JIMMA UNIVERSITY

COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES

DEPARTMENT OF EPIDEMIOLOGY

UNDER-NUTRITION AND ASSOCIATED RISK FACTORS AMONG PREGNANT WOMEN IN GAMBELLA TOWN, SOUTH WEST ETHIOPIA

BY

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A THESIS TO BE SUBMITTED TO COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES, SCHOOL OF GRADUATE STUDIES, DEPARTMENT OF EPIDEMIOLOGY AS THE PARTIAL FULFILLMENT OF THE REQUIREMENTS OF MASTER OF PUBLIC HEALTH IN EPIDEMIOLOGY

July, 2014

Jimma, Ethiopia

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Abstract

Background: Maternal under-nutrition affects both the health of mothers and children and, as a result, has broad impacts on economic and social development. Undernourished pregnant women have higher reproductive risks, including death during or following child birth

Objective: The aim of this study was to give insights about the magnitude of under- nutrition and local risk factors associated with it among pregnant women in Gambella town, which can be used for priority setting and designing effective nutritional program in addressing the nutritional problems of the pregnant women in Gambella town and similar settings.

Methods: community based cross sectional study was conducted from March to April, 2014. Three hundred thirty one pregnant women were recruited for the study by using of computer generated simple random sampling technique. Interviewer administered data collection method was used by the use of pre-tested English questionnaires adapted from related literatures and translated to local language (Amharic). A 24 hour dietary recall method was used to collect data on dietary intake. Mid upper arm circumference (MUAC) was measured by using non stretchable MUAC tape. Bivariate logistic regression was used to identify independent variables for multivariable logistic regression. Multivariable logistic regression was employed to identify independent predictors of under-nutrition and to control confounders.

Result. The prevalence of under-nutrition among pregnant women in Gambella town was 28.6%. Pregnant women who were married before their age of eighteen were 3.91 folds more likely to be under-nourished compared to pregnant women who were married at or after their age of eighteen (AOR=3.91, 95% CI: 2.23-6.86). Pregnant women who were from food insecure households were 2.3 times more likely to be undernourished compared to pregnant women who were from food secure households (AOR =2.3, 95% CI : 1.18-3.57). Pregnant Women who had dietary diversity score less than six were 2.05 more likely to be under-nourished when they were compared with pregnant women who had dietary diversity score more than or equal to six (AOR=2.05, 95% CI: 1.30-4.06).

Conclusion: The prevalence of under-nutrition among pregnant women in Gambella town was small compared to other studies. Household food insecurity, dietary diversity score and early marriage were independent predictors of under-nutrition. Gambella region women's affair bureau with other stake holders should give due consideration to health education to delay age at first marriage. The regional government along with other stakeholders should give due emphasis to mainstreaming and strengthening nutritional activities through community based nutrition programs (CBN) that contribute to reduction of food insecurity and consumption of unbalanced nutrients

Key words: Pregnancy, under-nutrition, dietary diversity score

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Acronyms

AOR: adjusted odds ratio
Cm: centimeter
cOR: crude odds ratio
CSA: Central Statistical Agency
DDS: Dietary Diversity Score
EAR: Estimated Average Requirement
FAO: Food and Agriculture Organization
HCG: Human Chorionic Gonadotrophin
HFIAS: Household Food Insecurity Access Scale
Hr: hour
IDDS: individual diet diversity score
IUGR: Intra Uterine Growth Restriction
IYCN: Infant and Young Child Nutrition project
JU: Jimma University
LBW: LOW BIRTH WEIGHT
LMIC: Low and Middle Income Countries
MDDS: Mean Dietary Diversity Score
MOH: Ministry Of Health
MUAC: Mid Upper Arm Circumference
OR: Odds Ratio
PW: Pregnant Woman
RDA: Recommended Daily Allowance
RDI: Reference Dietary Intake
SGA: Small for Gestational Age
SPSS: Statistical Package for Social Science
UNICEF: United Nation Children's Fund
USAID: United State Agency for International Development
WHO: World Health Organization

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1. INTRODUCTION

1.1 Background

Nutrition is a fundamental pillar of human life, health and development across the entire life span. From the earliest stages of fetal development, at birth, through infancy, childhood, adolescence, and on into adulthood and old age, proper food and good nutrition are essential for survival, physical growth, mental development, performance and productivity, health and well-being. It is an essential foundation of human and national development. For this reason everybody is expected to get adequate nutrition, especially woman's of child bearing age(1,2). Pregnancy is one of the most critical and unique period in a woman's life cycle. It is regarded as a "welcome event" for successful womanhood. A woman's body changes dramatically during pregnancy; hence there is a strong need to balance these changes with an adequate and nutritious diet(3).

Nutrient needs typically increase more during pregnancy and lactation than during any other stage in a woman's adult life. Additional nutrients are required during gestation for development of the fetus as well as for growth of maternal tissues that support fetal development. The materials required for this rapid growth and development depend on supply from the maternal diet (4,5).

The well-being of mother and the newborn infant is greatly determined by the nutrition of the expectant mother during pregnancy and it further influences health of the child during childhood and adulthood. Proper dietary balance is necessary to ensure sufficient energy intake for adequate growth of fetus without drawing on mother's own tissues to maintain her pregnancy (6).

For most women, the extra energy needs are easily met by adding small snacks or two during a day. Eating small amount of food more frequently also has a benefit of helping with some of the uncomfortable side effects of pregnancy including nausea and heart burn. The focus should be on consumption of nutrient dense foods and minimizing empty calorie foods that may provide the extra energy needed but do not provide micronutrient that are needed in much higher - amounts compared with increased caloric need(3)

However, because of the differing roles nutrients play in tissue development and growth as well as nutrient-specific changes in maternal homeostasis during pregnancy, nutrient requirements do not increase uniformly. Changes in the efficiency of absorption from the gastrointestinal tract and excretion by the renal system, as well as changes in maternal storage or tissue reserve, are examples of homeostatic mechanisms that must be considered in establishing nutrient requirements during gestation. Because the demand for some nutrients is great relative to others, care must be taken in selecting the optimal diet during pregnancy(5)

The common maternal nutritional problems during pregnancy include Protein energy malnutrition, Iron and folic acid deficiency, Vitamin A deficiency, Iodine deficiency, Zinc deficiency, Vit. B6 and B12 deficiency. Protein energy under nutrition is due to deficiency of proteins, fat and carbohydrate(4,7).

Mid upper arm circumference (MUAC) measurement as a measure of nutritional assessment: An accurate way to measure fat-free mass is to measure the Mid Upper Arm Circumference (MUAC). The MUAC is the circumference of the upper arm at the midway between the shoulder tip and the elbow tip on the left arm. The mid-arm point is determined by measuring the distance from the shoulder tip to the elbow and dividing it by two. A low reading indicates a loss of muscle mass. MUAC is the only anthropometric measure for assessing nutritional status among pregnant women. It is also very simple for use in screening a large number of people, especially during community level screening for community-based nutrition interventions or during emergency situations. Pregnant women with Mid- upper circumference of 17-21cm are categorized as moderately malnourished where as pregnant women with MUAC less than 17cm are categorized as severely malnourished(8).

Dietary method of nutritional assessment: Dietary methods of assessment include looking at past or current intakes of nutrients from food by individuals or a group to determine their nutritional status. One can ask what the family or the mother and the child have eaten over the past 24 hours and use this data to calculate the dietary diversity score. Dietary diversity is a measure of the number of food groups consumed over a reference period, usually 24 hours(8). The recall period of 24 hours has been chosen by FAO, as it is less subject to recall error, less cumbersome for the respondent and also conforms to the recall time period used in many other dietary diversity studies(9).. An increase in individual dietary diversity score is related to increased nutrient adequacy of the diet(9).

1.2 Statements of the problem

Maternal under-nutrition affects both the health of mothers and children and, as a result, has broad impacts on economic and social development(7,10–12). Undernourished pregnant women have higher reproductive risks, including death during or following child birth(6,7,13). Many women suffer from a combination of chronic energy deficiency, poor weight gain in pregnancy, anemia and other micronutrient deficiencies. These along with inadequate obstetric care, contribute to high rates of maternal mortality and poor birth outcomes(10,14).

Maternal malnutrition both in the form of chronic energy and micronutrient deficiencies causes intrauterine growth restriction (IUGR), low birth weight, pre-maturity, neonatal and infant mortality, abortion, still birth, reduced physical activity, and poor cognitive development of the baby leading to poor educational capability and performance(2,15–17).

Under- nutrition's most damaging effect occurs during pregnancy and in the first two years of life, and the effects of this early damage on health, brain development, intelligence, educability, and productivity are largely irreversible(6,7,11).

The toll of maternal under- nutrition during pregnancy was not limited to the above consequences. It has a life-cycle (or intergenerational) element as well. Undernourished girls have a greater likelihood of becoming undernourished mothers who in turn have a greater chance of giving birth to low birth weight babies, perpetuating an intergenerational cycle. This cycle can be compounded further in young mothers, especially adolescent girls who begin childbearing before attaining adequate growth and development(4,6).

It is heart breaking news to hear that, every day, 800 women die during pregnancy or childbirth and 8,000 newborn babies die during their first month of life. What is more surprising is, 98 percent of newborn deaths and 99 percent maternal deaths occur in developing countries(18) .

Nutrition practices vary dramatically by culture, geography, social, economic, and other family and community factors (10). Many women in developing countries maintain pregnancy on dietary intakes lower than those recommended by international agencies(19). In a systematic review including sixty-two studies published from 1989 to 2011, Lee et al reported that a large majority of pregnant women from Africa and Asia had taken lower energy and macronutrient than are recommended by the FAO/WHO. Lee et al. conclude that the problems of unbalanced

macronutrient profiles and multiple micronutrient deficiencies are common among pregnant women in developing countries across regions of the world (20).

In Ethiopia, studies have shown that cultural factors, including lack of care for pregnant women, increased workloads, and early marriage and teenage pregnancy make the situation worse(2,7).

In order to identify, prioritize and avert the devastating risk of malnutrition the government of Ethiopia has designed the National Nutrition strategy (NNS) of which maternal nutrition during pregnancy is one of the priority area (7).

Even though, maternal nutrition during pregnancy is crucial in reducing maternal mortality and infant mortality which are the target area in achieving millennium development goal, there is no study revealing the magnitude of under-nutrition and associated risk factors among pregnant women in the study area. There is also a dearth of literature at country level. As a result, there is lack of comprehensive information regarding the magnitude of under-nutrition and associated risk factors among pregnant women in the study area. The aim of the present study was to assess the magnitude of under-nutrition and associated risk factors among pregnant women in the study area

2. LITERATURE REVIEW

2.1 Factors affecting maternal nutritional status

Age of the woman was among the socio demographic factors which affects the nutritional status of women(21–23). Women in the young age group (15-19year) and women in the old age group (35-49years) are more likely to be undernourished as compared to women in the age group of 20-34 years(24). In adolescence, a young woman's nutritional needs increase because of the spurt of growth that accompanies puberty and the increased demand for iron that is associated with the onset of menstruation. Early childbearing can increase the health risks of women and also have a negative impact on their nutritional status and growth(25). There are numerous barriers to optimal nutrition in adolescent pregnancy including low levels of disposable income, unemployment, poor housing, suboptimal mental and physical health and limited access to a wide variety of reasonably priced foods. Family and peers are likely to have a strong influence on the eating habits of most pregnant adolescents(26). The higher risk of malnutrition in older age women (35-49 years) may be in part due to maternal depletion syndrome that may be associated with closely spaced births and the cumulative effects of a lifetime of nutritional deprivation, heavy work and low self-esteem(25).

A study based on raw data from National Family Health Survey for assessing food consumption pattern and nutritional status of women in Orissa showed that education of the husband and occupation of the husband were related to woman's nutritional status(27).

