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Determinants of Acute Malnutrition Among Pregnant Women in Mekdella ,District, South Wollo Zone, North East, Ethiopia

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**COLLEGE OF MEDICINE AND HEALTH SCIENCES SCHOOL OF
PUBLIC HEALTH DEPARTMENT OF EPIDEMIOLOGY AND
BIOSTATISTIC**

**DETERMINANTS OF ACUTE MALNUTRITION AMONG
PREGNANT WOMEN IN MEKDELLA ,DISTRICT, SOUTH WOLLO
ZONE, NORTH EAST, ETHIOPIA**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF, EPIDEMIOLOGY AND
BIOSTATISTICS SCHOOL OF PUBLIC HEALTH, COLLEGE OF MEDICINE
AND HEALTH SCIENCES IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH
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**BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND
HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH
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Study area	South Wollo zone, Mekdella district

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Acronyms and Abbreviations

ANC	Antenatal care
AOR	Adjusted Odds Ratio
CI	confidence interval
COR	Crude Odds Ratio
CSA	Central Statistical Agency
DDS	dietary diversity score
EDHS	Ethiopian Demographic and Health Survey
ETB	Ethiopian Birr
HH	House holds
IUGR	Intrauterine growth restriction
LBW	Low birth weight
MUAC	Mid Upper Arm Circumference
SD	Standard deviation
SPSS	Statistical Package for Social Science
TSFP	Therapeutic supplementary feeding program
UNICEF	United Nations Integrated Children's Emergency Fund
WHO	World Health Organization

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Abstract

Background: Maternal under nutrition is a worldwide public health problem affecting a high proportion of women in developing countries. Acute malnutrition is a major public health problem in Ethiopia and has significant impact on communities in particularly, the main health problems facing for pregnant women. Acute malnutrition in pregnancy increases the risk of gestational anemia, miscarriages, fetal deaths during pregnancy, pre-term delivery and maternal mortality.

Objective: The aim of this study was to identify the determinants of acute malnutrition among pregnant women in Mekdella district , South Wollo zone, North East, Ethiopia, 2019.

Methods: A Community based un matched Case control study design was conducted on 776 pregnant women in eleven kebeles of Mekdella district, South Wollo zone, Amhara region, from April to May 2019. The data was entered and cleaned using Epi data software version 3.1 then export to statistical package for social science version 20.0 for analysis. Binary logistic regression was used to identify the candidate variables and included in the multi variable binary logistic regression. The degree of association between independent and dependent variables were assessed using adjusted odds ratio and statistical significance was assessed a 5 % level of significance.

Results: A total of 260 cases and 516 controls were included in the study with a response rate of 100% and 97.3% respectively. Pregnant women who were from food insecure households (AOR 2.2 [95% CI: 1.51 -3.12]), didn't get ANC visits (AOR 2.5 [95% CI: 1.71-3.55]), dietary diversity score less than or equal to three (AOR 6.4 [95% CI: 4.39 -9.35]), pregnant women who were from non- model households (AOR 1.8 [95% CI: 1.05-2.94]) and the odds of acute malnutrition among literate pregnant women were 0.65 less likely (AOR 0.65 [(0.44-0.96]) lower than those who were illiterate were independent predictor of acute malnutrition.

Conclusion: Pregnant women who didn't get antenatal care visits, low dietary diversity score, women who were from food insecure households, being non-model households were an independent predictor of acute malnutrition. Therefore provision of antennal care to all pregnant women is used as a point of entry for educating pregnant women and increase nutritional knowledge, attitude and counseling on consumption of diversify foods should be used as a main tool.

Keywords: Determinants, acute malnutrition, pregnant women, Ethiopia

1. Introduction

1.1. Background

Maternal under nutrition/ malnutrition is one of the leading causes of morbidity and mortality in children and pregnant women in developing countries. Ethiopia being one of those countries, malnutrition is an important public health problem. Acute malnutrition occurs as a result of recent rapid weight loss or a failure to gain weight within a relatively short period of time and occurs as a result of deficiencies in both macronutrients (fat, carbohydrate and protein) and some micronutrients (vitamins and minerals) [1-3].

Acute malnutrition is also failure to take and absorb sufficient essential nutrients to grow and develop normally. This may be due to a poor appetite secondary to nutritional deficiency because of poor quality of the diet or infection, pathological losses or mal-absorption increase the requirement which increased amounts of a high quality diet [4, 5].

Acute nutrition including micronutrient deficiencies remains one of the major public health challenges, particularly in low-to-middle-income countries. A mother's nutritional status, diet and lifestyle influence pregnancy outcomes and can have lasting effects on her offspring's health. Inadequate intakes of certain micronutrients during pregnancy such as, folic acid and iodine, can contribute to birth defects and/ or the inability of the child to develop to his or her full cognitive potential [6]. The MUAC (Mid Upper Arm Circumference) values below which most adverse effects were identified < 22 and < 23 cm. A conservative cut-off < 23 is recommended to include most pregnant women at risk of LBW (Low birth weight) for their infants in the African and Asian contexts [7].

Pregnancy is a critical period during which maternal nutrition has a major effect on a women's and baby's health. Lack of adequate nutrition of a good quality and quantity during pregnancy, especially deficiencies of certain vitamins and minerals, have been associated with negative pregnancy outcomes for both the women and her fetus [8].

Acute malnutrition is known to increase the risk of poor pregnancy outcomes, including obstructed labor, premature or low-birth-weight (LBW) babies and postpartum hemorrhage and also, severe anemia during pregnancy is associated with increased maternal mortality.

