finally, a sample size of 364 pregnant women was selected for the study. Due to the possibility of non-response rate 10% added. That is 364+36=400. So this study had a sample size of 400 pregnant women.

4.6 Sampling technique

Fitche general hospital, Fitche health center one and Fitche health center two are public health facilities found in Fitche town providing antenatal care services included in the study. The study participants for each health facilities allocated proportionally after identifying the three months (September, October and November in 2019) antenatal care follow up of pregnant women at each health facility as shown in figure 2. The study participants were selected by systematic random sampling method. The sampling interval was calculated by dividing the monthly attendance for antenatal care follow up at each health facility to calculated sample size. The calculated sample interval for each health facility was two. The first study participant was selected by lottery method during ANC follow-up and continued at every two intervals at each health facility in similar pattern until the required numbers of samples was met.

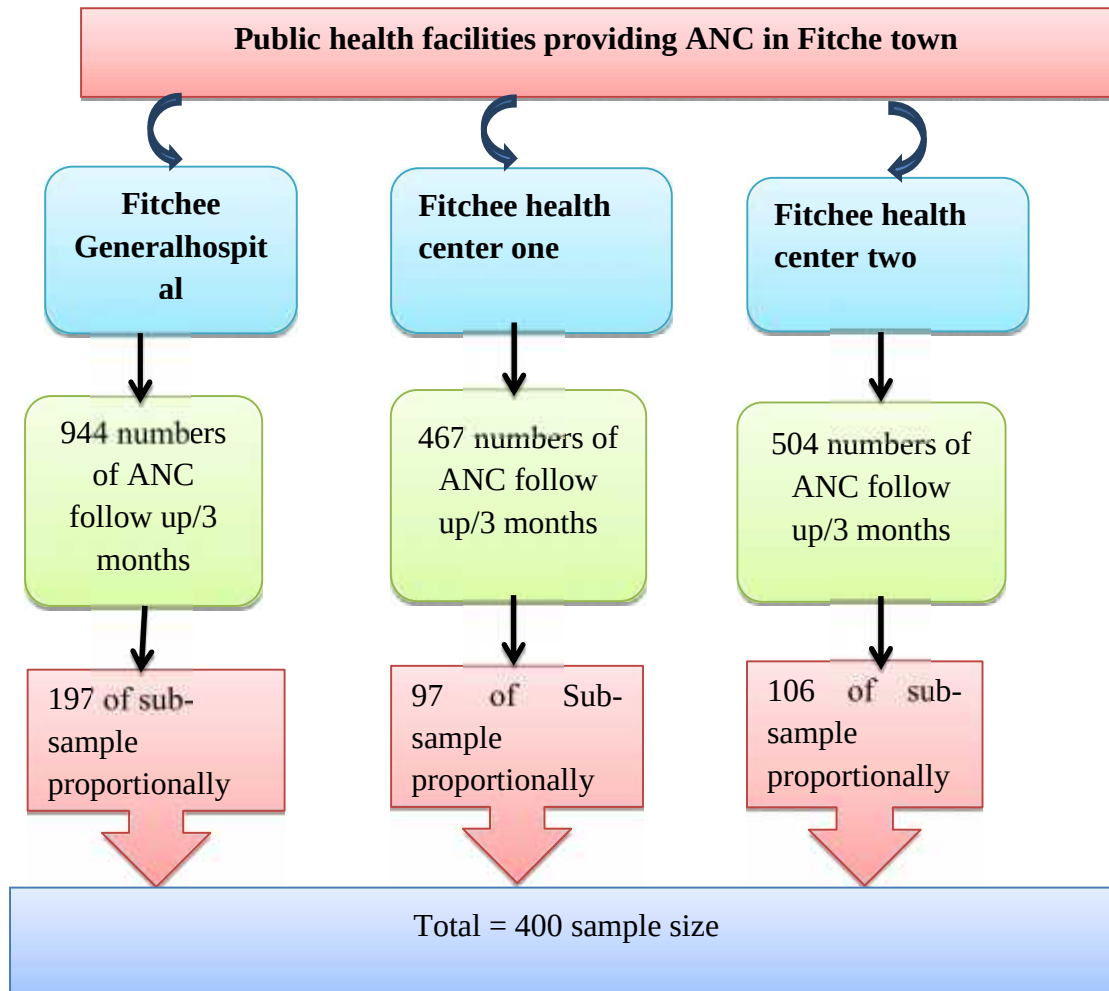


Figure 2:- Proportional allocation of sample size from each public health facilities

4.7 Variables of the study

4.7.1 Dependent variable

Dietary diversity

4.7.2 Independent variable

Socio-demographic factors

- Age of women, women education, head of household education, women's occupation, number of family members, place of residence, etc.

Pregnancy and feeding pattern related factors

- Gestational age, meal frequency per day during pregnancy, history of illness during the last two weeks before assessment, dietary counseling during ANC follow up

House hold food security-food secured household, mildly food unsecured household, moderately food unsecured household, severely food unsecured household

Socio- economic status

- Source of household income, average monthly income, home garden practice, having latrine, source of drinking water

4.8 Operational definitions

- **Dietary diversity:** Number of individual food groups consumed over a 24-hour period.
- **Maternal dietary diversity:** Defined as the number of food groups consumed by pregnant women over a 24-hour period.
- **Dietary diversity scores:** created by summing up the number of food groups consumed over a 24-hour period by the pregnant women. According MDDS there are around 10 different food groups as proposed by the MDD-W guideline based on their nutrient consist of: 1) starchy staple foods, 2) beans and peas; 3) nuts and seeds; 4) dairy products (milk, yogurt, and cheese); 5) flesh foods (meat, fish, poultry, and liver or organ meats); 6) eggs; 7) dark green vegetables; 8) vitamin A-rich fruits and vegetables; 9) other vegetables; and 10) other fruits. Each group was assigned a score of 1 if consumed and 0 if not consumed.
- **Inadequate dietary diversity:** When pregnant women consume less than or equal to four food groups.
- **Adequate dietary diversity:** When pregnant women consume five or more food groups(2).

Food security: a state in which all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. Household Food Insecurity Access Scale (HFIAS) was used to measure food security.

The scale consist of nine occurrence questions that represent a generally increasing level of severity of food security (access) and nine frequency of occurrence questions that are asked as follow up to each occurrence questions to determine how often the condition occurred. The collected response were coded as 0 (no) or 1 (yes) corresponding to the occurrence questions and 1 (rarely), 2 (sometimes) and 3 (often) corresponding to the frequency of occurrence questions and if the occurrence question answered 0 (no) to the occurrence questions then the frequency of occurrence question was skipped but if the occurrence questions was answered 1 (yes) to the occurrence questions then the frequency of occurrence questions could be 1 (rarely) or 2 (sometimes) or 3 (often).

The maximum score is 27 when the women responded yes to all nine occurrence questions and often to all nine frequency - of -occurrence questions and the minimum score is 0 when the women responded no to all occurrence questions. Households was categorized as increasingly food insecure as they respond affirmatively to more severe conditions and experience those conditions more frequently. After summing the codes for each frequency -of -occurrence questions, households were categorized into four food security categories as:

- **A food secure household:** Question (Q)3.1=0 or Q3.1a=1 and Q3.2-Q3.9=0) experiences none of the food insecurity (access) conditions or just experience worry, but rarely
- **A mildly food insecure household:** (Q3.1a=2 or 3 or Q3.2a=1 or 2 or 3 or Q3.3a=1 or Q3.4a=1 and Q3.5-Q3.9=0) worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely.
- **A moderately food insecure household:** (Q3.3a=2 or 3 or Q3.4a=2 or 3 or Q3.5a=1 or 2 or Q3.6a=1 or 2 and Q3.7-Q3.9=0) sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes.
- **A severely food insecure household:** (Q3.5a=3 or Q3.6a=3 or Q3.7a=1 or 2 or 3 or Q3.8a=1 or 2 or 3 or Q3.9a=1 or 2 or 3) has forced to cutting back on meal size or number of meals often and/or experience any of the three most sever conditions (running out of food , going to bed hungry, or going a whole day and night without eating) (46).

4.9 Data collection tools

Pre-tested structured interviewer administered questionnaire was used. The questionnaire to collect information on socio-demographic, socio- economic, pregnancy and feeding pattern related status is adapted and reviewed from literature review (36,38,45). Also, a questionnaire to collect dietary diversity of pregnant women was adapted from a validated and modified individual dietary diversity guideline as recommended by FAO. A minimum of 1 tablespoon ($\geq 15\text{g}$) (approximated by women) of any food items consumed was assigned to a defined food groups (2). Pregnant women household food security level was determined using standard set of questions derived from Household Food Insecurity Access Scale (HFIAS) measurement guide which was developed by Food and Nutrition Technical Assistance (FANTA)/United States Agency for International Development's (USAID) (46). The questionnaire was translated first into local language Afaan Oromo and Amharic and then translated back to English version for data analysis by language expert. Additionally, Human nutrition expert (Holder of master's degree in Human nutrition, and working at Salale University College of Health Science, Abebech Gobena Campus as academic staff) was consulted to improve the local validation of the tool.