Women's employment status is also another important socioeconomic variable explaining nutritional status. Unemployment or unpaid (cash) employment of women are a significant factor for chronic energy deficiency (CED) as compared with women employed for cash. Women's paid employment could provide an additional income source that can improve food security of the household and raise the status of women by allowing them to have more control over resources(24).

Cultural practices related to maternal nutrition during pregnancy cause women to spiral to a lower nutritional status. Women avoid eating nutritious foods (animal foods and green vegetables) for fear that the baby will be large and labor will be difficult later(15). Other cultural

practices exposing women to malnutrition include early marriage and teen-age pregnancy(2,12,,26, 27). The cross sectional study done in India shows that age at marriage was strongly associated with nutritional status of pregnant women(29). The 2012 USAID report of delaying age at marriage and reducing malnutrition of adolescent girls in Jharkhand, India showed that early marriage was associated with early pregnancy, high fertility; close spacing of births, unwanted pregnancies, and pregnancy termination which cumulatively deteriorates nutritional status of adolescent girls(30).

However, the cross sectional study done in rural Nigeria showed that food taboo had no significant effect on the nutrient intake of pregnant women since only 5-11% adhered to food taboo(31)

Low household income and number of children born to the women also expose pregnant women to under nutrition. Pregnant woman with high number of children and from low house hold income was at great risk of malnutrition as compared to pregnant woman from high household income and with low number of children(14). However, a comparative study conducted on the nutritional status of primiparous and multiparous women in the first trimester of pregnancy in the northeastern province of Thailand, Khon Kaen, showed that primiparous women were undernourished as compared to multipatous women after adjusting for age and socio economic status (32). The cross sectional study done on all three trimester to assess nutritional Status and the Impact of Socioeconomic factors on Pregnant Women in Kamrup District of Assam, India showed that the age of the mother and husband's occupation showed a strong positive correlation with BMI, while family size and income level showed a negative correlation(33)

Birth interval and women's educational level have an inverse relationship with the nutritional status of pregnant women(22).

Nutritional knowledge during pregnancy is another factor affecting nutritional status of pregnant women during pregnancy. Knowledge is a key aspect in confronting the problem of malnutrition at all level of the society and in all sectors(7,32). A cross sectional study conducted on nutritional status of pregnant women of some villages in Balasore District, showed that in spite of better education and high monthly income, nutrition intake was lower than RDA among pregnant women due to their poor knowledge on nutrition and ignorance about health (35).

similar study conducted on dietary knowledge and behaviors in a sample of malay pregnant women showed that higher knowledge of nutrition displayed healthier dietary behavior of fruit and vegetables intake among pregnant women(36).

Consumption pattern and dietary practice are another important factors affecting nutritional status of pregnant women(37). A survey done in Iran showed participants with diet diversity scores ≥ six had greater body Mass Index, waist circumference and waist-hip ratio than in individuals with scores less than six(38). A cross sectional study conducted at kapenguria district hospital west pokot county, Kenya showed that eating diversified food guarantees the optimal nutritional status of pregnant women(39). A cross sectional study done in rural Burkina Faso showed that dietary diversification was inversely associated with under-nutrition. The study showed that In April, when dietary diversity score was high fewer women were Under-nourished(40).

Food distribution within the households and the sacrificial tendencies of women have been implicated as major determinants of the health and nutritional status of women(41). A cross-sectional study conducted on determinants of Health and Nutritional Status of Rural Nigerian Women revealed that women were always deprived and preference were given to children and husband when the food to be eaten was small(31)

Utilization of family planning methods can make a significant contribution to prevention of maternal malnutrition(2,39).

A cross-sectional study done in Kenya showed that women in food secure households were less likely to be under-nourished when they were compared with women in food insecure households(42). Pregnant women are particularly vulnerable to food insecurity and associated nutrient inadequacies for two major reasons. First, physiological vulnerability comes with childbearing. Maternal nutrient needs increase during pregnancy and breastfeeding, and when these needs are not met, mothers may experience wasting and fatigue. Second, women have a sociological vulnerability. Food security research indicates that during periods of reduced food supply, women experience reduced intakes relative to men. Furthermore, mothers are likely to reduce their own intakes to secure those of infants and small children(43). The Ethiopian national nutrition strategy also underpins that in food insecure households women and children are the most vulnerable group and should be given special attention(7).

CONCEPTUAL FRAMEWORK

Nutritional status of pregnant women during pregnancy can be affected by the very complex and interrelated factors including socio-demographic, socio-economic, socio-cultural, and individual and behavioral factors

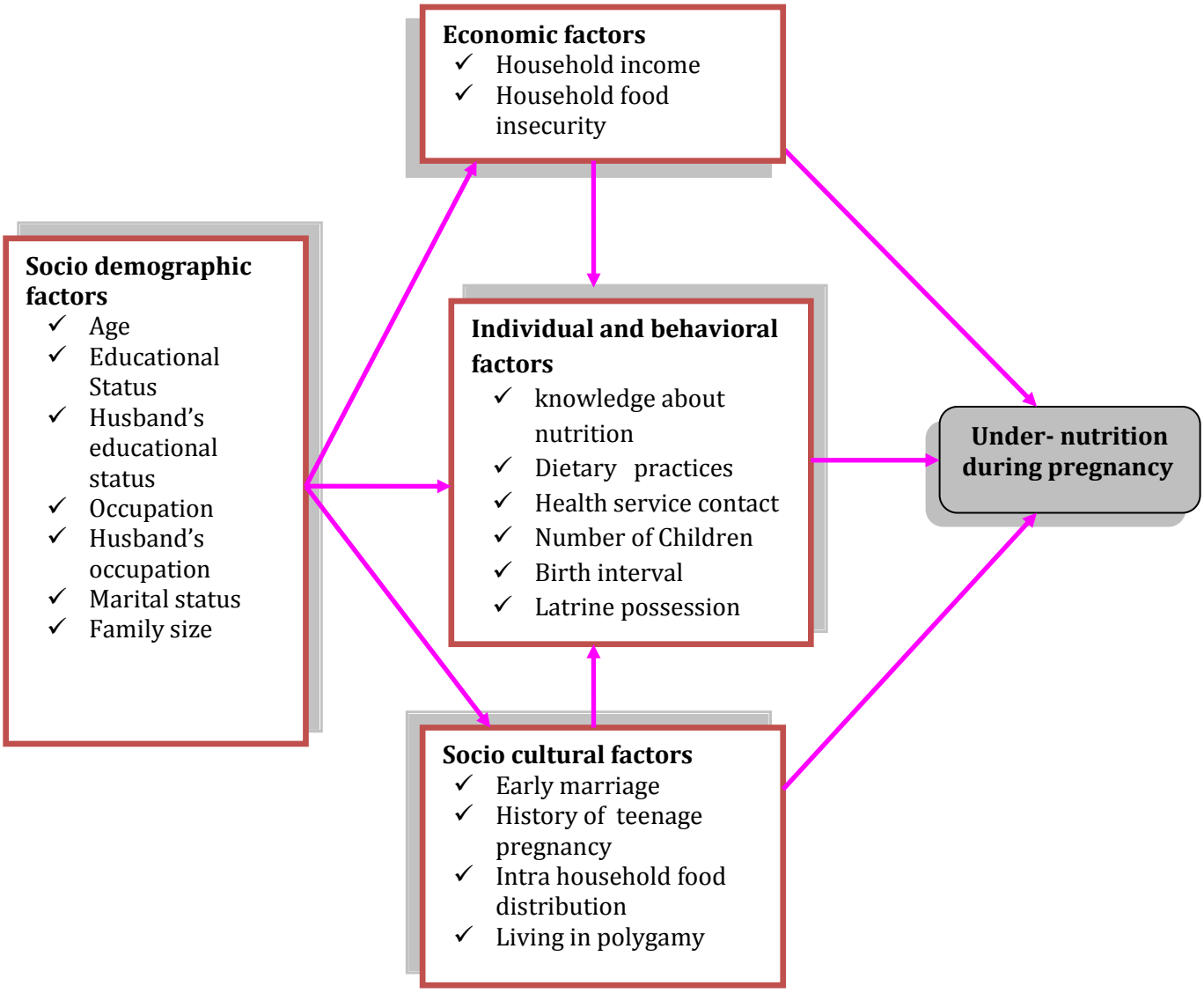

Figure 1: conceptual framework of the study

SIGNIFICANCE OF THE STUDY

The study will yield important insights about the magnitude of under- nutrition and local risk factors associated with it among pregnant women in Gambella town, which can be used for priority setting and designing effective nutritional program in addressing the nutritional problems of the pregnant women in the town and similar settings. More considerably, the study has important policy implications from a global health perspective in which it will help to evaluate the progress being made towards achieving the Millennium Development Goals in the study area. Finally, the study could be used as a stepping stone for further studies.

3. OBJECTIVE OF THE STUDY

3.1 General objective

- To assess under-nutrition and associated factors among pregnant women in Gambella town

3.2 Specific objectives

- To determine the prevalence of under-nutrition among pregnant women in Gambella town
- To assess factors associated with under-nutrition among pregnant women in Gambella town.

4. METHODS AND MATERIALS

4.1 Study area and period

Data was collected from March 10/2014 to April 5 / 2014 EC in Gambella town. Gambella town is separate woreda and the capital of the Gambella Region located at the confluence of the Baro River and its tributary the Jajjaba. The town has a latitude and longitude of 8°15′N 34°35′E and has an elevation of 526 meters above sea level having hot climatic condition. Gambella town is located 768 kilo meter in the south west away from Addis Ababa. The town harbors different ethnic groups. The majority of ethnic groups residing in the town are Nuire, Agnuhak, and Mejenger. However, there are also other ethnic groups including settlers from other parts of the country. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia, Gambella town has a total population of 39,022, of whom 20,790 are men and 18,232 women. The town had a total of 10,152 households with an average of 3.8 persons to a household. The town has one hospital, one health centers, two governmental junior clinics and 15 private clinics.

4.2 Study design

Community based cross sectional study was conducted

4.3 Source and study population

4.3.1 Source population

All pregnant women in Gambella town

4.3.2 Study population:

Sample pregnant women in Gambella town who fulfill the selection criteria

4.4. Eligibility criteria

4.4.1 Inclusion criteria

All pregnant women who dwelt in the town at least for the past six months

4.4.2 Exclusion criteria

Critically ill pregnant women who cannot respond to the questionnaire

4.5 Sample size determination and sampling technique

4.5.1 Sample size:

Sample size was calculated using single population proportion by considering 50% proportion of under- nourished pregnant women since there is no prior study in the area, 5% margin of error and 95% confidence interval.

$$n = \left(\frac{Z\alpha}{2}\right)^2 \frac{p(1-p)}{d^2}$$

Where:

n= sample size

Zα/2= Z score corresponding to 95% CI= 1.96

P= proportion of undernourished pregnant women

d= margin of error

Then, $n = \frac{1.96^2 * 0.5(0.5)}{(0.05)^2} = 384.16 \approx 385$

From the CSA report, pregnant women constitute 3.3% of the urban population of Gambella region. The current total population of the town is 51696 (projected from 2007 census), the numbers of pregnant women in the town were

$3.3\% \times 51696 = 1705.968 \approx 1706$.

Since this number is small (<10,000), finite population correction was used to calculate the final sample size.