Acute mal nutrition of pregnant women has also intergenerational effect with repeating cycles of malnutrition, for long term consequences include limited academic performance, stunted professional achievement and lower wages as adults [9]. In addition, acute malnutrition during pregnancy may result life-threatening hemorrhage, increased risk for sepsis and increased all-cause mortality [10].

Some literatures found the following risk factors for acute malnutrition of pregnant women like, inadequate food consumption of macronutrients, household's food insecurity, inadequate care, unhealthy house hold environment [3]. Antenatal care (ANC) services approach with appropriate information and evidence-based interventions enormous for a healthy pregnancy and antenatal care offers an opportunity for assessment of the nutritional status of a pregnant women as well as the assessment of essential nutritional actions and continuous monitoring throughout pregnancy [11]. There is no universally endorsed method of identification of maternal malnutrition, though mid-upper arm circumference (MUAC) has been used reproducibly in a standardized manner [1].

1.2. Statement of the problem

Globally maternal malnutrition accounts for 7% of the global disease burden, it contributes to at least a 5th of maternal deaths along with the increased probability of poor pregnancy outcomes. Especially widely prevalent in the regions of South East Asia, South America and Africa. Those countries in this region have maternal under nutrition prevalence as high as 35% [12].

Globally, maternal under nutrition contributes to 800,000 neonatal deaths and approximately 32 million pregnant women were anemic, 19 million suffer from vitamin A deficiency and millions suffer from insufficient iron, foliate, zinc, iodine stores and 20 million babies are born weighing less than 2500 g at birth (low birth weight), about 15 million are premature and many are born small for their gestational age, increasing their risk of morbidity and mortality during childhood by attributing of micronutrient malnutrition during pregnancy [13].

Poor pregnant malnutrition contributes to at least 20% of maternal deaths and increases the probability of poor pregnancy outcomes including intrauterine growth restriction (IUGR), low birth weight, stunting, wasting, mortality and also children are prone to retarded growth, less coordination, poor vision, learning difficulty and exposed many other diseases [14, 15].

Evidence showed that for Kamrup district of Assam of India, under nutrition among pregnant women are 48% and Iron-deficiency anemia 62% [16]. In Ardal district of Iran the Prevalence of malnutrition for pregnant women are 51.3% [17]. In Rafsanjan of Iran underweight women had 9.7% LBW during delivery [18]. In Ibadan, Nigeria 2014, weight gain of 7kg and below during pregnancy was associated with 12.12% low birth weight, this is contributing to maternal malnutrition problem [19].

Demographic and Health Survey (DHS) also shows that, the prevalence of low birth weight in Ethiopia is one of the highest in the world and has been estimated to be 14%. Based on mother's subjective assessment of the size of the baby at birth, 21% of births were reported to be very small and 7% were reported as smaller than average. This is due to contributing factor for the poor nutritional status of women both before and during pregnancy, made worse by inadequate weight gain during pregnancy [20]. Among the most common causes of maternal mortality are Preexisting conditions like under nutrition and anemia are more common and accounted for 28% [21]. Maternal micronutrient deficiencies also contributes like anemia is a risk factor for maternal deaths, most likely due to hemorrhage, the leading cause of maternal deaths 23%

of the total deaths like iron. Ethiopia also faces one of the world's highest rates of maternal under nutrition. One of every four (27%) women in Ethiopia are undernourished [22]. Ethiopian Demographic Health Surveys (EDHS) 2005, 26.9% ,2011, 27% of women are undernourished and in 2016, weight and height measurements of women age 15–49 were 22% are thin body mass index (BMI < 18.5) [22].

In some parts of Ethiopia studies showed that, the rates of malnutrition in pregnant women is high , like in Central Rift Valley of Ethiopia in 2016, the prevalence of malnutrition of pregnant women is 31.8% [23]. In Amhara region University of Gondar hospital study demonstrated that the prevalence of pregnant women under nutrition is 16.2% [24]. And the prevalence of under nutrition among pregnant women in Gambella town is 28.6% [25].

In previous literatures factors that influence this problem were Anemia , multiple pregnancy ,early marriage, low dietary diversity, low ANC visited during pregnancy in health facilities ,house hold food insecurity [25, 26]. To solve such problems pregnant Women nutrition interventions in the country has tried to concentrated more on iron supplementation, therapeutic supplementary feeding as emergency relief. but, a little effort to address other causes of malnutrition that are not related to food contribution. Only limited research has been conducted on the prevalence and associated factors of under nutrition of pregnant women. Particularly, determinants of acute malnutrition of pregnant women were not well addressed. So, this study was carried out to identify determinants of acute malnutrition among pregnant women.

1.3. Significance of the study

In Ethiopia most of the studies have focused on child under nutrition. As such problems pregnant women acute malnutrition were not given attention as children's acute malnutrition. But, pregnant women acute malnutrition have its own intergenerational effects. Pregnant women nutrition interventions in the country has concentrated more on iron supplementation and monitoring weight gain during pregnancy but little effort to address other causes of malnutrition that are not related to food contribution.

On the other hand, low level of understanding about the determinants of acute malnutrition is one of the challenges faced in addressing the problem of pregnant women under nutrition in Ethiopia. This is because of the inadequate studies available concerning the determinants of acute malnutrition among pregnant women.

At the mean time the government and other nongovernmental organizations were taking an action for emergency relief still now. However, the national survey and different studies have showed that maternal under nutrition is indicated to be still high. And there is no decrement of acute malnutrition in Pregnant women while given the intervention in the study area still now and also, there is no pocket level study to alleviate this problem.

Therefore, to identify determinants of acute malnutrition of pregnant women will be useful to inform local practitioners as well as planners or policy makers, design intervention strategies that help to reduce the burden of acute malnutrition to identify its determinants and to improve Pregnancy women health in the district, because women are the back bone of future generation. And the study can also use as a reference for researchers to do further researches.