4.10 Data quality control

To assure the quality of data, standard data collection questionnaire was used. The questionnaire was assessed for its content, length and word selection as well as it was given to 5% (21 pregnant women) of sample size who attended ANC follow up at Kuyu primary hospital found at 45 kilometers from Fitchee town. This helped to modify questionnaires' by involving missed food or by avoiding inapplicable food in the study. Then, the required number of pretested questionnaire was duplicated and prepared for field work.

Three data collectors (Midwives graduates) and one supervisor were trained for two days prior to data collection on whole data collection procedure. The procedure manual for the data collection was prepared and distributed for data collectors and supervisor. This facilitated the communication between data collectors and principal investigator. During data collection the principal investigator and supervisor were reviewed filled questionnaire on a daily basis. Before data entry, each questionnaire was given a unique code by the principal investigator.

4.11. Data processing and analysis

Completed questionnaire were checked for completeness and coded, data were entered in to Epi data version 4.6 and exported to Statistical Package for Social Science (SPSS) version 24 for data processing and analysis. Data were edited and cleaned using frequencies and cross-tabulations. Description of means, frequencies and proportions of the given data for each variable was calculated. Results from bivariate analysis of $p\text{-value} < 0.05$ were entered into multivariable logistic regression model to control the effects of confounders. A variable with the $P\text{-value} < 0.05$ at 95% confidence interval was considered as statistically significant. Crude and adjusted odds ratios with their 95% confidence intervals were calculated. Finally, the results of the study were presented using tables, figures and text based on the obtained data.

4.12 Ethical considerations

The proposal was approved by Addis Ababa University College of Health Science School of Nursing and Midwifery Department of Midwifery and written ethical clearance was obtained. Then a formal letter of cooperation was obtained from Addis Ababa University College of Health Science School of Nursing and Midwifery Department of Midwifery. Additional permission letter was granted from Fitcha town health bureau. Finally, after explaining the purpose and process of the research to the study participants, informed consent was obtained from each participant. To keep privacy of the respondents, the name and any identity was not included in the data collection questionnaire.

4.13 Dissemination of results

The final report will be presented and discussed at Addis Ababa University College of Health Science School of Nursing and Midwifery, Department of Midwifery as partial fulfillment of the degree of Master of Maternity and Reproductive Health Nursing. Results of this study will be sent to Fitcha town health Bureau and to each health facilities where data was collected. Efforts will be made to present on scientific conferences and it will be published on local or international journals.

5. RESULTS

In this study, a total of 395 of pregnant women were involved in the study with a response rate of 98.75%.

5.1 Socio-demographic characteristics

The mean $\pm$ Standard deviation (SD) of the respondents age was 26.88 ± 4.94 years and majority 149 (37.7%) of them were between 23 and 28 years of age. Majority of the respondents 264 (66.8 %) were Orthodox Tewaheido Christian religion followers and 343 (86.8%) were married. Three hundred forty six(87.6%) of pregnant women live urban.

Around one thirds of the participants 97(24.6%) were able to read and write. Greater than three-fourths 297 (75.2%) of households were headed by husband and for households were the pregnant women were not household heads, 112 (28.4%) heads of household had elementary level formal education. Majority of study participants 275 (69.6%) had family members size below five. More than half of the pregnant women were housewives 224(56.7%).

Table 1: Socio-demographic characteristics of pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020(n=395)

Variables	Frequency	%
Age		
17-22	95	24.1
23-28	149	37.7
29-34	125	31.6
35-40	26	6.6
Religion		
Orthodox	264	66.8
Protestant	64	16.2
Muslim	39	9.9
Others*	28	7.1
Marital status		
Single	14	3.5
Married	343	86.8
Widowed	22	5.6
Divorced	16	4.1
Residence		
Urban	346	87.6
Rural	49	12.4

Maternal educational status		
Unable to read and write	66	16.7
Read and write	97	24.6
Elementary school	81	20.5
Secondary and preparatory school	75	19.0
College and above	76	19.2
Head of household		
Husband	297	75.2
Wife	74	18.7
Both	24	6.1
Head of household educational status		
Unable to read and write	40	10.1
Read and write	51	12.9
Elementary school	112	28.4
Secondary and preparatory school	101	25.6
College and above	67	17.0
Number of family members		
Below five	275	69.6
Five and above	120	30.4
Mother's occupation		
House wife	224	56.7
Government employee	60	15.2
Merchant	53	13.4
Daily laborer	27	6.8
Others**	31	7.8

* Catholics, traditional believers ** students, unemployed etc.

5.2 Socio-economic characteristics

Greater than one third 142(35.9%) of study participants had trade and private enterprise as a main source of household income. Furthermore, more than half of the participants 266 (67.3%) had average monthly income between 501-1500 Ethiopian birr. Regarding the source of drinking water for family members of pregnant women household, 362 (91.6%) of mothers reported tap water as the main source of their drinking water. With regard to latrine presence in their home, 354 (89.6%) of pregnant women reported that they had toilet in their home. Slightly more than one third 128 (32.4%) of pregnant women reported they practice household home gardens.

Table 2: Socio economic characteristics of pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020(n=395).

Variables	Frequency	%
Main Source of household income		
Farming and livestock	102	25.8
Trade and private enterprise	142	35.9
Employed	78	19.7
Daily laborer	48	12.2
Others	25	6.3
Average monthly income		
Below 500 ETB	24	6.1
501-1500 ETB	266	67.3
Above 1501 ETB	105	26.6
Source of drinking water		
Tap water	362	91.6
Pumping water	16	4.1
Protected well	17	4.3
Latrine present		
Yes	354	89.6
No	41	10.4
Home garden practice		
Yes	128	32.4
No	267	67.6

5.3 Pregnant women's household food security status

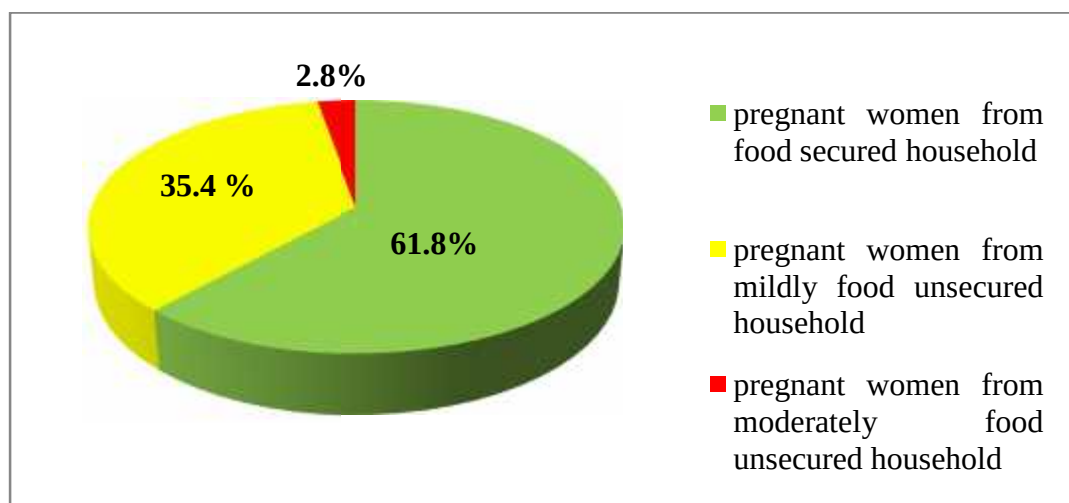


Figure 3: Household food security status of pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020.

More than half of pregnant women 244 (61.8%) were from food secured household and 140 (35.5%) of pregnant women were from mildly food unsecured household that worries about not having enough food sometimes or often, and/or is unable to eat preferred foods. Furthermore, 11 (2.8%) of pregnant women were from moderate food unsecured household that sacrifices quality more frequently, by eating a monotonous diet sometimes or/and often.

Table 3: Household food security status of pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020(n =395).