Then, $n = \frac{385}{1+\frac{385}{1706}} = 314.11 \approx 315$

By considering 5% non response rate, the final sample size was

$315 + 15.75 = 330.75 \approx 331$

4.5.2 Sampling techniques

Prior to data collection, community survey was conducted in the five kebeles of Gambella town to get lists of pregnant women in the town. During the survey unique identification number was given to the pregnant women, which was also written on the gate of their residential home in order to facilitate the process of sampling technique. Then, sampling frame was prepared using these unique identification numbers given to pregnant women. Lastly, sample pregnant women proportional to the number of pregnant women in each kebele were drawn using computer generated random number method

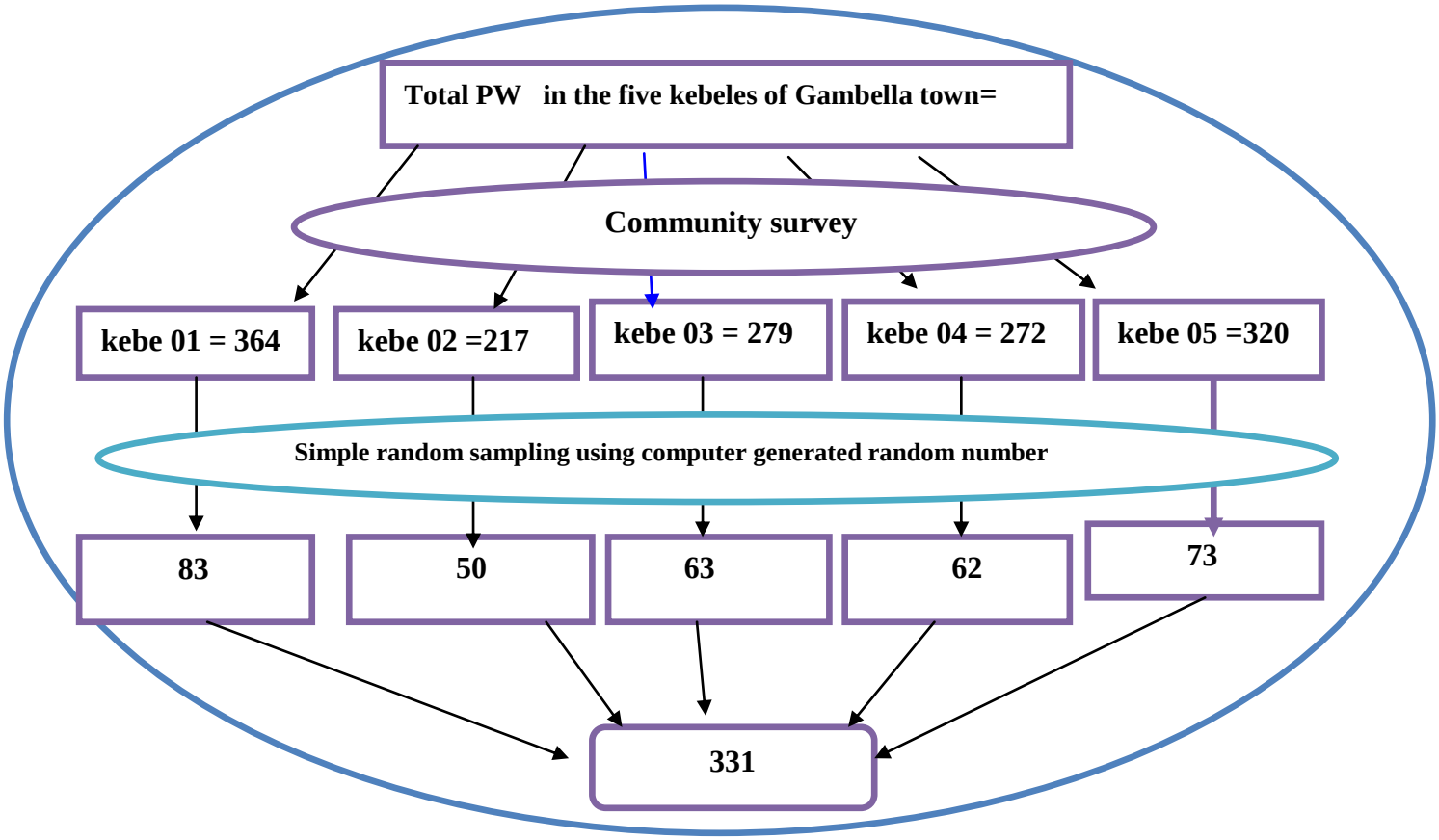

Figure 2: schematic presentation sampling procedure

4.6 Study variables

4.6.1Outcome variable

Under - nutrition

4.6.2 Independent variables

I. Socio demographic factors

- Age
- Marital status
- Educational Status
- Husband's educational status
- Occupation
- Husband's occupation
- Family size

II. Socio economic factors

- Household Income
- Household food insecurity

III. Socio cultural variables

- Early marriage
- History of teenage pregnancy
- Living in polygamy
- Intra household food distribution

IV. Individual and behavior factors

- Knowledge about nutrition
- Health service contact
- Dietary practice
- Birth interval
- Number of children born to the women
- Latrine possession

4.7 Data collection instruments and procedures

4.7.1 Data collection instruments

Structured questionnaires consisting five parts; **part I**: socio-demographic measurement tools, **part II**: socio-cultural measurement tools, **part III**: individual and behavioral factor measurement tools, **part IV**: Household Food Insecurity Access Scale (HFIAS) Measurement Tool which consist 9 items developed by the Food and Nutrition Technical Assistance (FANTA) project. **Part V**: MUAC measurement tape

4.7.2 Data collection procedures

Data on socio-demographic, socio-economic, socio-cultural, household food insecurity, and individual and behavioral factors was collected by the use of pre-tested English questionnaires adapted from related literatures and translated to Amharic. For Household Food Insecurity Access Scale (HFIAS) Measurement, each of the questions was asked with a recall period of four weeks (30 days).The respondent was first asked an occurrence question – that is, whether the condition in the question happened at all in the past four weeks (yes or no). If the respondent answers "yes" to an occurrence question, a frequency-of-occurrence question was asked to determine whether the condition happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four weeks. A 24hr dietary recall method was used to collect data on dietary intake. Local language speaking trained diploma nurse data collectors who were fluent in Amharic verbally administered questionnaire to respondents using structured interview questionnaires. After the conduct of face to face interview, mid upper arm circumference of the respondent was measured on the left hand at the mid-point between the tips of the shoulder and elbow to the nearest 0.1cm by using non stretchable MUAC tape.

Five trained diploma nurse data collectors and two B.Sc. public health officer supervisors were employed for data collection. The responsibilities of data collectors were measuring the mid upper arm circumference of the respondent and filling the questionnaires. The supervisor provides all items necessary for data collection on each data collection day, checking filled questionnaire for completeness and consistency, and solving problems during data collection.

Calculation of individual dietary diversity score (IDDS).

Individual dietary diversity score was calculated by summing a total of 14 food groups [1) Cereals; 2) Vitamin A rich vegetables and tubers; 3) White roots and tubers; 4) Dark green leafy vegetables; 5) Other vegetables; 6) Vitamin A rich fruits; 7) Other fruits; 8)Organ meat; 9) Flesh meat; 10) Eggs; 11) Fish; 12) Legumes, nuts and seeds; 13) Milk and milk products; and 14) Oils and fats] consumed over reference period (24 hours before the data collection). For example, if one pregnant woman eats from each food group, her DDS will be 14(9).

4.8 Data processing and analysis

Collected data was checked for completeness and consistency, and coded manually. Data was then entered into EpiData version 3.1. Data were exported to SPSS 16 for windows after entering and cleansing the data using EpiData version 3.1 to recode, compute and do other statistical analysis. First univariate analysis was conducted to explore frequency distribution, central tendency, variability (dispersion) and shape of the overall distribution of independent variables.

Bivariate analysis was done to identify independent variables associated with under-nutrition for multivariable logistic regression. To identify the independent predictors of under-nutrition, multivariable logistic regression model was fitted for variables which showed significant association. Variables that showed significant association (p value=0.2) with under-nutrition in the bivariate analysis were entered in the multivariable logistic model using backward stepwise method. Interaction between different variables was checked with the criteria for the significance of interaction term using Breslow-Day test of homogeneity of strata specific odds ratios. Multi collinearity between different predictor variables was also checked using variable inflation factor (VIF). In multivariable analysis p values of less than 0.05 were considered statistically significant.

4.9 Data quality management

To insure the quality of data the questionnaires originally prepared in English was translated to Amharic and administered to respondents by local language speaking data collectors who were fluent in Amharic. The questionnaires were translated back to English to check for its conceptual equivalence.

For effective and quality data collection, a two days training was provided for data collectors and supervisors. The training covered the objectives of the study, a thorough review of the questionnaire, direction how to administer the structured questionnaires, how to take MUAC measurements and ethics during field work.

Before conducting the main study, pretesting was done on 17 pregnant women residing in Abobo town of Gambella region. Finally, data collection tool was refined based on the findings from the pretesting.

Every day, all collected data was reviewed and checked for completeness and consistency by the supervisors. Data cleansing was done thoroughly using epiData version 3.1

4.11Ethical considerations

Ethical clearance letter was obtained from Jimma university research ethics committee. Permission letter to conduct the research was obtained from Gambella regional health bureau. During data collection the participants were informed the purpose of the study with their full right to say “no” (opt out), and it was clearly stated that their decision of “no” by no means affect any of their right to health provisions intended for pregnant women. The interviewer discussed the issue of confidentiality and obtained verbal consent before the actual interview was launched. For this purpose, a one page consent form was attached as cover page to each questionnaire. In addition, the name of the participants was not written in the questionnaire. By doing so, the issue of confidentiality was addressed.

4.13 Dissemination plan

The finding of this study will be disseminated through

- Presentation of the findings to Jimma University, College of public health and medical sciences
- Submission of the written document to JU, Gambella regional health bureau, and other stake holders
- All attempts will be made to publish the result of the study on national or international journal

4. 14 Operational definitions

Dietary diversification: is a measure of the number of food groups consumed over a reference period, 24 hours before the time of data collection.

Dietary diversity score: is the sum of total number of food groups consumed over 24 hours before the data collection

Dietary practice: in this study dietary practice include dietary diversification and meal frequency

Family size: The total number of people living in a house during the study period

Food Groups: A total of 14 food groups adapted from the FAO classifications as outlined: 1) Cereals; 2) Vitamin A rich vegetables and tubers; 3) White roots and tubers; 4) Dark green leafy vegetables; 5) Other vegetables; 6) Vitamin A rich fruits; 7) Other fruits; 8) Organ meat; 9) Flesh meat; 10) Eggs; 11) Fish; 12) Legumes, nuts and seeds; 13) Milk and milk products; and 14) Oils and fats was used(9)

Health service contact: at least one ANC visit and seeking medical control during illness

Household food insecurity: In this analysis, household food insecurity was assessed using the Household Food Insecurity Access Scale (HFIAS) developed by the Food and Nutrition Technical Assistance (FANTA) project. The HFIAS tool consists of nine questions that are believed to capture all three core domains that reflect a household's inadequate access to food. Each question has four response options—never, rarely, sometimes, or often—which was coded in order of increasing frequency from 0 to 3.

A household was classified as:

Food secure household which experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely.

A mildly food insecure (access) household which 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. But it does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating).

A moderately food insecure household which 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. But it does not experience any of the three most severe conditions.

A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure(45).

Nutritional knowledge: a woman was considered knowledgeable if she scores >50% of the question about nutrition.

Pregnancy: ANC follow up card and HCG test were used to ascertain pregnancy. Accordingly, pregnant women who ever followed ANC and had follow up card during the current pregnancy were considered pregnant and HCG test was done for ascertainment for those who reported that they had symptoms of pregnancy

Under-nutrition: woman with mid upper arm circumference (MUAC) $\leq$ 21cm (8)

5 RESULT

5.1 Socio-demographic characteristics of pregnant women in Gambella town

From the total 331 recruited pregnant women, five of them were refused to participate in the study making the response rate 98.5%. Complete data was collected on 322 pregnant women. Their mean age was 26.7 years with standard deviation of ±5.2 years. One hundred fifteen (35.7%) were within the age group of 25-29 years. Agnua constitute majority of the ethnic group, 89 (27.6%) followed Nuer, 54(16.8%). One hundred twenty seven (39.4%) were protestant Christian. One hundred thirty six (42.2%) women attended primary education and 65(20.2%) women had no formal education. Two hundred eighty nine (89.8%) were ever married. Two hundred nine (64.9%) women were house wife followed by governmental employee, 61 (18.8%). The mean family size was 5.5 with the standard deviation of ±2.7 ranging from 2 to 15. One hundred thirty seven (42.5%) were living in a family which had more than five members.