2. Literature review

2.1. Socio demographic Factors

A study conducted in the Amoron Mania region of Madagascar showed that pregnant women were in the household size equal to or greater than six were 1.59 times more likely exposed under nutrition [27]. Another study conducted in the University of Gondar hospital, revealed that pregnant women who were living in rural area were two times higher risk of under nutrition compared to pregnant women living in urban and pregnant women with no formal education 2.91 times higher as compared to pregnant women with higher education were exposed under nutrition. And also the risk of under nutrition for pregnant women with grand multi paras was two and half times higher as compared to pregnant women with no parity[24]. Similar study revealed that the likelihood of dietary practice during pregnancy among mothers who had monthly income of 1000-2000 was two times higher than those <1000 monthly income [28].

A study conducted in Guto Gida Woreda, East Wollega Zone, those who had an estimated monthly income of greater than 1000 birr were 5.7 times more likely knowledgeable about nutrition during pregnancy than who had an estimated monthly income of less than 1000 birr and also those respondents who had an estimated monthly income of greater than 2000 birr were 5.93 times more likely knowledgeable about nutrition during pregnancy than who had an estimated monthly income of less than 1000 birr [29].

Another study conducted in Shashemenne district , West Arsi Zone showed that literate women were protected from under nutrition. The odds of under nutrition were 70% lower for the literate adolescent pregnant women than the illiterate women [26].

2.2. Socio cultural Factors

Pregnant women (Early marriage) who were married before the age of eighteen were 3.9 times more likely to be undernourished compared to pregnant women who were married after the age of eighteen [25].

According to a study conducted in Shashemenne district, West Arsi Zone, revealed that pregnant women who married before the age of fifteen were about 7.3 times more likely develop undernourished compared to pregnant women who married between the ages of eighteen and nineteen years [26] .

2.3. Obstetric factors

Another study conducted under humanitarian setting in Ethiopia using MUAC < 21 cm as a criteria,(24%) surveyed Pregnant mothers were found to be malnourished and its determinants with under nutrition of pregnant women those mothers who did not received antenatal care (ANC) during their pregnancy were 1.83 times more likely to be malnourished as compared to mothers who received ANC during pregnancy [30].

Another study showed that Adolescent pregnant women who didn't visit ANC were six times more likely to be undernourished when compared to respondents who attended ANC greater or equal to four. Adolescent pregnant women who get pregnant less than three times were less likely to be under nourished than those who had more pregnancy [26] . ANC services dissatisfaction had 1.66 times more likely develop malnutrition compared to satisfied pregnant women and pregnant women who did not satisfied with ANC services had 66% risk of developing prenatal malnutrition compared with those satisfied [23].

A cross-sectional study done in Eastern Ethiopia revealed that the risk of malnutrition was more than two fold higher in pregnant women with low 2.47 and medium 2.74 autonomy of household decision-making than those who had high level of autonomy in household decision-making. Women in the second and third trimester had a 66% and nearly two fold increased risk of malnutrition compared with their counterparts. Women who improved their eating habits had 53% lower risk of malnutrition than those who did not. The risk of malnutrition was 39% lower in respondents who received prenatal dietary advice than in those who did not [31]. Similar study showed that Risk factors identified for under nutrition were multiple pregnancy were 1.96 times more likely develop under nourished compared to not multiple pregnancy [32]. No of pregnancy before the current pregnancy 3-4 were 3.537 times more likely develop acute malnutrition compared to number of pregnancy <2 [29] .

2.4. Nutrition Factors

Another study conducted in Gambella were Pregnant women who were from food insecure households were two times more likely to be under nourished compared to pregnant women who were from food secure households [25].

Pregnant women who did not take iron supplementation during the current pregnancy were 2.04 times more likely to develop anemia than those who took iron supplements [33].

A study conducted in Central Rift Valley of Ethiopia showed that MUAC <21 cm had significant association with Hemoglobin <11 g/dl accounted for 42%. MUAC 2.39 times , height 3.55 times were factors associated with maternal malnutrition [23].

Pregnant women who were anemic were 2.01 times more likely to be undernourished than those with normal hemoglobin level [34]. Women who had information about nutrition during pregnancy had 6.26 times more likely good nutrition practice than women who had no information during pregnancy [29]. Pregnant women who had low dietary diversity score were 2.1 times more likely to be under nourished as compared to pregnant women who had better dietary diversity score [25].

2.5. Water, sanitation and hygiene factors

One of the major causes of malnutrition in an individual is the presence of disease. Poor sanitation and the use or consumption of unsafe or contaminated water is usually the primary source of diseases related to environmental hygiene. Food and water should be handled in a hygienic manner in order to avoid food and water-borne illnesses. Pregnant women's immune systems are weaker and thus they are susceptible to infection. [11, 35].

A study conducted in the Amoron Mania region of Madagascar showed that pregnant women who used unsafe water source were 2.82 times more likely to be malnourished than those who used safe water source [27].The intestinal parasite was also found to be significantly associated with under nutrition, pregnant women who had one or more intestinal parasitic infection were 2.73 times more likely to be malnourished compared to those who had no intestinal parasitic infection [34] .