Variables	Frequency	%
Worry about not enough food		
Yes	198	50.1
No	197	49.9
How often did this happen		
Rarely	105	53.3
Sometimes	93	46.7
Unable to eat the kindsof foods you preferred		
Yes	140	35.4
No	255	64.6
How often did this happen		
Rarely	98	70
Sometimes	43	30
Eat a limited variety of foods or just a few kinds of foods		
Yes	56	14.2
No	339	85.8
How often did this happen		
Rarely	45	80
Sometimes	11	20
Eat a food they really do not want to eat		
No	395	100
Eat smaller meal than needed		
No	395	100
Eat fewer meal in a day		
No	395	100
No food of any kind in the household		
No	395	100
Go to sleep hungry		
no	395	100
Go a whole day and night without eating		
No	395	100

5.4 Pregnancy and feeding pattern related characteristics

About 200 (50.6%) of pregnant women were in the second trimester of pregnancy during assessment. More than one third 142 (35.9%) of pregnant women reported that they had received counseling on dietary intake during their antenatal care visit from health professional. About 268 (67.8%) of pregnant women consumed three and above meals per day in the last day before assessment. On the other hand, 43 (10.9%) of pregnant women had history of illness two weeks before the date of data collection

Table 4: Pregnancy and feeding pattern related characteristics of pregnant women attending antenatal care public health facilities in Fitch town, Oromia region, Ethiopia 2020(n=395).

Variables	Frequency	%
Gestational age		
First trimester	68	17.2
Second trimester	200	50.6
Third trimester	127	32.2
History of illness in the last two weeks before assessment		
Yes	43	10.9
No	352	89.1
The frequency of maternal food eating pattern		
Three meals and above per day	268	67.8
Two meals only or below per day	127	32.2
Dietary counseling during ANC follow up		
Yes	142	35.9
No	253	64.1

5.5 Dietary diversity adequacy

Dietary diversity adequacy created by summing up the number of food groups consumed over a 24 hour period by the pregnant women. According to Food and Agriculture Organization (FAO) individual and household dietary diversity guideline there are around 10 different food groups to determine dietary diversity. Each group was assigned a score of 1 if consumed and 0 if not consumed. Then, the score summed up for food groups consumed and classified into inadequate dietary diversity when pregnant women consume less than or equal to four food groups and adequate dietary diversity when pregnant women consume five or more food groups out of ten food groups.

Out of ten food groups, the study found that the mean dietary diversity score among the pregnant mothers was 4.6 ± 1.12 Standard deviations (SD). Among the total pregnant mothers, 219 (55.4 %) had adequate dietary diversity (dietary diversity score greater or equal to 5) and 176 (44.6%) of them had inadequate dietary diversity (dietary diversity score less than or equal to 4) in the previous 24-hours recall periods.

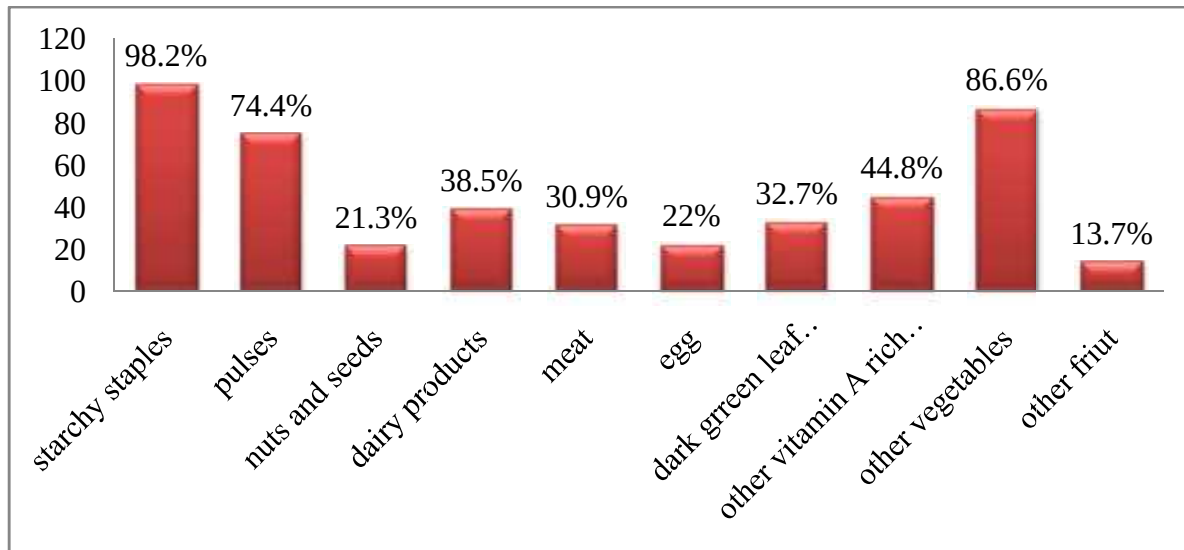


Figure 4: Dietary diversity adequacy of pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020 (n=395).

Regarding the most consumed food groups by the pregnant women almost all women 388 (98.2 %) ate starchy staples (grains, white roots and tubers, and plantains); more than three-thirds of pregnant women 342 (86.6 %) consumed other vegetables (onion, tomato, etc.) in the previous 24-hours. On the other hand, concerning the least consumed food groups, egg 87 (22%), nuts and seeds 84 (21.3%), and other fruit 54 (13.7%) were the least consumed food groups by pregnant women.

Table 5: Dietary diversity adequacy of pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020 (n=395).

Variables	Consumed/not consumed	Frequency	%
Grains, white roots and tubers, and plantains	Yes	388	98.2
	No	7	1.8
Pulses (beans, peas and lentils	Yes	294	74.4
	No	101	25.6
Nuts and seeds	Yes	84	21.3
	No	311	78.7
Dairy	Yes	152	38.5
	No	243	61.5
Meat, poultry and fish	Yes	122	30.9
	No	273	69.1
Egg	Yes	87	22
	No	308	88
Dark green leafy vegetables	Yes	129	32.7
	No	266	67.3
Other vitamin A-rich fruits and vegetables	Yes	177	44.8
	No	218	55.2
Other vegetables	Yes	342	86.6
	No	53	13.4
Other fruits	Yes	54	13.7
	No	341	86.3

5.6 Factors affecting dietary diversity adequacy of pregnant women

The association of dependent and independent variables were explored by both bivariate and multivariate logistic regression. The bivariate logistic regression analysis shows that place of residence, mother's educational level, mother's occupation, average household monthly income, having a latrine, practicing home garden, frequency of meals per day, receiving dietary intake counseling during ANC and no history of illness in the last two weeks before assessment were the factors associated with adequate dietary diversity of pregnant women. Then, in the multivariable logistic regression analysis, some variables such as place of residence, mother's occupation, average household monthly income, practicing home garden, history of illness in last two weeks before assessment, and receiving dietary intake counseling during ANC were factors significantly associated with adequate dietary diversity.

Pregnant women's place of residence was significantly associated with dietary diversity adequacy. Pregnant women who live in urban area were 2.6 (AOR=2.64, 95% CI: 1.412-4.94) times more likely to have adequate dietary diversity than those who live in rural area.

Concerning to women's occupation whose their occupation were housewife (AOR=2.5, 95% CI: 1.13, 5.58), being employed (AOR=2.95, 95% CI: 1.17, 7.50), and daily laborer (AOR=3.57, 95% CI: 1.21, 10.57) had more likely to have adequate dietary diversity compared to those whose occupation was student, unemployed.

The study also showed those pregnant women whose average household monthly income was below 500 ETB (AOR=0.25, 95% CI: 0.07, 0.83) were less likely to have adequate dietary diversity compared to those women whose average household monthly income was above 1501 ETB. Pregnant women who had practice home gardens were 2.5 times more likely to have adequate dietary diversity when compared with those who had no home garden practice (AOR=2.5, 95% CI: 1.39, 4.5). Those who had three meals and above per day had three times more likely to have adequate dietary diversity in their diet compared with those who had two meals and below per day (AOR=2.9, 95% CI: 1.64, 5.09). Similarly, pregnant women who reported receiving dietary counseling during ANC follow up had 3.5 times (AOR=3.56, 95% CI: 2.0, 6.35) more likely to have adequate dietary diversity.

Table 6: Factors associated with dietary diversity adequacy of pregnant women attending antenatal care at public health facilities in Fitch town, Oromia region, Ethiopia 2020 (n=395).