Table 1: socio-demographic characteristics of pregnant women in Gambella town, March—April/2014

Socio demographic variables	Category	Number (%)	MUAC≤21 cm	MUAC>21cm	Crude odds ratio(95% CI)	P value
Age in year	15-19	22(6.8)	5(22.7)	17(77.3)	1.06(0.36-3.15)	0.98
	20-24	90(28.0)	29(32.2)	61(67.8)	1.71(0.92-3.2)	0.092
	25-29	115(35.7)	25(21.7)	90(78.3)	1	
	30-34	64(19.9)	24(37.5)	40(62.5)	2.16(1.1-4.23)	0.025
	≥35	31(9.6)	9(29.0)	22(71.0)	1.47	0.396
Ethnicity	Agnuac	89(16.8)	35(39.3)	54(60.7)	1	
	Nuer	54(27.6)	22(40.7)	32(59.3)	1.06(0.53-2.11)	0.867
	Oromo	51(15.8)	7(13.7)	44(86.3)	0.25(0.10-0.61)	0.002
	Amhara	51(15.8)	12(23.5)	39(76.5)	0.48(0.22-1.03)	0.059
	Kambata	35(10.9)	10(28.6)	25(71.4)	0.62(0.26-1.14)	0.26
	Tigre	21(6.5)	2(9.5)	19(90.5)	0.1(0.036-0.74)	0.019
	mejang	4(1.2)	1(25)	3(75)	0.51(0.05-5.14)	0.57
	Others	17(5.3)	3(17.6)	14(82.4)	0.33(0.089-1.24)	0.100
Religion	protestant	127(39.4)	43(33.9)	84(66.1)	1	
	orthodox	80(24.8)	14(17.5)	66(82.5)	0.41(0.21-0.82)	0.012
	catholic	67(20.8)	23(34.3)	44(65.7)	1.02(0.55-1.91)	0.95
	Muslim	27(8.4)	5(18.5)	22(81.5)	0.44(0.16-1.25)	0.125
	others	21(6.8)	7(33.3)	14(66.7)	0.98(0.37-2.6)	0.96
Educational status	No formal education	65(20.2)	23(35.4)	42(64.6)	1.91(0.98-3.71)	0.057
	Primary education	136(42.2)	42(30.9)	94(69.1)	1.56(0.89-2.73)	0.123
	Secondary and above	121(37.6)	27(22.3)	94(77.7)	1	
Husband's educational status	No formal education	34(10.6)	16(47.1)	18(52.9)	2.34(1.13-4.85)	0.022
	Primary education	41(12.7)	8(19.5)	33(80.5)	0.64(0.28-1.45)	0.284
	Secondary and above	247(76.7)	68(27.5)	179(72.5)	1	
Marital status	married	289(89.8)	207(71.6)	82(28.4)	0.91(0.42-2.00)	0.82
	unmarried	33(10.2)	23(69.7)	10(30.3)		
occupation	House wife	209(64.9)	68(32.5)	141(67.5)	1.62(0.83-3.14	0.154

	Government employee	61(18.9)	14(23.0)	47(77.0)	1	
	merchant	25(7.8)	5(20.0)	20(80.0)	0.84(0.266-2.644)	0.77
	Others	27(8.4)	5(18.5)	22(81.5)	0.76(0.24-2.39)	0.64
Husband's occupation	Government employee	189(58.7)	54(28.6)	135(71.4)	1	
	Merchant	45(14.0)	5(11.1)	40(88.9)	0.31(0.12-0.834)	0.02
	Daily laborers	40(12.4)	16(40.0)	24(60.0)	1.67(0.82-3.38)	0.157
	others	48(14.9)	17(35.4)	31(64.6)	1.37(0.70-2.68)	0.356
Family size	>5	137(42.5)	52(38.0)	85(62.0)	2.22(1.36-3.63)	0.001
	≤ 5	185(57.5)	40(21.6)	145(78.4)		

*** 1= reference**

5.2 prevalence of under-nutrition

The overall prevalence of under-nutrition was 28.6%. Pregnant women who were in the age group of 30- 34 years had higher prevalence (37.5%) of under-nutrition compared to the other age groups.

Pregnant women who had no formal education and whose husband had no formal education had higher prevalence of under-nutrition (35.4% and 47.1%) compared to pregnant women who had completed secondary education and above, and whose husband had completed secondary education and above.

Pregnant women who were house wife and whose husband were daily laborers had higher prevalence of under-nutrition (32.5% and 40.0%) when they were compared with other occupational groups. Merchant pregnant women and pregnant women whose husbands were merchant had lower prevalence of under-nutrition (20.0% and 11.1%).

Pregnant women who were from the large family (≥5) had higher prevalence of under-nutrition (38.0%) when they were compared with pregnant women from small family (<5) who had only 21.6% prevalence of under-nutrition.

Pregnant women who were married before their age of eighteen and conceived before their age of twenty had higher under-nutrition prevalence (46.8% and 43.4%) when they were compared with pregnant women who were married at their eighteen or more age and conceived at their twenty or more age who had 14.4% and 14.1% under-nutrition prevalence respectively.

The prevalence of under-nutrition was also more pronounced among pregnant women who lived in polygamy (46.9%) when compared to pregnant women who lived in monogamy (24%).

Intra-household allocation of food had also indispensible effect on the prevalence of under-nutrition among pregnant women. For example, the prevalence of under-nutrition among pregnant women who live in households where the best portion of food was given to husband was 40.8%, which was far above the prevalence of under-nutrition among pregnant women who live in households were meal was shared equally (20.7%).

Higher prevalence of under-nutrition was also observed among pregnant women who were living in households with monthly income <1000 birr and food insecure which was 39.3% and 44.5% respectively.

Pregnant women who had no nutritional knowledge had higher prevalence of under nutrition (37.7%) compared to pregnant women who had nutritional knowledge (20.5%)

Pregnant women who had meal frequency less than three and DDS less than six had higher prevalence of under-nutrition(45.8% & 41.5%) compared to pregnant women who had meal frequency greater than or equal to three and DDS greater than or equal to six (27.2% and 19.8%). The prevalence of under-nutrition was also higher among pregnant women who bore more than five children and had birth interval less than or equal to three years(39.1% & 29.6%) compared to pregnant women who bore 1-4 children and had birth interval greater than three years (26.4% and 20.6%).

Pregnant women who were from households without latrine had 21.7% higher rate of under-nutrition compared to pregnant women who were from households with latrine.

5.3 Socio-cultural characteristics

The median age at first marriage was 18 years ranging from 14 to 31 years. One hundred forty one (43.8%) women were married before their age of eighteen. The mean age at first conception was 19.9 years with the standard deviation of ± 3.04 years ranging from 15 to 33 years of age. About half, 159 (49.4%) women were conceived their first pregnancy before their age of twenty. About one fifth, 64 (19.9%) pregnant women were living in polygamy.

In 247 (76.7%) households, diets were shared equally even though the foods to be eaten were small during meal. In 54(16.8%) of households, foods were first given to husband and then shared among other family members. About one third, 107 (33.2%) pregnant women eat their diet after serving their husband and children.

Table 2: Socio-cultural characteristics of pregnant women in Gambella town, March-April/ 2014

variables	Category	Number (%)	MUAC ≤21cm	MUAC >21cm	Crude odds ratio(95%CI)	P value
Early marriage	Yes	141(43.8)	66(46.8)	75(53.2)	5.25(3.09-8.92)	0.001
	no	181(56.2)	26(14.4)	155(85.6)		
History of teenage pregnancy	Yes	159(49.4)	69(43.4)	90(56.6)	4.67(2.72-8.02)	0.001
	No	163(50.6)	23(14.1)	140(85.9)		
Living in polygamy	Yes	64(19.9)	30(46.9)	34(53.1)	2.79(1.58-4.92)	0.001
	No	258(80.1)	62(24.0)	196(76.0)		
Measures taken when the food to be eaten was small	Shared equally	247(76.7)	60(24.3)	187(75.7)	1	
	Given to children only	21(6.5)	11(52.4)	10(47.6)	3.43(1.39-8.47)	0.008
	First given to husband and shared	54(16.8)	21(38.9)	33(61.1)	1.98(1.07-3.69)	0.03
Allocation of the best portion of the food during meal	Shared equally	198(61.5)	41(20.7)	157(79.3)	1	
	Give to husband	98(30.4)	40(40.8)	58(59.2)	2.64(1.56-4.49)	0.001
	Given to children	26(8.1)	11(42.3)	15(57.7)	2.81(1.2-6.57)	0.017
Time of dishing of mother's portion during meal	Along with husband	180(55.9)	35(19.4)	145(80.6)	1	
	After husband	35(10.9)	16(45.7)	19(54.3)	3.49(1.63-7.46)	0.001
	After husband and children	107(33.2)	41(38.3)	66(61.7)	2.57(1.51-4.40)	0.001

***1 reference**

5.4 Socio-economic factors

The median household income was 1800.00 birr. Sixty one (18.9%) pregnant women were from the households with monthly income less than one thousand, and one hundred twenty three (38.2%) pregnant women were from households with monthly income more than two thousand.

Household food insecurity access scale (HFIAS)

From the total 322 households, 140 (43.3%) households worried about not having enough food in the month before commence of data collection. One hundred thirty five (41.9%) households were unable to eat preferred food. One hundred thirty three (41.3%) households ate a few kinds of food. One hundred fourteen (35.4%) households ate the foods they really do not want to eat. One hundred twenty (37.3%) households ate a smaller meal. Ninety (28%) households ate a fewer meal. In the 11(3.4%) households, there was no food of any kind. seven (2.2%) households' members went to sleep hungry. Two (0.6) households went the whole day and night without eating.

Table 3: household food insecurity access scale (HFIAS) of pregnant women in Gambella town, March-April/2014

Household food insecurity access scale(HFIAS)			Frequency	Percentage
Worry about food	Yes		140	43.5
	No		182	56.5
	Frequency	Rarely	37	11.5
		Sometimes	78	24.2
		Often	25	7.8
Unable to eat preferred food	Yes		135	41.9
	No		187	58.1
	Frequency	Rarely	44	13.7
		Sometimes	69	21.4
		Often	22	6.8
Eat just a few kind of	Yes		133	41.3

food	No		189	58.7
	Frequency	Rarely	46	14.3
		Sometimes	70	21.7
		Often	17	5.3
Eat foods they really do not want to eat	Yes		114	35.4
	No		208	64.6
	Frequency	Rarely	40	12.4
		Sometimes	64	19.9
		Often	10	3.1
Eat a smaller meal	Yes		120	37.3
	No		202	62.7
	Frequency	Rarely	59	18.3
		Sometimes	54	16.8
		Often	7	2.2
Eat fewer meal in a day	Yes		90	28
	No		232	72
	Frequency	Rarely	69	21.4
		Sometimes	20	6.2
		Often	1	0.3
No food of any kind in household	Yes		11	3.4
	No		311	96.6
	Frequency	Rarely	9	2.8
		Sometimes	2	0.6
		Often	0	0
Go to sleep hungry	Yes		7	2.2
	No		315	97.8
	Frequency	Rarely	6	1.9
		Sometimes	1	0.3
		Often	0	0
Go a whole day and night without eating	Yes		2	0.6
	No		320	99.4
	Frequency	Rarely	2	0.6
		Sometimes	0	0
		Often	0	0

Household food insecurity access prevalence (HFIAP)

From the total 322 pregnant women, 137(42.5%) pregnant women were from food in secured households.