3. Conceptual frame work

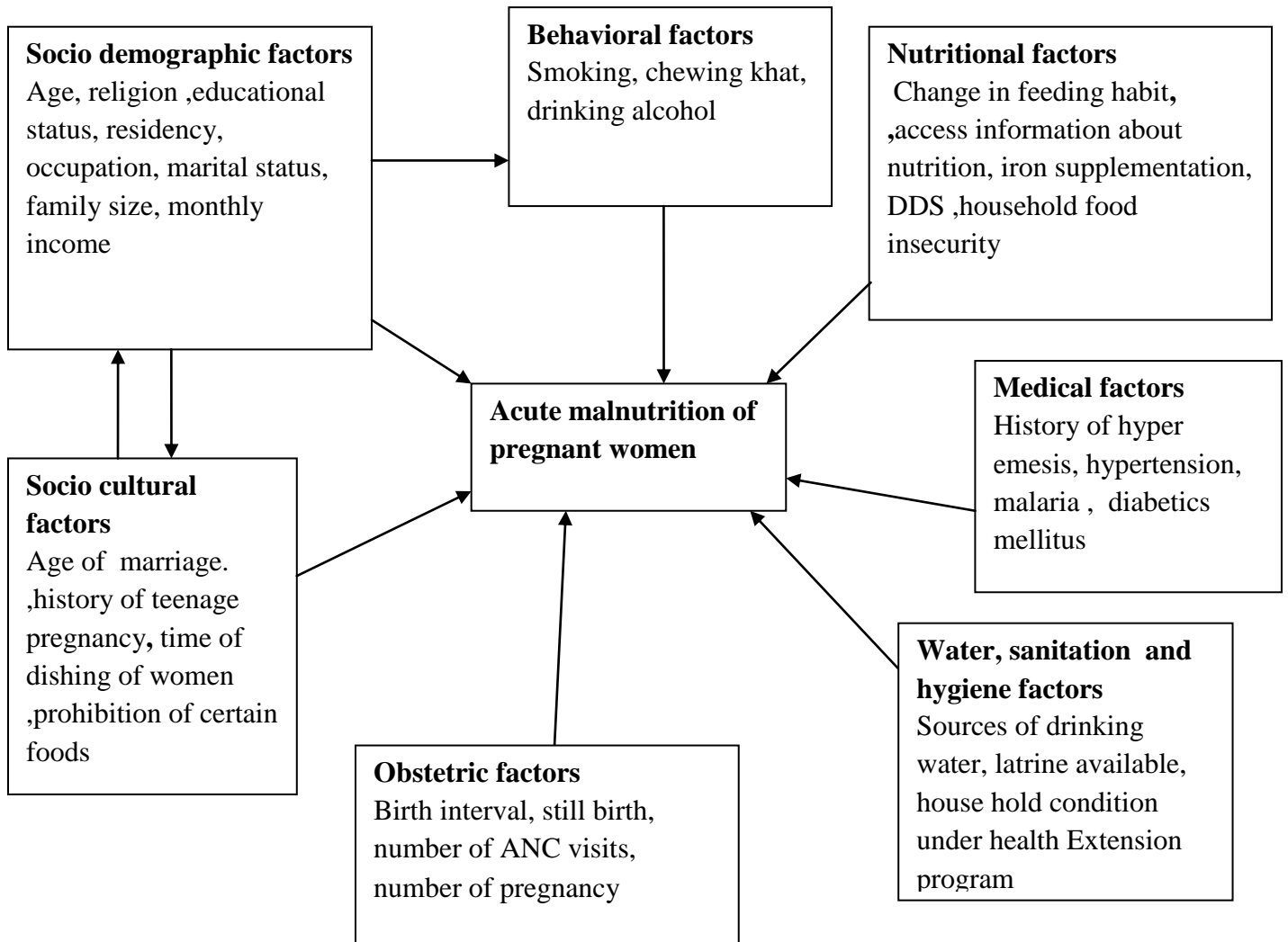


Figure 1: Schematic presentation of conceptual frame work

Those independent variables listed in the above figure were adapted from reviewing different literatures which is related to determinants of acute malnutrition. Like Socio–demographic, Socio cultural ,obstetric nutritional ,behavioral ,medical and water ,sanitation and hygiene related factors (ref. 25,26,27, 28, 29,30,31,32,33).

4. Objective

To identify the determinants of acute malnutrition among pregnant women in Mekdella district, South Wollo zone, North East, Ethiopia ,2019.

5.Methods and Materials

5.1. Study setting

The study was conducted in Mekdella district ,South Wollo zone, Amhara region in Ethiopia. It is located at an altitude of 500 -3200 meters above sea level , latitude 110 North and longitude 380 East direction of North East, Ethiopia. It is bordered by Delanta district on the North, Tenta district on the East, Sayint district on the South, Simada and Tach gayint to the West direction. It covers 152,100 Km² land from this area 28,724 hectare used as crop production. With annual rainfall 350 - 891 millimeter, annual temperature ranges from 9 0C -220C. The agro-ecological zone of the district were kola 44 % , 26.4 % Dega, 28 % Woina Dega and 1.6% Wurch. The total Population of the district was estimated over 168,303, of which 83,310 (49.5 %) were male and 84,993 (50.5%) were females. Among this 39,686 were reproductive age groups. The district has thirty rural and two urban kebeles with one district hospitals, seven health centers and thirty health posts. The area is marginal for agricultural production and suffers a food deficit every year. All health posts were provide therapeutic supplementary feeding program(TSFP) for acute malnutrition pregnant women after seven month of pregnancy.

5.2. Study design and Period

A Community based unmatched case control study was conducted from April to May, 2019.

5.3. Population

5.3.1. Source Population

All pregnant women who were living in Mekdella district during the study period

5.3.2.Study population

All pregnant women who lived in randomly selected kebeles who fulfill the inclusion criteria.

Cases : All pregnant women whose MUAC less than 23 cm in the sample population [7].

Controls : All pregnant women whose MUAC greater than or equal to 23 cm in the sample population.