Variables	Adequate dietary diversity		COR (95% CI)	AOR (95% CI)	P-value
	No	Yes			
Residence					
Urban	32	17	2.64(1.412-4.94)*	2.4(1.1, 5.18)**	P<0.02
Rural	144	202			
Mother's educational status					
Unable to read and write	38	28	0.38 (0.19, 0.76)*	0.59(0.0.23, 1.54)	P-0.282
Read and write	40	57	0.74 (0.39, 1.38)	1.79 (0.73, 4.39)	P-0.203
Elementary school	43	38	0.46 (0.24, 0.88)*	0.99 (0.4, 2.50)	P-0.973
Secondary and	29	46	0.83 (0.43, 0.16)	1.47 (0.63, 3.43)	P-0.374

preparatory school					
College and above	26	50	1	1	
Mothers occupation					
House wife	102	122	2.51 (1.13, 5.58)*	3.44 (1.37, 8.68)**	P-0.009
Government employee	21	39	3.9 (1.55, 9.8)*	3.69(1.12, 12.16)**	P-0.032
Merchant	22	31	2.95(1.17, 7.50)*	3.43 (1.15, 10.24)**	P-0.027
Daily laborer	10	17	3.57(1.21, 10.57)*	3.66 (1.0, 13.45)**	P-0.050
Others	21	10	1	1	
Average monthly income					
Below 500 ETB	18	6	0.21 (0.08, 0.57)*	0.25 (0.07, 0.83)**	P-0.024
501-1500 ETB	118	148	0.77(0.48, 1.23)	1.16 (0.63, 2.14)	P-0.64
Above 1501 ETB	40	65	1	1	
Toilet					
Yes	148	206	2.99 (1.50, 5.98)*	0.77(.032, 1.84)	P-0.555
No	28	13	1	1	
Household home garden practice					
Yes	27	101	4.72 (2.89, 7.69)*	2.5 (1.39, 4.5)**	P-0.002
No	149	118	1	1	
History of illness in past two weeks					
Yes	28	15	0.39 (0.20, 0.75)*	0.5 (0.23, 1.11)	P-0.089
No	148	204	1	1	
Mother's meals in the past one week					
3 and above times a day	88	180	4.62 (2.93, 7.28)*	2.9 (1.64, 5.09)**	P < 0.001
2 and below times a day	88	39	1	1	
Dietary counseling during ANC follow up					
Yes	28	114	5.74(3.54, 9.30)*	3.56 (2.0, 6.35)**	P < 0.001
No	148	105	1	1	

* Significant at p-value <0.25

** significant at p-value<0.05

6. DISCUSSIONS

In this study, about 55.4% of the pregnant women had consumed adequate dietary diversity ($\geq$ five food groups out of ten food groups), whereas 44.6% had consumed inadequate dietary diversity ($<$ four food groups out of ten food groups) in the last 24-hours. This proportion was lower than the study done in Laikipia, Kenya (60.6%)(47), and Ghana (85.5%)(48). The possible difference might be due to difference in study season, sample size of study participant. Furthermore, this study contains 10 food groups with two categories whereas study conducted in Ghana contained eleven food groups. Additionally, geographical location, seasonal variability and/or socio-cultural factors may be making difference.

The result of this study was also high as compared to the study done in India (31.1%)(49), Burla (47.3%)(32), South Africa (25%) (13), Bale (44.8%)(36), Dire Dawa (43%)(37), and Alamata, Ethiopia (38.5%)(45). The difference might be due to study period, variation of the food group involved and its food category, as study conducted in India contained eight food groups developed by WHO and in Bale contained nine food groups. Also variation in geographical location and agricultural practice may be making the difference.

Results of this study indicated that nearly all (98.2%) and 86.6% of the pregnant women had consumed grains, white roots and tubers, plantains (starchy staples/cereals) and other vegetables respectively in the previous 24 hours which is predominant. This study indicated that foods made from starchy staples and other vegetables are the study participant's staple food as they are locally grown and consumed by many respondents, which may not provide a full range of micronutrients. This finding is almost consistent with the finding of other studies conducted in Vimsar town, Burla which found the most commonly eaten food groups were 100% starchy staples and 71.3% other vegetables)(32), in Laikipia county, Kenya (99.2% starchy staples and 92.9% other vegetables)(47), and in Dire Dawa city (100% starchy staples), in Ethiopia(37). This indicates that the food consumption styles in resource poor setting are almost similar as they consume what is locally grown and easily available. This consistency could be explained by the fact that study participants grow similar foods that is influenced by the same East-African agricultural food production practice and geographical locations.

On the other hand, nuts and seeds group (21.3%, egg group (22%) and other fruits group (13.7 %) were the least consumed food groups by pregnant women in the previous 24 hours. This finding indicated that least consumed foods by pregnant women are a good source of unsaturated fatty acid, vegetable and animal protein, vitamin B12 and other minerals. The finding is nearly consistent with the findings from previous studies conducted in Vimsar town, Burla where other fruit (24%), egg (14%), and nut and seeds (8.7%) were the least food groups consumed (32). Also study conducted in Dire Dawa city, Ethiopia where egg (16.3%) and other fruits groups (4.5%) were the least consumed food groups (37). A possible explanation of this finding may be these food groups are often expensive, and not accessible at affordable price. In addition, traditional way of farming practice resulted in less productivity and seasonal availability of nuts and fruits.

However, this finding is not in harmony with study done in Kenya where nuts and seeds were consumed by 54.3% of study participants, other fruits by 51.3% of study participants (47) and in Shashemane, Ethiopia nuts and seeds were consumed by 58.7% and other fruits by 52.4% of (50). This difference might be due to study period, geographical locations, and agricultural food production practice varies across different geographic locations.

Place of residence is significantly associated adequate dietary diversity as pregnant women who live in urban area were 2.6 times more likely to have adequate dietary diversity than those who live in rural area (AOR=2.6, 95% CI: 1.412-4.94). This study is consistent with study conducted in Bale zone, Ethiopia that revealed that being urban residence were 3.72 (AOR=3.72, 95% CI, 2.22, 6.20) more likely to have adequate dietary diversity than rural (36). This might be due to lifestyle difference between rural and urban, availability of more packed and fresh foods in urban and geographic distance from rural household to closest market where food can be bought or sold.

Occupation of study participant was found to be predictor of dietary diversity in this study. Women whose occupation was housewife, employed (both government and non-government), merchant, and daily laborer were more likely to have adequate dietary diversity compared to those whose their occupation was student, unemployed, etc. This study agreed with study conducted in Laikipia county, Kenya, that reported being employed (salaried) had the highest odds (2.29 times) of attaining minimum dietary diversity as compared to the non-employed (AOR 2.29; 95% CI 1.18, 4.14) (47).

This may be due to the fact that having regular monthly income increases their chance of access and choice to food. Another study done in Alamata General Hospital, Ethiopia showed that being employed (AOR = 4.87, CI: 1.70–13.95), and merchant (AOR = 4.67, CI: 1.81–12.05) were significantly associated with high dietary diversity(45). This would be explained by the fact that the higher involvement in income generating activities the higher adequate dietary diversity.

This study also shows that dietary diversity was significantly associated with the monthly household income; as the pregnant women's average monthly household income decline the probability of consuming adequately diversified food have been observed to decrease by 25% (AOR=0.25, 95% CI: (0.07, 0.83). This result showed that higher economic status was associated with higher dietary diversity adequacy. This finding is similar to finding from an institutional-based study in Shashemane, Ethiopia that showed those pregnant women whose their monthly household income was above 3500 ETB had high probability of attaining adequate dietary diversity than those whose monthly household income less than 2000 ETB (50). This could be due to the fact that low income earners recognized to be negatively affected on their preference of quality and quantity of diversified food groups consumed in their feeding arrangements attributable to income.

Pregnant women who had home gardens were 2.5 times more likely to have adequate dietary diversity when compared with those who had no home garden (AOR=2.5, 95% CI: 1.39, 4.5). This finding is supported by study conducted among pregnant women in Bale zone, Ethiopia, which revealed that pregnant women who had home gardens were 2.34 times more likely to have adequate dietary diversity when compared with those who had no home garden (AOR=2.34, 95% CI: 1.39, 3.94)(36). This would be explained by the fact that a home garden is a place where household access to a variety of foods and horticultural crops (tubers, vegetables and fruits). Also study conducted in Myanmar reported that, access to home garden is associated with a 7.7 percentage point's lower probability of being in the lowest dietary diversity score category and a 13.1 percentage point's higher probability of being in the highest dietary diversity category, relative to a household with no home gardens(51). This might be due to the reason that home gardens provide easy access to a variety of food that may not be available in the market through cultivation of different vegetables, fruits and other crops.

This study clarified that increasing meal frequency improves pregnant women dietary diversity, as those who had three meals and above per day had three times more likely to have adequate dietary diversity in their diet compared with those who had two meals and below per day (AOR=2.9, 95% CI: 1.64, 5.09). This finding is consistent with the findings from previous study done among pregnant women in East Gojjam zone, Northwest Ethiopia that reported less likelihood of inadequate dietary diversity among women with an increased meal frequency (AOR = 0.53, 95% CI (0.38–0.74)(21). This study also supported by study conducted in Hosanna town, South Ethiopia. This study shows that pregnant women's consumed meal 3 times per day where 8.3 times (AOR=8.3; 95% CI: 4.5, 15.6) had greater odds of achieving adequate dietary diversity than who had 2 times meal per day(44).This could be explained by the fact that frequent small, but balanced meals and three light snacks for pregnant throughout the day increase number of consumed food items and ensure nutritional needs are met.