Table 4: socio-economic characteristics of pregnant women in Gambella town, March-April/ 2014

Variables	Category	Number (%)	MUA ≤21cm	MUAC >21cm	Crude odds ratio(95% CI)	P value
Households' monthly income in birr	<1000	61(18.9)	24(39.3)	37(60.7)	2.54(1.29-4.998)	0.007
	1000-2000	138(42.9)	43(31.2)	95(68.8)	1.77(1.005-3.13)	0.048
	>2000	123(38.2)	25(20.3)	98(79.7)	1	
Household food insecurity	Yes	137(42.5)	61(44.5)	76(55.5)	3.99(2.39-6.66)	0.001
	No	165(57.5)	31(16.8)	154(83.2)		

* 1 reference

5.5 Individual and behavioral characteristics of pregnant women in Gambella town

From the total 322 pregnant women recruited in the study, 151 (46.9%) pregnant women had no better nutritional knowledge.

The mean meal frequency per day was 3.43 meals with the minimum of 2 meals per day and maximum of six meals per day. Twenty four (7.5%) pregnant women had eaten less than three meals a day.

The mean dietary diversity score was 6 food groups out of 14 food groups with the standard deviation of ± 1.58 ranging from 2 to 13 food groups. From the fourteen food groups, cereal food group was eaten by 100% (322) of the women. From the cereal food group 'teff' (58.4%) was the most consumed food followed by corn (54.7%), wheat (43.5%) and millet (36%). 'Injera' (62.1%) and porridge (46%) were the most processed food eaten from cereal group. One hundred thirty (40.4%) pregnant women had eaten from less than six food groups.

Two hundred forty two (74.5%) pregnant women had ever followed antenatal care service during their current pregnancy at Gambella hospital and Gambella town health center.

The median number of children born to the women was 2 children with standard deviation of 1.9. Seventy three (22.7%) pregnant women had no child and forty six (14.3%) pregnant women had more than or equal to five children. The mean birth interval between children was 2.52 years with the range and standard deviation of 9 and ± 1.1 years.

Eighty eight (27.3%) pregnant women were from households without latrine.

Table 5: Food groups consumed by pregnant women in Gambella town, March-April/2014

Food groups		Frequency	Percentage
Cereals	yes	322	100
	No	0	0
Vitamin A rich vegetables and tubers	Yes	96	29.8
	No	226	70.2
White tubers	Yes	48	14.9
	No	274	85.1
Dark green leafy vegetables	Yes	197	61.2
	No	125	38.8
Other vegetables	Yes	286	88.8
	No	36	11.2
Vitamin A rich fruits	Yes	187	58.1
	No	138	41.9
Other fruits	Yes	56	17.4
	No	266	82.6
Organ meat (iron rich)	Yes	1	0.3
	No	321	99.7
Flesh meat	Yes	93	28.9
	No	229	71.1
Eggs	Yes	30	9.3
	No	292	90.7
Fish	Yes	65	20.2
	No	257	79.8
Legumes, nuts and seeds	Yes	160	49.7
	No	162	50.3
Milk and milk products	Yes	81	25.2
	No	241	74.8
Oils and fats	Yes	310	96.3
	No	12	3.7

Table 6: Individual and behavioral characteristics of pregnant women in Gambella town, March-April/2014

Variables	Category	Number (%)	MUAC ≤ 21cm	MUAC >21cm	Crude odds ratio(95%CI)	P value
Nutritional knowledge	No	151(46.9)	57(37.7)	94(62.3)	2.36(1.43-3.87)	0.001
	Yes	171(53.1)	35(20.5)	136(79.5)		
Meal frequency	< 3	24(7.5)	11(45.8)	13(54.2)	2.27(0.98-5.26)	0.057
	≥3	298(92.5)	81(27.2)	217(72.8)		
DDS	< 6	130(40.4)	54(41. 5)	76(58.5)	3.88(1. 75-4.74)	0.001
	≥6	192(59.6)	38(19.8)	154(80.2)		
ANC contact	Yes	240(74.5)	64(26.7)	176(73.3)	0.70(0.41-1.20)	0.197
	No	82(25.5)	28(34.1)	54(65.9)		
Number of children	0	73(22.7)	20(27.4)	53(72.6)	1	
	1-4	203(63.0)	54(26.4)	149(73.4)	0.96(0.53-1.75)	0.895
	≥ 5	46(14.3)	18(39.1)	28(60.9)	1.70(0.78-3.73)	0.183
Birth interval in year	≤ 3	206(64.0)	61(29.6)	145(70.4)	1.62(0.67-3.93)	0.283
	> 3	34(10.6)	7(20.6)	27(79.4)		
Latrine possession	No	88 (27.3)	39(44.3)	49(55.7)	2.72(1.62-4.57)	0.001
	Yes	234(72.7)	53(22.6)	181(77.4)		

***1 reference**

5.6 Factors independently associated with under-nutrition among pregnant women in Gambella town

Multivariable logistic regression was fitted in order to identify independent predictors of under-nutrition. Accordingly, early marriage, household food insecurity and dietary diversity score were independent predictors of under-nutrition during pregnancy. Pregnant women who were married before their age of eighteen were 3.91 folds more likely to be under-nourished compared to pregnant women who were married after their age of eighteen (AOR=3.91, 95% CI: 2.23-6.86). Pregnant women who were from food insecure households were 2.3 times more likely to be undernourished compared to pregnant women who were from food secure households (AOR =2.3, 95% CI : 1.18-3.57). Pregnant Women who had DDS less than six were 2.05 more likely to be under-nourished when they were compared with pregnant women who had DDS more than or equal to six (AOR=2.05, 95% CI: 1.30-4.06).

Table 7: Independent predictors of under-nutrition among pregnant women in Gambella town, March-April/ 2014

variables	Category	Number (%)	MUAC ≤ 21cm	MUAC >21cm	Crude odds ratio(95%CI)	Adjusted odds ratio(95%CI)
Early marriage	Yes	141(43.8)	66(46.8)	75(53.2)	5.25(3.09-8.92)*	3.91(2.23-6.86)*
	no	181(56.2)	26(14.4)	155(85.6)		
DDS	< 6	130(40.4)	54(41.5)	76(58.5)	3.88(1. 75-4.74)*	2.05(1.18-3.57)*
	≥6	192(59.6)	38(19.8)	154(80.2)		
Household food insecurity	Yes	137(42.5)	61(44.5)	76(55.5)	3.99(2.39-6.66)*	2.30(1.30-4.06)*
	No	165(57.5)	31(16.8)	154(83.2)		

* p value<0.01

6 Discussion

The current study tried to reveal the magnitude of under-nutrition and factors associated with it among pregnant women in Gambella town. The magnitude of under-nutrition among pregnant women in Gambella town was 28.6%. The result was almost similar with the result reported from Kenya which was 31.7% (39). But, magnitude of under-nutrition reported in this study was far below the magnitude reported from Kersa Demographic Surveillance and Health Research Center (KDS-HRC) field site, Ethiopia, which was 47.28%(46). The big discrepancy observed may be due to different MUAC cut-off points used to determine under-nutrition.

Early marriage was one of the socio-cultural factors which independently associated with under-nutrition during pregnancy. The median age at first marriage was 18 years. This is almost consistent with the EDHS 2011 report in which the median age at first marriage in Gambella region was 17.4 years. But, it was above the national median age at first marriage which was 16.5year (47). The difference may be due to disparity of age at first marriage among urban and rural women. From pregnant women who were married before their age of eighteen, 66 (46.8%) were under-nourished where as from those who married at their eighteen or more age, only 26 (14. 4%) were under-nourished. Pregnant women who were married before their age of eighteen were 3.91 folds more likely to be under-nourished compared to pregnant women who were married at or after their age of eighteen (AOR=3.91, 95% CI: 2.23-6.86). This result is consistent the study done in Nigeria in which age at first marriage had significant impact on protein energy malnutrition (31) . The 2012 USAID report on delaying age at marriage and reducing malnutrition of adolescent girls in India showed that early marriage was associated with early pregnancy, high fertility; close spacing of births, unwanted pregnancies, and pregnancy termination which cumulatively deteriorates nutritional status of adolescent girls(30).

Household food insecurity was also one of the socio- economic factors which independently associated with under-nutrition during pregnancy. Sixty one (44.5%) pregnant women from food insecure households were under-nourished where as thirty one (16.8%) pregnant women from food secured households were under-nourished. Pregnant women who were from food insecure households were 2.3 times more likely to be undernourished compared to pregnant women who were from food secure households (AOR =2.3, 95% CI : 1.18-3.57). The result

could be due to the fact that in food insecure households, women pay a sacrificial role and are more vulnerable to be under-nourished than other family members(7).

Pregnant women are particularly vulnerable to food insecurity and associated nutrient inadequacies for two major reasons. First, physiological vulnerability comes with childbearing. Maternal nutrient needs increase during pregnancy and breastfeeding, and when these needs are not met, mothers may experience wasting and fatigue. Second, women have a sociological vulnerability. Food security research indicates that during periods of reduced food supply, women experience reduced intakes relative to men. Furthermore, mothers are likely to reduce their own intakes to secure those of infants and small children(43). The Ethiopian national nutrition strategy also underpins that in food insecure households women and children are the most vulnerable group and should be given special attention(7)

Dietary diversity score was also independently associated with under-nutrition. Pregnant Women who had DDS less than six were 2.05 more likely to be under-nourished when they were compared with pregnant women who had DDS more than or equal to six (AOR=2.05, 95% CI: 1.30-4.06). This is consistent with the result of survey done in Iran in which participants with scores ≥ six had greater body Mass Index, waist circumference and waist-hip ratio than in individuals with scores less than six(38). The study done in Kenya also shows that pregnant women with DDS greater than or equal to six had greater macro and micro nutrient intake when compared to pregnant women with DDS less than six(39).

Limitations of the study

- The use of 24hr dietary recall questionnaire may lend itself to over or underestimation of dietary intake as it is dependent on the respondents' ability to recall their dietary intake, and persistence of the interviewer
- The single 24hr dietary recall method used in this study does not reflect seasonal variation of dietary intake
- The magnitude of household food insecurity may vary across seasons, so that data which shows seasonal variations may be needed to fully understand household food insecurity and its association with under-nutrition among pregnant women

7 Conclusion and recommendation

7.1 Conclusion

The prevalence of under-nutrition among pregnant women in Gambella town was small compared to other studies. Household food insecurity, dietary diversity score and early marriage were independent predictors of under-nutrition.

7.2 Recommendation

- Gambella regional agricultural and rural development bureau should work in collaboration with other stakeholders to develop locally available crops to strengthen household food security and improve dietary quality
- Gambella region women's affair, Gambella region culture and tourism bureau, Gambella region education bureau, Gambella region health bureau and other stake holders should give due consideration to health education to delay age at first marriage.
- Regional health bureau in collaboration with other stakeholders should make nutritional behavior change communication on the importance of having diversified diets for pregnant women in Gambella town.
- The regional government along with other stakeholders should give due emphasis to mainstreaming and strengthening nutritional activities through community based nutrition programs (CBN) that contribute to reduction of food insecurity and consumption of unbalanced nutrients.

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Annex

ANNEX 1: RESEARCH TOOL

JIMMA UNIVERSITY
COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES
DEPARTMENT OF EPIDEMIOLOGY

QUESTIONNAIRE ON ASSESSMENT OF UNDER NUTRITION AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN IN GAMBELLA TOWN

Kebele_____
Questionnaire Identification Number: _____

Information sheet

Good morning/afternoon? My name is _____. I came from Jimma University College of public health and medical science, department of Epidemiology. I'm a member of research team of Jimma University. I came here to conducted study on under nutrition among pregnant women and its associated factors. I would like to have a short discussion with you concerning the study. The interview will take about half an hour. You are selected to be one of the participants in the study. The objective of the study is to assess under-nutrition and associated factors among pregnant women in Gambella town. The information you give me will be kept confidentially. The interview is based on your will and you have the right to participate or not to participate or to refuse at any time during the interview. Your refusal has no any effect on you or any member of your family. However, your participation is important to fulfill the study and design appropriate nutritional intervention for pregnant women in Gambella region and similar set up.