5.4. Inclusion and Exclusion criteria

5.4.1. Inclusion criteria

All Pregnant women who were resident for at least six months in the district were included in the study

5.4.1. Exclusion criteria

Women who were unable to communicate due to severe illness

Dependent Variable

Acute malnutrition

Independent Variables

Socio-demographic: Age, religion, educational status, resident, occupation, marital status, family size, monthly income

Socio cultural factors: Early marriage, history of teenage pregnancy, time of dishing of women, prohibition of certain food

Obstetric Factors: Birth interval, Still birth, number of ANC visits, number of pregnancy

Nutritional factors: Change in feeding habit, nutritional counseling, use of extra food during pregnancy, supplementation of iron foliate, DDS, house hold food insecurity

Water, sanitation and hygiene: Sources of drinking water, latrine available, house hold condition under health extension program

Medical factors: History of hyper emesis, malaria, hypertension, diabetics mellitus

Behavioral factors: Smoking, chewing khat, drinking alcohol

5.9. Definitions of terms

Cases: All pregnant women with screened acute malnutrition by using MUAC less than 23 cm treated in therapeutic supplementary feeding program or without TSFP in Mekdella district

Controls: All pregnant women not diagnosed acute malnutrition by using MUAC greater than or equal to 23 cm in Mekdella district

Acute malnutrition or wasting of pregnancy: is an indicator of acute (short-term) malnutrition which is MUAC less than 23 cm, is the dependent variable. In pregnant women wasting can be assess through MUAC.

Model households: defined as households that attended at least 75% of the training given by health extension workers and implemented at least 75% of the health extension program packages

Dietary diversity score (DDS): defined as all pregnant women which is consumed nine food groups within 24 hours and then it was categorized as low dietary diversity ≤ 3 food groups , medium dietary diversity 4-6 food groups and high dietary diversity 7-9 food groups.

5.6. Sample size determination

The Sample size was determined based on sample size calculation for double population proportions formula using EPI Info software with the assumption of 95% confidence interval (CI), control to case ratio of 2:1, AOR 2.01 [24], power of 80 % , percent of control exposed 70.6 % , from similar previous study, 157 case and 313 control with non- response rate of 10% gives 173 pregnant women with acute malnutrition (case) and 344 pregnant women without acute malnutrition (control) and take design effect 1.5 it gives 260 cases and 516 controls. The final sample size was 776.

Table 1:Sample size determination for double population proportion formula from previous similar study

Variables	Percent of cases with exposure (p1)	Percent of controls exposed (p2)	Ratio (unexposed to exposed)	Assumptions		Sample size	Ref.
				CI	Power (1 – β)		
Anemia	85.6	70.6	2	95%	80%	470	[24]
House hold food insecurity	53.1	33	2	95%	80%	231	[25]
Early marriage	65.4	32.6	2	95%	80%	93	[25]

Anemia was selected because it was the exposure variable that gives the highest sample size of cases and controls among the other variables from previous studies.

5.7. Sampling procedure

In the district there are thirty rural and two urban Kebeles. From those kebeles , ten Kebeles from rural and one kebele from urban were selected randomly using lottery method and the calculated sample size was proportionally allocated to randomly selected kebeles based on the average number of acute malnutrition pregnant women prior to the study period by reviewing survey for two months was used. Then to select cases and controls simple random sampling was applied for each kebele by using unique identification number from pregnant women nutrition screening registration book for a month prior to data collection until the desired sample size was attained for proportionally allocated Cases and controls (figure2).