Furthermore, this study noted counseling on dietary intake during ANC significantly increases the number of food groups consumed by pregnant women. This finding supported by study performed on pregnant women in Hosanna town, South Ethiopia that showed pregnant women who received health education about source of foods contain iron, increasing meal frequency per day and consuming diversified foods during pregnancy were 2.3 times more likely to have adequate dietary diversity as compared to those who didn't received health information(AOR=2.3; 95% CI: 1.2, 4.4) (44). It has been proven that integrating dietary counseling and nutrition intervention into an existing maternal, neonatal, and child health program significantly increased the number of food groups consumed by pregnant women in Bangladesh(52). A meta-analysis conducted on 34 articles showed that nutrition education and counselling provided during pregnancy improved gestational weight gain by 0.45 kg (AOR=0.45, 95% CI: 0.12, 0.79), reduced the risk of anaemia in late pregnancy by 30%(AOR=0.70 95% CI: 0.58, 0.84), increased mean birth weight by 105 g (105.2 g, 95% CI: 17.73, 192.67) and lowered the risk of preterm delivery by 19% (AOR=0.81, 95% CI: 0.66, 0.99)(53).This might be related to counseling during ANC facilitates effective communication with pregnant women about dietary diversity including food sources of vitamins, and minerals. Likewise it's the way of discussing about locally held beliefs, attitudes and misconception prohibiting pregnant women from consuming adequate diversified diet during pregnancy.

7. LIMITATION OF THE STUDY

- ✓ Lack of standardized dietary diversity measurement tool at national level and failure to determine food intake in terms of specific nutrient consumed
- ✓ As being cross-sectional study in nature, it might have drawbacks on the actual situation of the seasonal difference of the food availability in the study area.
- ✓ This study did not consider if there is any significant loss of nutrients during food preparation

8. CONCLUSIONS AND RECOMMENDATIONS

This study has shown that 55.4% of the pregnant women consumed adequate dietary diversity. Being an urban dweller, mother's occupation (being housewife, employed, merchant and daily laborer), household monthly income, household home garden practice, frequency of meal three and above per day, and receiving dietary intake counseling during ANC follow up were positively associated with the adequate dietary diversity

- ❖ **Local microfinance and saving institutes:-** this study identified pregnant women from rural households and low average monthly household incomes were more vulnerable to inadequate dietary diversity
- ✓ Support and strengthen saving habits and establish small-scale enterprises to create off-farm income opportunities for rural households. Such enterprises would improve pregnant women buying power and lead to adequate dietary diversity
- ❖ **Woreda Agriculture Offices and other non-governmental organization.**
- ✓ Promoting urban agriculture and home garden practice among vulnerable household can improve pregnant women dietary diversity.
- ✓ Increasing agro-biodiversity with production and productivity is the main factor as more than one third of pregnant women were from mildly food insecure household.
- ❖ **Health professionals and health extension workers**
- ✓ Appropriate dietary intake and meal frequency counseling during ANC, delivery, and postnatal care service are very important to improve dietary diversity during pregnancy.
- ❖ **For researcher**
- ✓ Further research is recommended with a different study design (e.g. community based) to address dietary knowledge, seasonal variability and other variables that were not included in this study.
- ✓ More study need to be done on the locally held beliefs, food taboos and misconception toward diversified food intake during pregnancy in the study area.

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APPENDIX I: ENGLISH VERSION CONSENT INFORMATION SHEET

Name of the Hospital-----Questionnaire code -----

INTRODUCTION:

My name is -----, I am working as data collector in a research conducted by Fikadu Tolesa student at Addis Ababa University. We are interviewing pregnant women here about pregnant women dietary diversity in order to generate information necessary for the planning of appropriate strategies (interventions) in the area. To attain this purpose, your honest and genuine participation by responding to the question prepared is very important & highly appreciated.

CONFIDENTIALITY AND CONSENT

Your answers are completely confidential. Your name will not be written on this form. The nurses, doctors, and other people will not be told what you said in connection to your name. You do not have to answer any question if you don't want to and you can stop the interview at any time. However your honest answer to these questions will help us to better understand the experience of mothers related to dietary diversity practice during pregnancy. We would greatly appreciate your help in responding to this study. The interview will take about 20 - 30 minutes.

Would you be willing to participate?

If yes, proceed

If no, thank and stop here.

APPENDIXII: AMHARIC VERSION CONSENT INFORMATION SHEET

የሆስፒታሉ/ጤና ጣቢያስም-----

ጤናይስጥልኝ፡፡ ስሜ _____ ይባላል፡፡

እዚህ የመጣሁት በአዲስ አበባ ዩኒቨርሲቲ በጤና ሳይንስ ኮሌጅ በሚድሃኤድ ምህንድስና ትምህርት ክፍል ማስተርስ-ን የሚሰራው ተማሪ ፍቃዱ ቶላ ሳለሚያሰሩት ጥናት መረጃ ለመሰብሰብ ነው፡፡ የጥንቱ ዋና አላማ በፍቼ ከተማ የህዝብ ጥናት ተቆማት በሚገኙ ነፍሰ-ጤና እና ቶች የአመጋግብሁኝ ቤት እና ተያያዥኛ ምክንያቶችን ለመለየት ነው፡፡

በጥናቱ መሳተፍዎ ከፍተኛ ምህንድስና ለየእንክብካቤ አይደረግልዎትም፡፡ ለሚቀርብልዎ ጥያቄ

መልስ ለመመለስ የማይፈልጉት ካለ አይገደዱም፡፡ ጥያቄዎቹን ሞልቶ ለመጨረስ 30 ደቂቃ በላይ አይወስድም፡፡

ማንኛውም የሚሰጡት መረጃም ጤራ ዊነቱ ተጠብቆ ለሌላ ሰነድ ወገን (ለነርስ ፣ ለህኪሞች እና ለልሎች ሰዎች) አይተላለፍም፡፡

በማንኛውም ቦታ የዕርስዎን አይጠቀስም፡፡ የሰጡት መረጃ ለምርምሩ አገልግሎት ከሞለበት ሂሳብ አይቀጥልም፡፡

በዚህ ጥናት ለመሳተፍ ፈቃደኛ ነዎት?

1. አዎ-----

2. አይደለሁም-----

ፈቃደኛ ካልሆኑ ጥያቄውን እዚህ ጋ ያቋርጡ፡፡

APPENDIX III: AFAAN OROMOO VERSION CONSENT INFORMATION SHEET

Seensa:

Maqaan koo ----- jedhama. Ani hojiin koo odeeffannoo nama gaafachuudhaan sassaabuudha. Innis kutaa saayinsii nyaataa fi sirna soorataa fakaltii saayinsii uumamaa yunivarsitii Finfinnee dhaan deeggarama. Nuti kan dubartoota gaafachaa jirruu waa'ee nyaataa hadhoollii yeroo ulfati. Innis karoora fi xiyyeeffannoo akka naannoo kanaatti fi akka biyyaatti guddisuuf fayyaada. Dhimma kan fiixaan baasuuf, gargaarsii fi hirmaannaan kee gaaffii kana deebisuun ati nuuf gootuu baayee barbaachisaa fi galatoomifamuu kan qabudh.

Ichii eeguu Fi Hayyamamummaa

Gaaffii dhuunfaa yookan waa'ee mataa keetii sii gaafannuuf deebii akka ati nuuf kennituuf si affeerra. Deebii kee namni biraa hindhagahu yookan ichii kee guutummaatti ni eegna . Maqaan kee waraqaa kana irratti hin barreeffamu. Narsooni, Doktorootatti ykn nama biraatti gaaffiishee gaafanneera jenne hin himnu. Gaaffii kana deebisuuf fedhii hin qabdu taanaan dhiisuu dandeessa ykn sa'atii barbaadetti dhaabuu dandeessa. Garuu gaaffii kana deebisuuf gargaarsa ati nuuf gootuu waa'ee nyaata hadhoollii yeroo ulfaa beekuuf nufayyada. Gargaarsa ati deebii kana deebisuuf nuuf gootuuf guddaa si galateeffanna. Gaaffii fi deebiin kun daqiiqaa 20-30 fudhataa.

Irratti hirmaachuu ni barbaadda ?

- ✓ Yoo isheen ,eyyeen jette itti fufi.
- ✓ Yoo isheen hin barbaadu jette moo asirratti dhaabi.