May I continue the interview?
Yes …….. Continue the interview
No …… stop the interview and thank the respondent
Interview's name:_____
Interviewer's signature:_____
Date_____/_____ 2014

Supervisor check
Supervisor's Name: _____
Supervisor's signature: _____
Date: _____/_____2014

Part I: Socio demographic characteristics.

Table 8: socio demographic questionnaires

NO	Questions	Coding classification	Skip
101	How old are you at your last birth day?	____year	
102	What is your religion?	1. Protestant 2. Orthodox 3. Catholic 4. Muslim 5. Others(specify)	
103	What is your Ethnic group?	1. Nuer 2. Agnua 3. Mejenger 4. Oromo 5. Amhara 6. Tigre 7. Kembata 8. Others (specify)	
104	What is the highest level of education you attended?	1. Illiterate 2. Able to read and write 3. ____grade 4. College/university diploma 5. College/university degree 6. others(specify)	
105	What is the highest level of education your husband attended?	1. Illiterate 2. Able to read and write 3. _____grade 4. College/university diploma 5. College/university degree 6. others(specify)_	
106	What is your current marital status?	1. single 2. Married 3. Widowed 4. Separated 5. divorced	
107	Does your husband have another wife?	1. Yes 2. No	
108	What is your current occupation?	1. house wife 2. government employee	

		3. merchant 4. private employee 5. unemployed 6. others(specify)	
109	What is your husband's current occupation	1. government employee 2. private employee 3. merchant 4. unemployed 5. others(specify)	
110	What is your net monthly household income?	_____ Eth birr	
111	How many members are there in your family	_____members	

Part II: socio cultural questionnaires

Table 9: socio cultural questionnaires

201	How old were you when you first get married?	_____year	
202	How old were you when you conceived for the first time	_____year	
203	Is there a food item that pregnant women omit during pregnancy in your community?	1. Yes 2. No	
204	If the answer to question 203 is 'yes', what?		
205	If the answer to question 203 is 'yes', why?		
206	What measure is taken during meal if the food to be eaten is small in your family members?	1. Shared equally 2. Given to the children only 3. Given to the husband only 4. Shared between mother and children 5. Other (specify)	
207	Who receives a best portion of meal in your family members?	1. Shared equally 2. Husband 3. Children 4. Husband and children 5. Self and Husband 6. Other (specify)	
208	When does mother's portion is dished during meal?	1. Along with husband 2. After husband 3. After husband and children 4. Others (specify)	

Part III: Individual and behavioral factors questionnaires

Table 10: health and health related questionnaires

No	Questions	Coding classifications	Skip
301	How many numbers of pregnancies have you had?	_____pregnancies	
302	How many children do you have?	_____ children	
303	How many months of gestation are you now?(approximately)	_____months	
304	How many years are there between your previous child birth and your current pregnancy?	_____years	
305	During this pregnancy or a previous pregnancy have you had any sickness?	1. Yes 2. No	
306	If your answer to question 305 is 'yes', what?		
307	If your answer to question 305 is 'Yes', have you sought any medical control?	1. Yes 2. No	
308	If your answer to question 307 is 'Yes', where? (do not read, circle only what she says)	1. Governmental hospital 2. Governmental health center 3. Private clinic 4. Health post 5. Others (specify)	
309	If your answer to question 307 is 'No', why? (do not read, circle only what she says)	1. Because I do not know where to get service 2. Because I cannot afford the transportation cost 3. Because I do not trust in health professionals 4. Because the service is not available around 5. Others (specify)	
310	Do you have ANC contact during your current pregnancy?	1. Yes 2. No	
311	If your answer to question 310 is 'Yes, how many times have you contacted ANC service during your current pregnancy?	_____ times	
312	If your answer to question 310 is 'Yes', from where do you get the service? (do not read, circle only what she says)	1. Governmental hospital 2. Governmental health center 3. Health post 4. Others (specify)	
313	If your answer to question 310 is 'No' why?	1. Because I do not know where to get	

	(do not read, circle only what she says)	service 2. Because I cannot afford the transportation cost 3. Because I do not trust in health professionals 4. Because the service is not available around 5. Others (specify)	
314	What is your main source of drinking water	1. Private tap 2. Public tap 3. Private well 4. Spring water 5. Others(specify)	
315	Do you have latrine	1. Yes 2. No	
316	If your answer to question 315 is 'Yes' what is the type of latrine?	1. Private Flush latrine 2. Private Pit latrine 3. Communal pit latrine 4. Others specify	
317	Where do you dispose waste materials	1. In the pit 2. Open field 3. Compose 4. Others (specify)	

Table 11: dietary knowledge and practice related questionnaires

No	Question	Coding classification	Skip
401	Do you know balanced diet?	1. Yes 2. No	
402	If your answer to question 401 is 'Yes' what are does it constitute? (do not read, circle what she says only)	1. Carbohydrate 2. Protein 3. Fat 4. Fibers 5. Minerals 6. Vitams 7. water	
403	Do you think that under nutrition among pregnant women has a bad consequence?	1. Yes 2. No	
404	If your answer to question 403 is 'Yes' what? (do not read, circle or write what she says only)	1. Low birth weight child 2. Pre- term birth 3. Still birth 4. Maternal disease 5. Others (specify)	
405	Do you think that pregnant woman should eat additional foods than when she was not pregnant?	1. Yes 2. No	

406	If the answer to question 405 is 'yes', why?		
407	Are you eating more foods than when you were not pregnant?	1. Yes 2. No	
408	If your answer to question 407 is 'Yes', what?		
409	If the answer to question 407 is 'No', why?		
410	Do you think that pregnant woman should make a change about what she eats from what she has been eating before getting pregnant?	1. Yes 2. No	
411	If the answer to question 410 is 'Yes', what?		
412	If the answer to question 410 is 'Yes', why?		
413	In terms of what foods you are eating, have you made any changes from how you were eating before becoming pregnant?	1. Yes 2. No	
414	If the answer to question 413 is 'Yes', what?		
315	Is there anything that you do not normally eat and that you are eating now?	1. Yes 2. No	
416	If the answer to question 415 is 'yes', what?		
417	If the answer to question 415 is 'yes', why?		
418	Do you have favorite foods that you are eating a lot of or that are particularly appealing to you now that you are pregnant?	1. Yes 2. No	
419	If your answer to question 418 is 'Yes', what?		
420	If your answer to question 418 is 'Yes', Are you able to get these foods as much as you would like?	1. Yes 2. No	
421	If your answer to question 420 is 'No', why? (do not read, circle only what she says)	1. Because it is not locally available 2. Because it is costly and I cannot buy it 3. Others (specify)	
422	Are there any special foods or preparations or products that you are	1. Yes 2. No	

	taking as diet supplements while you are pregnant?		
423	If your answer to question 422 is 'Yes', what? (observe)		
424	If your answer to question 422 'Yes', from where are you getting it?	1. Hospital 2. Health center 3. Private clinic 4. Others(specify)	
425	Is there a food that you normally eat and you do not eat now because you are pregnant?	1. Yes 2. No	
426	If your answer to question 425 is 'Yes' what is that food?		
427	If your answer to question 425 is yes why you stop eating that food?		
428	Have you been enrolled in food aid program in the past 1 month?	1. Yes 2. No	

24 hour Dietary recall questionnaires

Please tell me the foods (meals and snacks) that you ate from yesterday during the day and night whether at home or outside the home. Let us start with breakfast

Table 12: 24Hr dietary recall questionnaires

Breakfast	Snack	Lunch	Snack	Dinner	Snack

Complete this table when the recall is complete and ask further the food group that is not eaten. Lastly ask the food that is prepared and eaten outside.

NO	Food group	examples	(yes =1, No=0)
1	Cereals	corn/maize, teff , millet, sorghum, barrel, wheat, rice, bread, 'injera', porridge , pasta,	
2	Vitamin a rich Vegetables and tubers	pumpkin, carrots, sweet potatoes that are orange inside, sweet pepper	
3	White tubers and roots	white potatoes, white yams, cassava, false banana (kocho), taro (godere)	
4	Dark green leafy vegetables	kale, spinach, lettuce	
5	Other vegetables	tomato, onion, garlic, cabbage, zucchini, fosoliya, cucumber,	
7	Other fruits	Orange, avocado, apple, banana, grapes, peach, lemon. Gishta, , menderin	
8	Organ meat (iron rich)	liver, kidney, heart, blood-based foods	
9	Flesh meats	beef, pork, lamb, goat, chicken, dikula, midakua, agazin, jigira	
10	Eggs	Duck egg, hen egg or any other egg	
11	Fish	fresh or dried fish	
12	Legumes, nuts and seeds	Beans, peas, lentils, nuts. sesame, chickpea, guaya	
13	Milk and milk Products	milk, cheese, yogurt or other milk products	
14	Oils and fats	oil, fats or butter added to food or used for cooking	
15	Sweets	sugar, honey, chocolates, candies, cookies and cakes	
16	Spices, Condiments, Beverages	black pepper, salt, sauce, coffee, tea, alcoholic beverages	

17. Did you or anyone in your household eat anything outside of the home yesterday**? 1. Yes**

2. No

18**.** If your answer is yes what is that food?

_____

_____

_____

_____

Part IV: Household food insecurity questionnaires

Table 13: Household food insecurity questionnaires

NO	questions	Coding classifications	skip
501	In the past four weeks, did you worry that your household would not have enough food?	0. No 1. yes	
502	If your answer to question 501 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	
503	In the past four weeks, were you or any household member not able to eat the kind of foods you preferred because of a lack of resources?	0. No 1. yes	
504	If your answer to question503 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	
505	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0. No 1. yes	
506	If your answer to question 505 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	
507	In the past four weeks, did you or any household 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 1. yes	
508	If your answer to question 507 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	
509	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0. No 1. yes	
510	If your answer to question509 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	
511	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	0. No 1. yes	
512	If your answer to question 511 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	
513	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0. No 1. yes	
514	If your answer to question 513 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	
515	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0. No 1. yes	
516	If your answer to question 515 is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	

517	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	1 No 1 yes	
518	If your answer to question 517is 'YES' how often did this happen?	1. Rarely 2. Sometimes 3. Often	

Key

Rarely = 1-2 days

Sometimes = 3-9 days

Often = 10-30 days

Part V: MUAC measurement

MUAC = _____cm

Thank you!

ጅማ ዩኒቨርሲቲ
የሕብረተሰብ ጤናና ሕክምና ሳይንስ ኮሌጅ
ኢፒዴሞሎጂ ድፓርትመንት

የጋምበላ ከተማ የነፍሰጡር እናቶች የምግብ እጥረት እና ተያያዥ መንሴዎች መጠይቆች
ቀበሌ_____

የጥያቄዉ መለያ ቁጥር _____

<u>የስምምነት መግለጫ</u>

እንደ ምን አደርሽ/ዋልሽ? ስሜ _____እባላለሁ:: የመጣሁት ከጅማ ዩኒቬርሲቲ ነዉ:: እኔ የጅማ ዩኒቬርሲቲ የምርምር ቡድን አባል ሲሆን የመጣሁት የጋምቤላ ከተማ ነፍሰጡር እናቶች ምግብ እጥረት እና ተያያዥ መንሴዎች ላይ ጥናት ለማድረግ ነዉ:: ጥናቱን በተመለከተ ካንቺ ጋር አጭር ዉይይት እንዲኖረን ልገልፅልሽ እወዳለሁ:: የጥናቱ ዓላማ የነፍሰ ጡር እናቶች ምግብ እጥረትና ተያያዥ መንሴዎችን ማጥናት ነዉ:: አንቺ በጥናቱ ዉስጥ እንደ አንድ ተሳታፊ ተደርገሽ ተመርጠሻል:: ማንኛዉም የሚትሰጪኝ መረጃ ምስጥራዊ እና ለጥናቱ ብቻ የሚያገለግል ነዉ:: ማንኛዉም ተሳታፊ የሚለየዉ በሚሰጠዉ የሚስጥር ቁጥር እንጂ ስማቸዉ አይፃፈም:: ዉይይቱ ባንቺ ፍላጎት ላይ የተመሰረተ ነዉ: በማንኛዉም ሰዓት ዉይይቱን የማቋረጥ መብት አለሽ:: በዉይይቱ ዉስጥ አለመሳተፍሽ ባንቺም ሆነ በቤተሰቦችሽ ላይ ምንም ዓይነት ተፅዕኖ አያሳድርም:: ይሁን እንጂ ያንቺ ተሳትፎ ለጥናቱ ሙላት እና በጋምቤላ ከተማ ለሚገኙት የነፍሰጡር እናቶች የምግብ እጥረትና ተያያዥ መንሴዎች እልባት ለመስጠት ወሳኝ ሚና አለዉ::

ቃለ መጠየቁን መቀጠል እንችላለን?