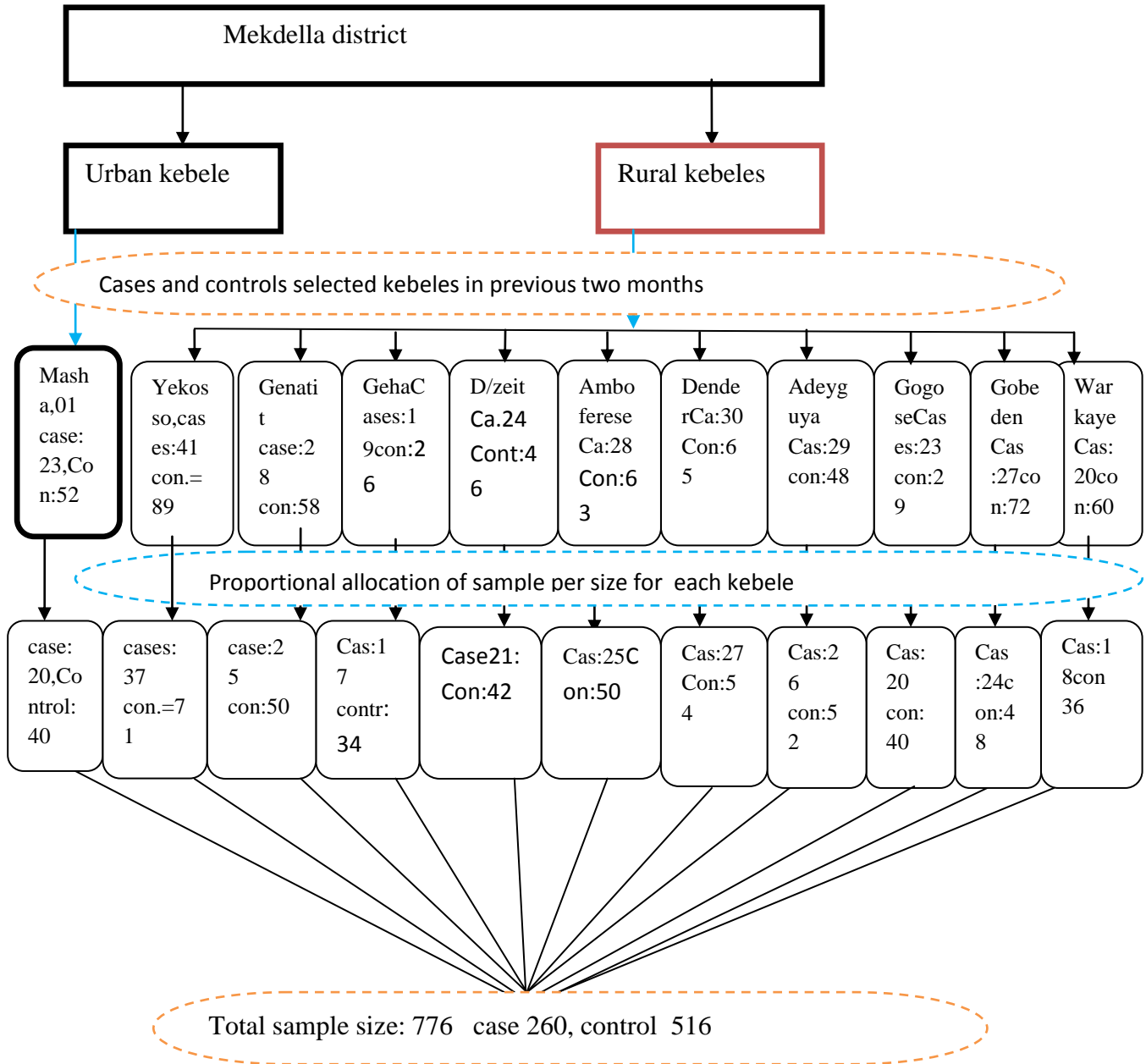


Figure 2: Sampling procedure of pregnant women in Mekdella district, South Wollo zone, North East, Ethiopia, 2019

5.8. Data Collection Procedures

Data were collected by face to face interview using a structured questionnaire after reviewing from previous similar literatures to include all possible variables that address the objective of the study. The questionnaire gathered seven theme of participants characteristics, like socio-demographic ,socio cultural, obstetric history, nutrition information, water, sanitation and hygiene, medical, behavioral related factors and measuring anthropometric (MUAC). The data were collected by seven nursing and four midwifery graduated data collectors and five supervisors were recruited for the data collection. Two days training were given to data collectors and supervisors before the beginning of the data collection.

Measurement

Acute malnutrition of Pregnant women were determined through measurement of MUAC, which was commonly used approach in diagnosing acute malnutrition among pregnant women. MUAC of each woman was measured at the mid-point between the tips of the shoulder and elbow of the left arm using non-elastic, non-stretchable MUAC tapes. Measurements were recorded to the nearest 0.1 cm with no clothing. This cutoff point was used based on the SPHERE Standard .

Dietary diversity score (DDS) was calculated from a single 24 hour dietary recall data. All the foods and the liquids consumed a day before the study was categorized into 9 food groups. Consuming a food item from any of the groups was assigned a score of 1 and if no food was taken a score of 0 was given. Accordingly, a DDS of 9 points was computed by adding the values of all the groups.

5.10. Data Quality assurance

Before data collection the questionnaire was first prepared in English then translated in Amharic (local language). To enhance the quality of this research pretest was conducted 5% from the total sample size in Bazura kebele out of the study area. The quality of the data were assured by properly designed and pre-tested questionnaire, proper training of the interviewers and supervisors. During the data collection time, regular monitoring and supervision of the overall activity was done by supervisors and principal investigator to ensure the quality of data. All the collected data were checked, cleaned and coded to avoid some inconsistencies and incompleteness before analysis.

5.11. Data processing and analysis

The data were entered and cleaned using Epi data software version 3.1 and analyzed using statistical package for Social science (SPSS) version 20.0 for analysis. Descriptive statistics were used to describe the profile of study participants and binary logistic regression was conducted primarily to identify individual variable which has association with the dependent variable and Variables with $p < 0.2$ were candidate in the multiple binary logistic regression to identify the determinants of acute malnutrition among pregnant women. Backward stepwise regression model was used to select the variables. Finally, variables with $P\text{-value} < 0.05$ in the multivariable binary logistic regression model were taken as statistically significant a 5% level of significance.

The model goodness of the test was checked by Hosmer and Lemeshow goodness of the fit ($P\text{-value} > 0.05$) to test whether the required assumptions for the use of multivariable binary logistic regression is fulfilled.

5.12. Ethical consideration

Ethical clearance was obtained from institutional review board of school of public health, College of Medicine and Health Sciences, Bahir Dar University. Then official letter from the school of public health was written to Mekdella district health office. in addition, letter of permission was obtained from Mekdella district health office to selected kebeles. After telling the purpose and objectives of the study verbal consent was obtained from each study participants. The name was not written on the questionnaire and the confidentiality was assured as the information they give was not disclosed or used for any purpose other than the study. Pregnant women whose MUAC less than 23 were linked to TSFP to fulfill the eligible criteria.

6. Results

6.1. Socio-demographic related factors

A total of seven hundred seventy six participants were included in the study with a response rate of 98.32%. A total of two hundred sixty cases and five hundred sixteen controls were included with a response rate of 100% and 97.3% respectively and also the mean age of cases and controls were 28.28 ± 5.350 (SD) and 27.93 ± 5.652 (SD) years respectively .

Of the total participants 240 (92.3%) of cases and 463 (92 %) of controls were from rural kebeles. About the total participants 177 (68%) of cases and 347 (68.9 %) of controls were Muslim and 138 (53.1%) of cases and 221 (43.9%) of controls were monthly family income less than two toughened in Ethiopia birr (Table 2).