APPENDIX IV: ENGLISH VERSION QUESTIONNAIRE

Socio demographic characteristics questionnaire		
1.	How old are you?	----- age in years
2.	What is your current marital status?	1.Single 2. Married 3.Widowed 4.Divorced
3.	Where is your place of residence?	1.Urban 2.Rural
4.	What is the highest educational level you completed?	1. Unable to read and write 2. Read and write 3. Elementary school 4.High school 5.College and above
5.	Who is the head of your household?	1. Mother (jump to question number 7) 2. Husband 3. Both (jump to question number 7)
6.	If the head of household is husband, what is the highest educational level he completed?	1. Unable to read and write 2. Read and write 3. Elementary school 4.High school 5.College and above
7.	How many people are living in your household (total number of family members)?	----- by numbers
8.	What is your current main occupation?	1.House wife 2.Government employee 3. Merchant 4.Daily laborer 5.Others (specify)-----
Socio economic characteristics questionnaire		
1.	What is the main source of income to the family?	1. Farming or livestock 2. Trade and private enterprise 3. Employed (government and non-government) 4. Daily laborer 5. Other (specify
2.	What is your total monthly family (household) average income in ETB birr (approximately)?	_____ETB birr/month
3.	What is the main Source of drinking water to the household?	1.Tap water 2.Pumping water 3.Protected well 4. others(specify)-----

4.	Do you have a latrine in your household?	1. Yes 2. No
5.	Do you practicing home gardening?	1. Yes 2. No
Pregnancy related characteristics questionnaire		
1.	What is the month of your current pregnancy (approximated by mother)?	----- month/s
2.	Have you been unwell (history of illness) in the previous 2 weeks	1. Yes 2. No
3.	What is your daily eating pattern in the previous days	1. Three meals and/or above 3. Two meals and/or below
4.	Have you ever been received dietary intake counseling during your ANC visit?	1. Yes 2. No

2. DIETARY DIVERSITY QUESTIONNAIRE.

INSTRUCTIONS ONE: Please describe the foods (meals and snacks) that you ate or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning.

Write down all foods and drinks mentioned. When composite dishes are mentioned, ask for the list of ingredients. When the respondent has finished, probe for meals and snacks not mentioned

Breakfast	Snack	Lunch	Snack	Dinner	Snack

INSTRUCTION TWO: When the respondent recall is complete, fill in the food groups based on the information recorded above. For any food groups not mentioned, ask the respondent if a food item from this group was consumed.

	Food group	Items	Consumed Yes =1 No=0
1	Grains, white roots and tubers, and plantains	Barley, corn, millet, maca, oats, sorghum, teff, wheat, potatoes, sweet potato, rice, and food made from this such as Porridge, bread, pasta/noodles or other foods made from grains White yams, manioc/cassava/yucca, cocoyam, taro or any other foods made from white-fleshed roots or tubers, or plantains	___ yes (1) ___ no (0)
2	Pulses (beans, peas and lentils)	Mature beans or peas (fresh or dried seed), lentils, soybean, or bean/pea products, including hummus, tofu and tempeh	___ yes (1) ___ no (0)
3	Nuts and seeds	Any tree nut, groundnut/peanut or certain seeds, or nut/seed “butters” or pastes Flaxseed, pumpkin, sesame seed, sunflower seed.	___ yes (1) ___ no (0)
4	Dairy	Milk, cheese, yoghurt or other milk products	___ yes (1) ___ no (0)
5	Meat, poultry and fish	Liver, kidney, heart or other organ meats or blood-based foods, including from wild game Cow, ox, sheep, goat, beef, pork, lamb, wild game meat, chicken, duck or other bird Fresh or dried fish, shellfish or seafood	___ yes (1) ___ no (0)

6	Eggs	Raw eggs and foods prepared from eggs	___ yes (1) ___ no (0)
7	Dark green leafy vegetables	Spinach, kale, romaine and bibb lettuce	___ yes (1) ___ no (0)
8	Other vitamin A-rich fruits and vegetables	Carrots, pumpkin, red sweet pepper, mangoes, papaya, and deep yellow- or orange-fleshed squash and fruit juice made from this group.	___ yes (1) ___ no (0)
9	Other vegetables	other vegetables (e.g. green pepper, mushroom, cucumber, okra, tomato, onion) , fresh/green pod of bean, pea, corn, etc. and including wild vegetables	___ yes (1) ___ no (0)
10	Other fruits	other fruits such as apple, avocado, banana, grapefruit, guava, lemon, orange, pineapple, strawberry, figs, peach, fruit juice and including wild fruits	___ yes (1) ___ no (0)

3.FOOD SECURITY QUESTIONNAIRE

S. NO	Question	Response options
3.1	In the past four weeks, did you worry that your HH would not have enough food?	0 = No (skip to Q2.2) 1=Yes
3.1a	How often did this happen?	1 = Rarely (once or twice in the last 4 weeks) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)

3.2	In the past four weeks, were you or any HH member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q2.3) 1=Yes
3.2a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)
3.3	In the past four weeks, did you or any HH member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q2.4) 1 = Yes
3.3a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)
3.4	In the past four weeks, did you or any HH member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q2.5) 1 = Yes
3.4a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)
3.5	In the past four weeks, did you or any HH member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q2.6) 1 = Yes
3.5a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)
3.6	In the past four weeks, did you or any other HH member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q2.7) 1 = Yes

3.6a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)
3.7	In the past four weeks, was there ever no food to eat of any kind in your HH because of lack of resources to get food?	0 = No (skip to Q2.8) 1 = Yes
3.7a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)
3.8	In the past four weeks, did you or any HH member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q2.9) 1 = Yes
3.8a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)
3.9	In the past four weeks, did you or any HH member go a whole day and night without eating anything because there was not enough food?	0 = No 1 = Yes
3.9a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)

APPENDIXV: AMHARIC VERSION QUESTIONNAIRE

የማ በራዊ ኑሮ ሁኔታ ለመዳሰስ የተዘጋጀ መጠይቅ		
ተ.ቁ	መጠይቅ	አማራጭ መልሶች
1.	አድሜዎ ስነት ነዉ ?	-----አመት
2.	የጋብቻ ሁኔታ ምን ይመስላል	1. ያላገቡ 2. ያገቡ 3. የሞተባቸዉ 4. የተፋቱ
3.	አሁን የሚኖሩበት ቦታ	1. ከተማ 2. ገጠር
4.	ያጠናቀቁት ከፍተኛ የትምህርት ደረጃ ምንድነዉ ?	1. ያልተማረች/ መጻፍና ማንበብ የማትችል 2. ማንበብና መጻፍ የምትችል 3. አንደኛ ደረጃ 4. ሁለተኛ ደረጃ 5. ኮልጅና ከዚያ በላይ
5.	የቤተሰብህ አስተዳዳሪ (ሀላፊ) ማን ነዉ?	1. እናት (አናት ካሉ ወደ ጥያቄ ቁ 7 ይዘለሉ) 2. አባት 3. ሁለቱም (ሁለቱም ካሉ ወደ ጥያቄ ቁ 7 ይዘለሉ)
6.	መልሶ አባት ከሆነ ፤ የአባት የትምህርት ደረጃ ምንድን ነው?	1. ያልተማረች/ መጻፍና ማንበብ የማትችል 2. ማንበብና መጻፍ የምትችል 3. አንደኛ ደረጃ 4. ሁለተኛ ደረጃ 5. ኮልጅና ከዚያ በላይ
7.	የቤተሰብ አባላት ብዛት ስንት ነው (ጠቅላላ የቤተሰቡ አባላት ቁጥር)?	-----
8	አሁን ስራዎ ምንድን ነዉ?	1. የቤት አመቤት 2. ስራተኛ (የመንግስት/የግል) 3. ነጋዴ 4. የቀን ተቀጣሪ (ላብ አደር)

		5. ስራ የልላት 6. ሌላ ካለ (ይገለፅ.....)
የእኩዋሚ ሆኔታ ለመዳሰስ የተዘጋጀ መጠይቅ		
1.	የቤተሰብዎ ዋነኛው የገቢ ምንጭ ምንድን ነው?	1. ግብርና 2. የንግድ ስራ 3. የመንግስት ስራ 4. የቀን ስራ 5. ሌላ ካለ (ይገለፅ.....)
2.	የቤተሰብዎ አማካይ ገቢ በወር ስንት ነው?	----- ብር/ወር
3.	የመጠጥ ውሃ ምንጭ ከየት ነው የሚያገኙት?	1. የቧንቧ ውሃ 2. የኩሬ ውሃ 3. በደንብ የተጠበቀ ምንጭ 4. ሌላ ካለ (ይገለፅ.....)
4.	መጽዳጃ ቤት አለዎት?	1. አዎ 2. የለም
5.	የጓሮ አትክልት ያለማሉ?	1. አዎ 2. የለም
ከእርግዝና ጋር የተያያዙ ሁኔታ ለመዳሰስ የተዘጋጀ መጠይቅ		
1.	የፅንሰ ፅድሜ	-----ወር
2.	ባለፉት ሁለት ሳምንታት ውስጥ ታመው ነበር?	1. አዎ 2. የለም
3.	ትናንት ምግብ ስነት ጊዜ በላሽዉ.	1. ሶስት ጊዜና ከዛ በላይ 2. ሁለት ጊዜና ከዛ በታች
4.	ለቅድመ ወሊድ አገልግሎት የመጡት ጊዜ የምግብ አመጋገብ ምክር አግኝተዉ የዉቃሉ	1. አዎ 2. የለም