አዎን…….ቃለ መጠየቁን ቀጥይዉ

አየደለም……ቃለ መጠየቁን ተይና ተጠያቂዋን አማሰግኛት

የጠያቂዉ ስም _____

የጠያቂዉ ፍርማ _____

ቀን ___/_____/_____

የተቆጣጣሪ ማረጋገጫ

የተቆጣጣሪዉ ስም_____

የተቆጣጣሪዉ ፍርማ_____

ቀን_____/_____/_____

ቀበሌ_____

ክፍል አንድ የስነ ሕዝብ መጠይቆች

ቁጥር	ቃለ መጠይቆች	መለያ ቁጥሮች	ወደ
101	ዕድሜሽ ስንት ነዉ?	_____ ዓመት	
102	አይማኖትሽ ምንድን ነዉ?	ፕሮተስታንት አርቶዶክስ ካቶልክ ሙሲሊም ሌላ(ግለጪ)	
103	ብሔርሽ ምንድን ነዉ?	ኑዌር አኙዋ መጀንግር ኦሮሞ አማራ ትግሬ ከምባታ ሌላ(ግለጪ)	
104	እስከ ስንተኛ ክፍል ተምረሻል?	ትምህርት የለኝም ማንበብና መፃፍ እችላለሁ _____ክፍል የኮሌጅ /የዩኒቬርሲቲ ድፕሎማ የኮሌጅ /የዩኒቬርሲቲ ድግሪ ሌላ(ግለጪ)_____	
105	ባለቤትሽ እስከ ስንተኛ ክፍል ተምሯል?	ትምህርት የለዉም ማንበብና መፃፍ እችላል _____ክፍል የኮሌጅ /የዩኒቬርሲቲ ድፕሎማ የኮሌጅ /የዩኒቬርሲቲ ድግሪ ሌላ(ግለጪ)	
106	ባዉኑ ሰዓት የጋብቻሽ ዉነታ ምንድ ነዉ?	ያላገባች ያገባች ባል የሞተባት ከባሉዋ ጋር የተለያየች የተፋታች	
107	ባለቤትሽ ካንቺ ዉጪ ለላ ምስት አለዉ;	አዎን የለዉም	
108	ባዉኑ ሰዓት ስራሽ ምንድ ነዉ?	የቤት እመቤት የመንግስት ተቀጣሪ ነጋዴ የግል ተቀጣሪ ያልተቀጠረች ሌላ (ግለጪ)	
109	ባዉኑ ሰዓት የባለቤትሽ ሥራ ምንድነዉ;	የመንግስት ተቀጣሪ የግል ተቀጣሪ ነጋዴ ያልተቀጠረ ሌላ(ግለጪ)	
110	የቤተሰብሽ ወራዊ ገቢ ስንት ነዉ?	_____ ብር	
111	ቤተሰባችሁ ስንት አባላት አለዉ		

ክፍል ሁለት፡ የማህበራዊና ባህላዊ አኗኗር መጠይቆች

201	የመጀመሪያ ባልሽን በስንት ዓመትሽ ነዉ ያገባሽዉ?	_____ዓመት	
202	መጀመሪያ የፀንሽዉ በስንት ዓመትሽ ነበረ?	_____ዓመት	
203	አንች በሚትኖሪበት ማሕበረሰብ ዉስጥ በእርግዝና ጊዜ እርጉዝ እናቶች የማይበሉት ምግብ አለ?	ነ. አዎን 2. የለም	
204	ለጥያቄ 113 መልሽ አዎን ከሆነ የማይበላዉ ምግብ ምንድ ነዉ?		
205	ለጥያቄ 113 መልሽ አዎን ከሆነ ለምንድ ነዉ የማይበላዉ?		
206	ለቤተሰባችሁ ለመብላት የቀረበ ምግብ ለሁሉም የማይበቃ ከሆነ ምን አማራጭ ይወሰዳል?	1. ለሁሉም እኩል ማበቃቃት 2. ለልጆች ብቻ ይሰጣል 3. ለአባ ወራ ብቻ ይሰጣል 4. እናትና ልጆች ብቻ ናቸዉ የሚበሉ 5. ሌላ (ግለጪ)	
207	ከቤተሰባችሁ የሚሻለዉን ድርሻ የሚበላ ማን ነዉ?	1. ሁለም እኩል እበላል 2. አባ ወራ 3. ልጆች 4. አባወራና ልጆች 5. አባ ወራና እማ ወራ 6. ሌላ(ግለጪ)	
208	በምግብ ሠዓት እናቶች የሚበሉት ምግብ መቼ ነዉ የሚቀርበዉ?	1. ከባላቸዉ ጋር 2. ባላቸዉን ካበሉ በኃላ 3. ባላቸዉንና ልጃቸዉን ካበሉ በኃላ 4. ሌላ (ግለጪ)	

ክፍል ሶስት፡የግለሰብ አኗኗርና ፀባይ መጠይቆች

የጤናና ጤና ነክ መጠይቆች

No	መጠይቆች	መለያ ቁጥሮች	ወደ
301	እስካሁን ስንት ጊዜ አርግዘሻል?	_____ ጊዜ	
302	ስንት ልጆች አሉሽ?	_____ ልጆች?	
303	ፅንስሽ ስንተኛ ወሩ ነዉ?(በግምት)	_____ወር	
304	በአማካይ ልጆችሽ በስንት አመት ይበላለጣሉ?	_____ዓመት	
305	ባዉኑ ወይም ባለፈዉ እርግዝናሽ ግዜ አሞሽ ያዉቃል?	ነ. አዎን 2. አይደለም	
306	ለጥያቄ ቁጥር 305 መልስሽ አዎን ከሆነ ምንድ ነዉ የታመምሽዉ?		
307	ለጥያቄ ቁጥር 305 መልስሽ አዎን ከሆነ	ነ. አዎን 2. አይደለም	

	ታክሜሽ ነበረ?		
308	ለጥያቄ ቁጥር 307 መልስሽ አዎን ከሆነ የት ነዉ የታከምሽዉ? (ምርጫዎቹን አታንብቢላት እሷ የሚትለዉን ብቻ አክብቢ)	1. በመንግስት ሆስፒታል 2. በመንግስት ጤና ጣብያ 3. በግል ክሊኒክ 4. ጤና ኬላ 5. ሌላ (ግለጪ)	
309	ለጥያቄ ቁጥር 307 መልስሽ አይደለም ከሆነ ለምን? (ምርጫዎቹን አታንብቢላት እሷ የሚትለዉን ብቻ አክብቢ)	1. አገልግሎቱን ከየት ማግኘት እንደሚችል አላዉቅም 2. ዋጋዉን መክፈል አልችልም 3. በጤና ባለሙያዎቹ አመኔታ የለኝም 4. አገልግሎቱ በአቅራብያ የለም 5. ሌላ (ግለጪ)	
310	ባዉኑ እርግዝናሽ ጊዜ ለነፍሰጡር እናቶች የሚሰጠዉን የቅድመ ወሊድ አገልግሎት ተጠቅመሽ ታዉቂዋለሽ?	ı. አዎን 2. አይደለም	
311	ለጥያቄ ቁጥር 3ıo መልስሽ አዎን ከሆነ እስካሁን ስንት ግዜ ተጠቅመሻል?	_____ጊዜ	
312	ለጥያቄ ቁጥር 310 መልስሽ አዎን ከሆነ አገልግሎቱን ከየት ነዉ የሚታገኚዉ? (ምርጫዎቹን አታንብቢላት እሷ የሚትለዉን ብቻ አክብቢ)	1. ከመንግስት ሆስፒታል 2. ከመንግስት ጤና ጣብያ 3. ከግል ክሊኒክ 4. ጤና ኬላ 5. ሌላ (ግለጪ))	
313	ለጥያቄ ቁጥር 310 መልስሽ አይደለም ከሆነ ለምን? (ምርጫዎቹን አታንብቢላት እሷ የሚትለዉን ብቻ አክብቢ)	1. አገልግሎቱን ከየት ማግኘት እንደምችል አላዉቅም 2. ዋጋዉን መክፈል አልችልም 3. በጤና ባለሙያዎቹ አመነታ የለኝም 4. አገልግሎቱ በአቅራብያ የለም 5. ሌላ (ግለጪ)	
314	የመጠጥ ዉሃ ከየት ነዉ የሚታገኚዉ?	1. የግል ቧንቧ 2. የሕዝብ ቧንቧ 3. የግል ጉድጓድ ዉሃ 4. የምንጭ ዉሃ 5. ሌላ(ገለጪ)	
315	ሽንት ቤት አላችሁ?	1. አዎን 2. የለንም	
316	ለጥያቄ 3ı3 መልስሽ አዎን ከሆነ ሽንት ቤቱ ምን ዓይንት ነዉ?	1. የግል በዉሃ የሚሄድ ሽንት ቤት 2. የግል የጉድጓድ ሽንት ቤት 3. የጋራ የጉድጓድ ሽንት ቤት 4. ሌላ(ገለጪ)	

317	ቆሻሻ የት ነዉ የሚታስወግጂዉ?	1. በጉድጓድ ዉስጥ 2. በሜዳ ላይ 3. ኮምፖስ አደርጋለሁ 4. ሌላ (ግለጪ)	

የምግብ እዉቀትና አጠቃቀም መጠይቆች

ቁጥር	መጠይቆች	መለያ ቁጥሮች	ወደ
401	ተመጣጣኝ ምግብ ማለት ምን ማለት እንደሆነ ታዉቂዋለሽ?	ነ. አዎን 2. አላዉቂም	
402	ለጥያቄ ቁጥር 401 መልስሽ አዎን ከሆነ ምን ምን ያካትታል? (ምርጫዎቹን አታንብቢላት እሷ የሚትለዉን ብቻ አክብቢ)	1. ዓይልና ሙቀት ሰጪ 2. ገምቢ ምግብ 3. ጮማ ነክ ምግብ 4. ቀይበር 5. ሜኔራል 6. ቫይታምኖች 7. ዉሃ	
403	የምግብ እጦት በነፍሰጡር እናቶች ላይ መጥፎ ዉኔታዎችን ያስከትላል ብለሽ ታምኚያለሽ?	ነ. አዎን 2. አይደለም	
404	ለጥያቄ 403 መልስሽ አዎን ከሆነ ምን? (ምርጫዎቹን አታንብቢላት እሷ የሚትለዉን ብቻ አክብቢ)	1. ዝቅተኛ የዉልደት ክብደት 2. ወር ሳይደርስ መዉለድ 3. የሞቱ ልጅ መዉለድ 4. የሕናቶች በሽታ 5. ሌላ (ግለጪ)	
405	ነፍሰጡር ሕናት ከማርገ□ ግዜ በፊት ከሚትበለዉ ምግብ ተጨማሪ ምግብ መብላት አለባት ብለሽ ታምኚያለሽ?	1. አዎን 2. አይደለም	
406	ለጥያቄ ቁጥር 405 መልሱ አዎን ከሆነ ለምን?		
407	ከማርገዝሽ በፊት ከሚትበይዉ ምግብ ተጨማሪ እየበላሽ ነዉ?	ነ. አዎን 2. አይደለም	
408	ለጥያቄ 407 መልስሽ አዎን ከሆነ ምን?		
409	ለጥያቄ 407 መልስሽ አይደለም ከሆነ ለምን?		
410	ነፍሰ ጡር ሕናት ከማርገ□ በፊት ከሚትበላቸዉ ምግቦች ይልቅ የሚትበለቸዉን የምግብ ዓይነቶች	1. አዎን 2. አይደለም	