Table 2: Socio-demographic related factors of pregnant women in Mekdella, district, South Wollo zone ,North East, Ethiopia, 2019

Variables	Cases (n= 260)		Controls (n= 503)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Age				
15-24	67	25.8	147	29.2
25-34	152	58.5	282	56.1
35-44	41	15.7	74	14.7
Residence				
Urban	20	7.7	40	8.0
Rural	240	92.3	463	92.0
Religion				
Muslim	177	68.0	347	68.9
Orthodox	83	32.0	156	31.1
Educational status				
Illiterate	131	50.4	226	44.9
Literate	129	49.6	277	55.1
Marital Status				
Married	253	97.3	497	98.8
Divorced	7	2.7	6	1.2
Occupational status				
House wife	228	87.7	443	88.0
Governmental	15	5.7	23	4.6
Merchant	17	6.5	37	7.4
Family size				
1-3	115	44.2	245	48.7
4-6	126	48.5	225	44.7
>6	19	7.3	33	6.6
Monthly income				
<2000	138	53.1	221	43.9
≥2000	122	46.9	282	56.0

6.2.Socio-cultural related factors

Of the total participants 76 (29.2%) of cases and 101 (20.1 %) of controls had a history of teenage pregnancy and 121 (46.5%) of cases and 132 (26.2%) of controls were the age of marriage less than eighteen . Regarding to the prohibition of foods, 45 (17.3%) of cases and 57 (11.3%) of controls were practicing prohibition of foods.

6.3. Obstetric related factors

Among the total participants 137 (52.7%) of cases and 118 (23.5%) of controls were not visited antenatal care during pregnancy. Of the total 183(70.4%) of cases and 404 (80.3%) of controls had birth interval less than three (Table 3).

Table: 3 Obstetric related factors of acute malnutrition of pregnant women in Mekdella, district, South Wollo zone ,North East, Ethiopia, 2019

Variables	Cases (n= 260)		Controls (n= 503)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Birth interval				
<3	183	70.4	404	80.3
≥3	77	29.6	99	19.7
Month of current pregnancy				
0-3 month	10	3.8	27	5.4
4-6 month	114	43.8	228	45.3
7-9 month	136	52.4	248	49.3
Parity				
≤2	106	40.8	251	49.9
>2	154	59.2	252	50.1
History of still birth				
Yes	17	6.5	19	3.8
No	243	93.5	484	96.2
ANC visits				
Yes	123	47.3	385	76.5
No	137	52.7	118	23.5

6.4. Nutritional related factors

About the total participants 152 (58.5%) of cases and 73 (14.5%) of controls had low dietary diversity scores (Table 4).

Table 4: Nutritional related factors of acute malnutrition of pregnant women in Mekdella, district, South Wollo zone ,North East, Ethiopia, 2019

Variables	Cases (n= 260)		Controls (n= 503)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Household food insecurity				
Yes	114	43.8	146	29.0
No	146	56.2	357	71.0
Nutrition information (counseling)				
Yes	159	61.2	369	73.4
No	101	38.8	134	26.6
Dietary diversity scores				
≤3	152	58.5	73	14.5
>3	108	41.5	430	85.5
Avoid any food during pregnancy				
Yes	103	39.6	149	29.6
No	157	60.4	354	70.4

6.5. Medical related factors

Of the total participants 170 (65.4%) of cases and 222 (44.1 %) of controls had no history of nausea and vomiting during the first three months of pregnancy.

6.6. Behavioral related factors

Among the total participants 233(89.6%) of cases and 490 (97.4%) of controls were not drinking alcohol and also 256 (98.5%) of cases and 496 (98.6%) of controls were not chewing khat during pregnancy.

6.7. Water ,sanitation and hygiene related factors

About the total Participants 235 (90.4%) of cases and 371 (73.8%)of controls were non-model households and 179 (68.8%) of cases and 392 (77.9 %) of controls were using safe water for drinking.

6.8. Determinants of acute malnutrition among pregnant women

Binary logistic regression was conducted and Variables with P-value <0.2 were candidate in the multiple binary logistic regression. Those list of candidate variables from bi-variable logistic regression were educational level, monthly income, household food insecurity, history of teenage pregnancy, prohibition of foods, age of marriage, number of pregnancy, history of still birth, nutrition information, dietary diversity score, drinking alcohol, house hold condition under health extension program and ANC visits. Then multiple binary logistic regression analysis were carried out to control potential confounding and identify predictor variables.

The odds of acute malnutrition among literate pregnant women were 0.65 less likely (AOR 0.65 [0.44-0.96]) lower than those who were illiterate.

The odds of acute malnutrition among pregnant women who were from food insecure households were 2.2 times (AOR 2.2 [95% CI: 1.51 -3.12]) higher than those who were from food secure households.

The odds of acute malnutrition among pregnant women who didn't get antenatal care (ANC) visits were 2.5 times (AOR 2.5 [95% CI: 1.71-3.55]) higher than those who were get ANC visits during pregnancy.

The odds of acute malnutrition among pregnant women with dietary diversity scores (DDS) less than or equal to three were 6.4 folds (AOR 6.4 [95% CI: 4.39 -9.35]) higher than those whose dietary diversity scores greater than three .

The odds of acute malnutrition among pregnant women who lived in non- model households were 1.8 times (AOR 1.8 [95% CI:1.05-2.94]) higher than those who lived in model households(Table 5).