2. የአመጋገብ ሁኔታ ለመዳሰስ የተዘጋጀ መጠይቅ

መመሪያ አንድ፡ እባክዎን ትናንት ቀንም ሆነ ሌሊት በቤት ውስጥም ሆነ ከቤት ውጭ የበሉትን ወይም የጠጡትን ምግቦች ያብራሩ፡፡ ሁሉንም ምግቦች እና መጠጦች ይጻፉ፡፡

ቁርስ	መክሰስ	ምሳ	መክሰስ	እራት	መክሰስ

መመሪያ ሁለት፡ መልስ ሰጪው ሲታወስ ከዚህ በላይ በተመዘገበው መረጃ ላይ በመመርኮዝ የምግብ ቡድኖችን ይመሉ፡፡ ላልተጠቀሱት ማንኛውም የምግብ ቡድኖች ተጠቅመው ከሆነ ይጠይቁ፡፡

ተ.ቁ	የምግብ ምድብ	ዝርዝሮች
1.	እህል እና የእህል ዘሮች	ጤፍ፣ ስንዴ፣ ጉብስ፣ ማሽላ፣ በቆሎ፣ ሩዝ፣ ማስላ፣ ዳጉሳ፣ ድነች፣ እና ከእነዚህ የሚሰሩ ምግቦች በሙሉ (ገንፎ፣ ዳቦ፣ ፓስታ፣ መኮረኒ ፣ እንጆራ፣ ቂጣ፣ ንፍሮ እና ወዘተ ምግቦች)
2.	ጥራጥሬ	የበሰላ ባቄላ፣ አተር፣ ምስር፣ እና ከእነዚህ የሚሰሩ ምግቦች በሙሉ (ንፍሮ ፣ ቆሎ ፣ ክክ ወጥ እና የመሳሰሉት)
3.	ለወዝና የቅባት አህሎች	ኑግ፣ ተልባ፣ ሰሊጥ፣ ሱፍ፣ ዱባ፣ ኦቶሎኒ
4.	ወተትና የወተት ተዋጽዎች	ወተት፣ አይብ፣ ዕርጎ፣ አሬራ፣ አጉዋት፣ ወይም ልላ የወተት ተዋጽዖ
5.	ስጋ አሳ እና የሚበሉ አእዋፋት	የሰውነት ክፍሎች (ጉበት፣ ኩላሊት፣ ልብ፣ ደም ወይም ልላ አካል) የበሬ ፣ የአሳማ ፣ የበግ ፣ የፍየል ፣ የግማል ፣ የዶር፣ የቆቅ ፣ የጅግራ ስጋ እና ከእነዚህ የሚሰሩ ማንኛውም ምግቦች በሙሉ (ወጥ፣ ጥብስ፣ ቅቅል፣ ወዘተ ምግቦች ትኩስ (ፍረሽ) አሳ ወይም የደረቀ ወይም የባህር አሳ
6.	እንቁላል	የዶሮ ፣ የቆቅ እና የጅግራ እንቁላል (የተቀቀለ፣ ፍርፍር፣ ዋይም እንቁላል ከልሎች ምግቦች ጋር የተሰራ)
7.	ቅጠላቸው የሚበላ ደማቅ አረንጓዴ ቅጠላቅጠል ያላቸው አትክልቶች	ጎመን፣ ሰላጣ፣ ቆስታ፣ ሳማ፣ ጥቅል ጎመን
8.	በቫይታሚን ኤ የበለጸጉ ፍራፍሬ እና የጓሮ አትክልቶች	የበሰለ ማንጎ ፣ ፓፓያ፣ ካሮት፣ ቀይሰር፣ ዱባ እና ግሸጣ፣
9.	ልሎች አትክልቶች	ቲማቲም፣ ሽንኩርት፣ ቃሪያ፣ የበቆሎ ፣ የአተር ፣ የምስር እና የባቄላ እሸት፣ ወዘተ እሸቶች
10.	ሌሎች ፍራፍሬዎች	ፖም፣ አቮካዶ፣ ሙዝ፣ ሎሚ፣ ብርቱካን፣ አናናስ፣ እንጆራ፣ የወይን ፍሬ፣ እና ወዘተ ፍራፍሬዎች

ክፍል 3: የቤተሰብ ምግብ ወርሃዊ የጥጥር ስልጣን ማረጋገጫ

ተ.ቁ	ጥያቄ	አማራጭ መልሶች
3.1	ባለፈው አንድ ወር ውስጥ በቤት ውስጥ የምግብ እጥረት እንዳያጋጥሙት ተጨንቀው ያውቃሉ	0 አላውቅም (አላውቅም ካሉ ወደ ጥያቄ 2.2 ይዝለሉ) 1 አዎ
3.1a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
3.2	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት የሚፈልጉትን ምግብ ሳይመገቡ ቀርተው ያውቃሉ	0 አላውቅም (አላውቅም ካሉ ወደ ጥያቄ 2.3 ይዝለሉ) 1 አዎ
3.2a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
3.3	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ አቅርቦት ምክንያት የሚመገቡትን የምግብ አይነቶችን ቀንሰዋል	0 አላውቅም (አላውቅም ካሉ ወደ ጥያቄ 2.4 ይዝለሉ) 1 አዎ
3.3a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
3.4	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ አቅርቦት ምክንያት የሚፈልጉትን የምግብ አይነት ተመግበው ያውቃሉ	0 አላውቅም (አላውቅም ካሉ ወደ 2.5 ጥያቄ ይዝለሉ) 1 አዎ
3.4a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
3.5	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት የሚመገቡትን የምግብ መጠን ቀንሰዋል	0 አላውቅም (አላውቅም ካሉ ወደ 2.6 ጥያቄ ይዝለሉ) 1 አዎ
3.5a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
3.6	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት በቀን ምግብ የሚመገቡትን ጊዜዎች ቀንሰዋል	0 አላውቅም (አላውቅም ካሉ ወደ 2.7 ጥያቄ ይዝለሉ) 1 አዎ
3.6a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
3.7	ባለፈው አንድ ወር ውስጥ በምግብ እጥረት ምክንያት ማንኛውም የሚበላ ምግብ ከቤት ጠፍቶ ያውቃል	0 አላውቅም (አላውቅም ካሉ ወደ 2.8 ጥያቄ ይዝለሉ) 1 አዎ
3.7a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
3.8	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት እየተራቡ ምግብ ሳይበሉ ተኝተው ያውቃሉ	0 አላውቅም (አላውቅም ካሉ ወደ 2.9 ጥያቄ ይዝለሉ) 1 አዎ
3.8a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)

3.9	ባለፈው አንድ ወር ውስጥ ማንኛውም የቤተሰብ አባል በምግብ እጥረት ምክንያት እየተራቡ ቀንና ሌሊት ሙሉ ሳይበሉ ቀርተው ያወቃሉ	0 አላውቅም 1 አዎ
3.9a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ጊዜ ተከስቷል	1 አልፎ- አልፎ (አንዴ ወይም ሁለቱ) 2 የተወሰነ ጊዜ (ከ 3 እስከ 10 ጊዜ) 3. ብዙ ጊዜ (ከ 10 ጊዜ በላይ)

ጥያቄዬን ጨርሻለው :: ለነበረን ቀይታ ከልብ አመሰግናለው

APPENDIX VI: AFAAN OROMOOVERSION QUESTIONNAIRE

Gaffii waa'ee seenaa jireenyaa odeeffannoo haala dinagdee.		
Lakk.	Gaffii	Filannoo
1.	Umuriin kee meeqa?	-----waggadhaan
2.	Haali gaa'ilaa kee akkami?	1. kan hin herumnee 2. kan herumtee 3. kan abbaan mana irraa du'e 4. kan wal hikaan
3.	Iddoon jireenya kessaan ammaessaa?	1. Magaalaa 2. Badiyyaa
4.	Sadarkaa barnoota kee maali (kutaa xummura xummurte)?	1. Barreessuu fi dubbisuu kan hin dandeenyee 2. Barreessuu fi dubbisuu kan dandeessuu 3. Sadarkaa tokkoffaa kan barattee 4. Sadarkaa lammaaffa kan barattee 5. koolleejjii fi isaa ol kan barattee
5.	Hoogganaan/tuun maatii keessanni eenyuu?	1. hadhaa warra (lakk 7 darbii) 2. Abbaa warra 2. lachuu (lakk 7 darbii)
6.	Yoo hoogganaan matii abbaa warra ta'e sadarkaan barnoota isaa meeqa (kutaa xummura xummure)?	1. Barreessuu fi dubbisuu kan hin dandeenyee 2. Barreessuu fi dubbisuu kan dandeessuu 3. Sadarkaa tokkoffaa kan barattee 4. Sadarkaa lammaaffa kan barattee 5. Koolleejjii fi isaa ol kan barattee
7.	Mana keessaan keessaa namoota meeqatu jiraata?	1. 5 fi isaa ol 2. 5 gadii
8.	Hojiin kee amma maali?	1. Hadhaa manaa 2. Hojjeettuu(mootummaa ykn mitii mootummaa)