	መቀያየር አለባት ብለሽ ታምኚዋለሽ?		
411	ለጥያቄ ቁጥር 410 መልስሽ አዎን ከሆነ ምን?		
412	ለጥያቄ ቁጥር 410 መልስሽ አዎን ከሆነ, ለምን?		
413	ከማርገዝሽ በፊት ከሚትበይአቸዉ ምግቦች ይልቅ አዉን የሚትበይአቸዉን ምግቦች እየቀያያርሻቸዉ ነዉ?	1. አዎን 2. አላደረኩም	
414	ለጥያቄ ቁጥር 413 መልስሽ አዎን ከሆነ ምን ?		
415	ከማርገዝሽ በፊት የማትበይአቸዉና በዉኑ ግዜ የሚትበይአቸዉ ነገሮች አሉ?	1. አዎን 2. የለም	
416	ለጥያቄ ቁጥር 415 መልስሽ አዎነ ከአነ ምን?		
417	ለጥያቄ ቁጥር 415 መልስሽ አዎነ ከአነ ለምን?		
418	አሁን እርጉዝ ስለሆንሽ ብዙ ጊዜ የሚትበይዉ ወይም ለሙበላት የሚትፈልጊዉ ምግብ አለ?	1. አዎን 2. የለም	
419	ለጥያቄ ቁጥር 418 መልስሽ አዎን ከሆነ ምን?		
420	ለጥያቄ ቁጥር 418 መልስሽ አዎን ከሆነ, እነዛ የሚትፈልግያቸዉን ምግቦች እያገኘሻቸዉ ነዉ?	1. አዎን 2. አይደለም	
421	ለጥያቄ ቁጥር 420 መልስሽ አይደለም ከሆኔ ለምን? (ምርጫዎቹን አታንብቢላት እሷ የሚትለዉን ብቻ አክቢ)	1. ምክንያቱም ምግቡ በአቅራቢያ አይገኝም 2. ዉድ ስለሆነ መግዛት አልችልም 3. ሌላ (ግለጪ)	
422	በዚህኛዉ እርግዝናሽ ወቀት የሚትወስጂያቸዉ ልዩ ምግቦች ወይን ንጥረ ነገሮች ወይን ምርቶች አሉ?	1. አዎን 2. የለም	
423	ለጥያቄ ቁጥር 422 መልስሽ አዎን ከሆነ ምን? (ቀኚ)		
424	ለጥያቄ ቁጥር 422 መልስሽ አዎን ከሆነ, ከየት እያገኘሻቸዉ ነዉ?	1. የመንግስት ሆስፒታል 2. የመንግስት ጤና ጣብያ	

		3. የግል ክሊኒክ 4. ሌላ(ገለጪ)	
425	ከማርገዝሽ በፊት የሚትበይአቸዉ ነገር ግን አዉን እርጉዝ ስለሆንሽ የማትበይአቸዉ ምግቦች አሉ?	1. አዎን 2. የለም	
426	ለጥያቄ ቁጥር 425 መልስሽ አዎን ከሆነ ምን ምግብ ነዉ የማትበይዉ?		
427	ለጥያቄ ቁጥር 425 መልሽ አዎን ከሆነ ለምንድ ነዉ የማትበይዉ?		
428	በምግ እርዳታ ፕሮግራም ተመዝግበሽ ነበር?	1 አዎን 2. አይደለም	

በ24 ሰዓት ውስጥ የተበሉ ምግቦች የማስታወስ መጠይቆች

ትላንት ቀኑን ሙሉ ሌሊቱንም ጨምሮ በቤትም ሆነ ወጪ የበላሽዉን ምግብ እነዲትነግሪኝ እወዳለው፡፡ እስቲ በቁርስ እንጀምር

ቁርስ	ማቆያ	ምሳ	መክሰስ	እራት	ከእራት በ;ኃላ

የበላችሁን ምግቦች ሁሉ አስተዉሳ ካጠናቀቀች በ;ኃላ ስላልበላችዉ ምግብ አይነት ተጨማሪ መረጃ ጠይቃትና

የሚቀጥለዉን ሰንጠረዥ ሙይ

ቁጥር	የምግብ አይነት	ምሳሌዎች	አዎን=1 አይደለም=0
1	የሰብል ሕህሎች	በቆሎ, ጤፍ , ማሽላ, ዘንጋዳ, ገብስ, ስንዴ, ሩዝ, ዳቦ/ቂጣ, እንጀራ, ገንፎ , ፓስታ	
2	ቫይታሚን ኤ ያላቸዉ አትክልቶች እና ስራስሮች	ዱባ, ካሮት, ስ;ኳር ድንች ፣ ቃርያ	
3	ነጭ የግንድ አትክልቶችና ስራስሮች	ድንች, ከሳቫ, ቆጮ, ጎደሬ	
4	አሮንጓድ ቅጠላማ አትክልቶች	የሐበሻ ጎመን, ቀስጣ፣ ሰላጣ, .	
5	ለሎች አትክልቶች	ቲማትም, ሽንኩርት, ነጭ ሽንኩርት,ዙኩኒ,ጥቅል ጎመን, ፎሶሊያ, ከከምበር	

6	ቫታሚን ኤ ያላቸዉ ፍራፍሬዎች	የበሰለ ማንጎ, የበሰለ ፓፓያ	
7	ለሎች ፍራፍሬዎች	ብርቱካን, አቮካዶ, አናናስ, ሙዝ, የወይን ፍሬ, ኮክ, ሎሚ, ግሽጣ, መንደሪን	
8	የአርጋን ሥጋ (አይረን ያለዉ)	ጉበት, ኩላሊት,ልብ, የደም መረቅ ምግቦች	
9	የፍሌሽ ሥጋ	የበሬ ሥጋ, የዓሳማ ስጋ, የበግ ሥጋ, የፍየል ሥጋ, የዶሮ ሥጋ, የድኩላ ሥጋ	
10	ዕንቁላል	የዳክዬ , የዶሮ ወይም ለላ ዕንቁላል	
11	ዓሣ	ትኩስ ወይን የደረቀ የዓሣ	
12	ጥራጥሬዎች, ሎዝ እና ፍሬዎች	ባቄላ, አተር, ምስር, ሎዝ.ሳሊጥ, ሽንቡራ, ጓያ	
13	ወተትና የወተት ዉጤቶች	ወተት, አይብ, እርጎ ወይ ለላ የወተት ዉጤቶች	
14	ዘይትና ጮማ ነክ ምግቦች	ዘይት, በወጥ ዉስጥ የተጨመረ ቅቤ	
15	ጣፋጪ ምግቦች	ስኳር, ማር, ቸኮለት, ከረሜላ, ኩኪስ እና ኬክ	
16	ቅመማቅመም,ማጣፈጫዎች, መጠጦች	ጥቁር አዝሙድ, ጨዉ, ሳልሳ, ቡና, ሻይ, የአልኮል መጠጦች	

17. ካንቺ ወይም ከበተሰባችሁ ወስጥ አንድ ሰዉ ትላት ቀንም ሆነ ማታ ምግብ ዉጪ የበላ አለ? 1. አዎን 2. የለም

18. ለጥያቄ ቁጥር 17 መልስሽ አዎን ከሆነ ዉጪ የተበላ ምግብ ምንድ ነዉ?

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ክፍል አራት፡ የቤተሰብ ምግብ ዋስትና መጠይቆች

ቁጥር	መጠይቆች	መለያ ቁጥሮች	ወደ
501	ባለፉት አራት ሳምንታት ዉስጥ ቤተሰቦቼ በቂ ምግብ አያገኙም ብለሽ ተጨንቀሽ ታዉቂዋለሽ?	0. አይደለም 1. አዎን	
502	ለጥያቄ ቁጥር 501 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	
503	ባለፉት አራት ሳምንታት ዉስጥ ካንቺ ወይም ከቤተሰቦችሽ ዉስጥ አንድ ሰዉ ንብረት ስላጣችሁ አንቺ የሚትፈልጊዉን ምግብ መብላት ያልቻለ አለ?	0. አይደለም 1. አዎን	
504	ለጥያቄ ቁጥር 503 መልስሽ አዎን ከሆነ ለምን ያህል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	
505	ባለፉት አራት ሳምንታት ዉስጥ ካንቺ ወይም ከቤተሰቦችሽ ዉስጥ አንድ ሰዉ ንብረት ስላጣችሁ ውስን የምግብ ዓይነቶችን የበላ አለ?	0. አይደለም 1. አዎን	
506	ለጥያቄ ቁጥር 505 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	
507	ባለፉት አራት ሳምንታት ዉስጥ ካንቺ ወይም ከቤተሰቦችሽ ዉስጥ አንድ ሰዉ ንብረት ስላጣችሁ አንቺ የማትፈልጊዉን ምግብ በልተዋል?	0. አይደለም 1. አዎን	
508	ለጥያቄ ቁጥር 507 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት	

		2. አልፎ አልፎ 3. ብዙ ጊዜ	
509	ባለፉት አራት ሳምንታት ዉስጥ ካንቺ ወይም ከቤተሰቦችሽ ዉስጥ አንድ ሰዉ በቂ ምግብ ባለመኖሩ አንቺ ከምትፈልጊዉ በታች የሆነ በመጠን አነስተኛ ምግብ የበላ አለ?	0. አይደለም 1. አዎን	
510	ለጥያቄ ቁጥር 509 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	
511	ባለፉት አራት ሳምንታት ዉስጥ ካንቺ ወይም ከቤተሰቦችሽ ዉስጥ አንድ ሰዉ በቂ ምግብ ባለመኖሩ በሙሉ ቀን ዉስጥ ትንሽ ምግብ የበላ አለ?	0. አይደለም 1. አዎን	
512	ለጥያቄ ቁጥር 511 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	
513	ባለፉት አራት ሳምንታት ዉስጥ ንብረት ስላጣችሁ ከቤታችዉ ምንም የሚበላ ምግብ ጠፍቶ ያዉቃል?	0. አይደለም 1. አዎን	
514	ለጥያቄ ቁጥር 513 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	
515	ባለፉት አራት ሳምንታት ዉስጥ ካንቺ ወይም ከቤተሰቦችሽ ዉስጥ አንድ ሰዉ ምግብ ባለመኖሩ ሌሊት እየራበዉ የተኛ አለ?	0. አይደለም 1. አዎን	
516	ለጥያቄ ቁጥር 515 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	
517	ባለፉት አራት ሳምንታት ዉስጥ ካንቺ ወይም ከቤተሰቦችሽ ዉስጥ አንድ ሰዉ በቂ ምግብ ባለመኖሩ ምንም ሳይበላ ዉሎ ያደረ አለ?	0. አይደለም 1. አዎን	
518	ለጥያቄ ቁጥር 517 መልስሽ አዎን ከሆነ ለምን ያእል ጊዜ ነዉ ይሄ የተከሰተዉ?	1. በጣም ትንሽ ቀናት 2. አልፎ አልፎ 3. ብዙ ጊዜ	

<u>ቁልፍ</u>

በጣም ትንሽ ቀናት = 1-2 ቀን

አልፎ አልፎ= 3-9 ቀናት

ብዙ ግዜ= 10-30 ቀናት

<u>ክፍል አምስት :</u>

MUAC = _____cm

አመሰግናለሁ!!