		3. Daldaltuu 4.Hojjeettuu guyyaa 5. kan biro(ibsii)-----
Gaffilee waa’ee odeeffannoo haala dinagdee gafachuuf qophaahan		
1.	Galiin maatii keessaani inni guddaan maal irraa argaman?	1. Qonnaa yookin hoorsiaa beeladoota 2.Daldalaa irraa 3. Hojii mootummaa 4.Hojii guyyaa irraa 5. Kan biroo (ibsii)----
2.	Galiin ji’a maatii keessaanii gidduu galeessaan qarshiin meeqa (tilmaama)?	-----birri
3.	Bishaan dhugaati keessaan essaa argattuu?	1.Bishaan ujummoo 2.Bishaan kuree 3. Bishaan burqaa halaan egamee 4.Kan biroo(ibsii)-----
4.	Mana finca’anii qabduu?	1. Eeyyeen 2. lakkii
5.	Oddoo keessaan keessatti biqiloota nyaatamaan ni oomishtuu?	1. Eeyyeen 2. lakkii
Gaffilee waa’ee ulfaa gafachuuf qophaa’an		
1.	Ulfii kee ji’a meeqa?	-----
2.	Torbee lamaan darbaan kan keessaatti isiin dhukkubee beekaa?	1. Eeyyeen 2. lakkii
3.	Guyyaa kalessaa yeroo meeqaf nyaata nyaattee turee?	1. yeroo sadii fi isaa ol 2. yeroo lamaa fi isaa gad
4.	Yeroo hordoffii ulfaa gorsa waa’ee nyaataa fudhattee beekta?	1. Eeyyeen 2. lakkii

2. Gaaffilee waa’ee nyaata gosa gara garaa

Ajaja tokkooffaa: Nyaata kaleessa galgala ,guyyaa manatti ykn alatti nyaattee tarreessi .Nyaata jalqaba ganama nyaatte ykn dhugde waliin eegali.Gosa nyaataa fidhugaatii armaan gaditti ibsaman hunda isaanii barreessi.qabiyyeen isaanii yeroo ibsaman qabiyyee isaanii tokko tokkon ibsi jedhii gaafadhu.

Ciree	Oolchaa (turtii)	laaqana	Oolchaa (turtii)	Irbaata	Oolchaa (turtii)

Ajaja lammaffaa: Gaaffileen kana gubbaa jiran erga guutamanii boodaa nyaata caqasaman gosa gosa dhaan gutii. Nyaata gosa kamiyyuu kan hin caqasamiin jiruu taanaan ,nyaataa gosa kana fayyadamuu isaanii gaafadhu.

Lakk.	Ramaddii nyaata	Fakkeenya	Deebii Eyyeen-- -1 Lakkii--- --2
1.	Kan firiin isaanii nyaatamuu, hundee adii fi kan jirmii isaanii nyaatamuu	Xaafii,garbuu,mishingaa,boqqolloo,qamadii,ruuzii,ajjaa, dinnicha, maxaxishaa, kaasaava adii fi nyaata kanneen irraa hojjetaman kanneen akka marqaa, dabboo, buddeen, mokoroonii, paastaa, fi kanneen kan fakkataan.	Eyyeen-- -1 Lakkii--- --2
2.	Midhaan dheedhii	Baaqelaa, ataraa, misira goggogaan fi nyaata isaan irraa hojjetamee	Eyyeen-- -1 Lakkii--- --2
3.	Nyaata cooma fi zaayitaa	Oocholonii,nuugii, talbaa, suufii, kkf	Eyyeen-- -1 Lakkii--- --2
4.	Aannan	Aannan, itittuu,baaduu fi firiwwaan aannani kanneen biroo	Eyyeen-- -1 Lakkii--- --2
5.	Foon ,qurxummii fi allatiwwaan nyaatamaan	Tiruu, kalee, oonnee fi nyaata qamaa ta'aan Foon hoola, re'ee, sa'aa, gaala, booyyee, kuruphee, fi kanneen kan fakkaatan akkasumaas nyaata gosaa kammiyyuu kanneen irraa hojjetaman Foon qurxummii	Eyyeen-- -1 Lakkii--- --2

6.	Hanqaaquu (killee)	Hanqaaquu lukkuu, gogorrii, sololiyaa fi nyaata kanneen irraa hojjeetaman	Eyyeen-- -1 Lakkii--- --2
7.	Kuduralee baala magariisaqabaani fi nyaataf oolan	Raafuu, saalaxaa, raafuu maramaa, doobbii, qoosxaa fi kanneen kan fakkataan	Eyyeen-- -1 Lakkii--- --2
8.	Nyataa vaayitaminii A badhaadhaan kuduralee fi muduralee biroo	Mangoo, pappaaayyaa, karoota, hundee diimaa, fi cuunfaa nyaatoota kanneen irraa hojjetaman	Eyyeen-- -1 Lakkii--- --2
9.	Kuduralee biroo	Timaatimaa, qullubbii adii yookiin diimaa, coorqa fi nyaata yeroo asheeta nyaataman kanneen akka baaqelaa, atara, misiraa, shumburaa fi kanneen kan fakkaatan	Eyyeen-- -1 Lakkii--- --2
10.	Muduraalee biroo	Avoocadoo, muuzii, loomii, burtukaana, annanasii, cuunfaa kanneen irraa hojjetaman fi kanneen kan fakkatan	Eyyeen-- -1 Lakkii--- --2

3. Gaaffilee waa'ee haala nyaata mana

Lakk.	Gaffii	Deebii
3.1	Torbaan afran darbaan kan keessaatti mana kessaan keessaatti rakkoon hanqina nyaata akka hin mudanneef yaddooftee beekta?	0=lakkii(gara gaffii 2.2 darbii) 1= eeyyee
3.1a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.2	Torbaan afran darbaan kan keessaatti atii yookiin matiin kee kamiyyuu sabaaba hanqina nyaatan nyaata barbaadan/ddan nyaachuu dhabdani beektuu?	0=lakkii(gara gaffii 2.3 darbii) 1= eeyyee
3.2a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.3	Torbaan afran darbaan kan keessaatti atii yookiin matiin kee kamiyyuu sabaaba hanqina dhiyyeessaa	0=lakkii(gara gaffii 2.4 darbii)

	nyaatan gostii nyaata nyaattanii/tani hira'aate beekaa?	1= eeyyee
3.3a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.4	Torbaan afran darbaan kan keessaatti atii yookiin matiin kee kamiyyuu sabaaba hanqina dhiyyeessaa nyaataan nyaata nyaachuu hin barbaannee nyaatannii/tanii jiru/ttuu ?	0=lakkii(gara gaffii 2.5 darbii) 1= eeyyee
3.4a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.5	Torbaan afran darbaan kan keessaatti atii yookiin matiin kee kamiyyuu sabaaba nyaanni gahaan hin jirreef hangii nyaachuu qabdaan hir'atee jiraa?	0=lakkii(gara gaffii 2.6 darbii) 1= eeyyee
3.5a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.6	Torbaan afran darbaan kan keessaatti atii yookiin matiin kee kamiyyuu sabaaba hanqina nyaatan guyyaatti yeroon nyaata itti nyaataan xiqqatee beeka?	0=lakkii(gara gaffii 2.7 darbii) 1= eeyyee
3.6a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.7	Torbaan afran darbaan kan keessaatti sabaaba hanqina nyaatan waanti nyaatamuu kamiyyuu mana dhabamee beeka?	0=lakkii(gara gaffii 2.8 darbii) 1= eeyyee
3.7a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a

		tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.8	Torbaan afran darbaan kan kessaa ati yookiin maatin kee kamiyyuu sabaaba hanqina nyaatan osoo beela'anuu osoo nyaata hin nyaatin rafaani beekuu?	0=lakkii(gara gaffii 2.9 darbii) 1= eeyyee
3.8a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)
3.9	Torbaan afran darbaan kan kessaa ati yookiin maatin kee kamiyyuu sabaaba hanqina nyaatan guyyaa fi halkaan guutuu osoo nyaata hin nyaatin oolani beekuu?	0=lakkii 1= eeyyee
3.9a	Haalli kun yeroo hangamiif ta'aa?	1. Darbee darbee (yeroo tokkoo yookiin lama ji'a tokkoo keessatti 2. Yeroo murasaa (yeroo 3-10) 3. Yeroo baay'ee (yeroo 10 ol)

GAAFFILEE KOO XUMMUREEN JIRAA GALATOOMA!