Table 5: Determinants of acute malnutrition among pregnant women in Mekdella, district, South Wollo zone ,North East, Ethiopia, 2019

Variables	Category		COR [95% CI]	AOR [95% CI]
	Cases	Controls		
Educational level				
Literate	129(49.6%)	277(55.1%)	0.803(0.595-1.084)	0.647(0.436-0.961)*
Illiterate	131(50.4%)	226(44.9%)	1	
Monthly income				
<2000	138 (53.1%)	221(43.9%)	1.443 (1.069 -1.949)	
≥2000	122(46.9%)	282(56.1%)	1	
House hold food insecurity				
Yes	114(43.8%)	146(29.0%)	2.897 (2.123 -3.953)	2.168 (1.509-3.116)**
No	146(56.2%)	357(71%)	1	
History of teenage pregnancy				
Yes	76(29.2%)	101(20.1%)	1.64(1.164 -2.321)	
No	184(70.2%)	402(79.9%)	1	
Prohibition of foods				
Yes	45(17.3%)	57(11.3%)	1.638 (1.072 -2.501)	
No	215(82.7%)	446(88.7%)	1	
Age of marriage				
<18	121(46.5%)	132(26.2%)	2.447(1.787 -3.350)	
≥18	139(53.5%)	371(73.8%)	1	
Number of pregnancy				
>2	154(59.2%)	252(50.1%)	1.447 (1.069 -1.959)	
≤2	106(40.8%)	251(49.9%)	1	
History of still birth				
Yes	17(6.5%)	19(3.8%)	1.782 (.910 -3.490)	
No	243(93.5%)	484(96.2%)	1	
ANC visits				

No	137(52.7%)	118(23.5%)	3.634 (2.641 -5.000)	2.463 (1.707-3.554)**
Yes	123(47.3%)	385(76.5%)	1	
Nutrition information				
No	101(38.8%)	134(26.6%)	1.749 (1.272 -2.405)	
Yes	159(61.2%)	369(73.4%)	1	
Dietary diversity score				
≤3	152(58.5%)	73(14.5%)	8.290 (5.843 -11.763)	6.411(4.397-9.348)**
>3	108(41.5%)	430(85.5%)	1	
Drinking alcohol				
Yes	27(10.4%)	13(2.6%)	4.368 (2.213 -8.620)	
No	233(89.6%)	490(97.4%)	1	
Household condition under health Extension program				
Non- model	235(90.4%)	371(73.8%)	3.344 (2.116 -5.286)	1.761 (1.054-2.943)*
Model	25(9.6%)	132(26.2%)	1	
Source of drinking water				
Unsafe	81(31.2%)	111(22.1%)	1.598 (1.141-2.238)	
Safe	179(68.8%)	392(77.9%)	1	

* P- value < 0.05

** P- value < 0.001

Note: Hosmer and Lemeshow's goodness of model test was found P-value of 0.632 which implies the goodness of the model to predict the outcome.

7. Discussion

A case-control study was conducted to identify the determinants of acute malnutrition of pregnant women in resource limited setting. This study was conducted on 260 pregnant women with acute malnutrition and 516 pregnant women without acute malnutrition.

The odds of acute malnutrition among literate pregnant women were 35 % lower than those who were illiterate pregnant women. This finding was in line with finding from Shashemenne district [26], and disagrees with findings from Gondar [24]. This might be due to the reason that the better health seeking behavior of literate women.

House hold food insecurity increases the risk of developing acute malnutrition for pregnancy women; The odds of acute malnutrition among pregnant women who were from food insecure households were 2.2 folds higher than those who were from food secure households. This finding was in line with finding from Gambella [25]. This might be due to house hold food insecurity through influencing the quality and sufficiency of nutrition can have considerable effects on individual health. Thus pregnant women were shared such problem as household members and it might be contribute to decrease meal frequency.

The odds of acute malnutrition among pregnant women who didn't get antenatal care (ANC) visits were 2.5 folds higher than those who were get ANC visits during pregnancy. This finding was in line with findings from central Rift Valley of Ethiopia ([23], Shashemenne district[26] and Rayitu district of Ethiopia [30].This might be due to antenatal care visits offers an opportunity for assessment of the nutritional status of a pregnant woman as well as the assessment of essential nutritional actions and continuous monitoring throughout pregnancy. Whereas, those pregnant women who did not attend ANC visits were missed opportunities in the counterpart .

The odds of acute malnutrition among pregnant women with dietary diversity score (DDS) less than or equal to three were 6.4 folds higher than those whose dietary diversity scores greater than three. This finding supported by the study conducted in Gambella and Kenya [25]. This might be due to the fact that those women with lower household income, misconceptions due to cultural influence and it may cause prohibition of food choice , lack of awareness about nutrition and low educational status could contributed to got low dietary diversify scores.

In this study household condition under health Extension program was newly finding and suggested that being a model households can have apposite impact on acute malnutrition among pregnant women. The odds of acute malnutrition among pregnant women who lived in non- model households were 1.8 folds higher than those who lived in model households. There was no other comparable study even if literature review was needed. The possible explanation for this finding could be stated as model house hold (families) strategy is found to be an appropriate way of promoting do able and simple interventions that have a major impact on the health of the households and communities. The difference might be due to attributed to practice and knowledge difference acquired from health extension integrated refresher training

8. Limitation of the study

- It might be affected by recall bias and social desired bias .
- Seasonal variation of dietary intake

9. Conclusions and recommendations

9. 1. Conclusions

The risk of acute malnutrition was high in pregnant women who didn't get antenatal care visits, low dietary diversity scores, women who were from food insecure households, being non-model households and the risk of acute malnutrition was low for literate pregnant women.

9.2 . Recommendations

Based on the findings in this study the following were recommended

- **To Ministry of health , ministry of Agriculture and stake holders**
 - Should be developed new strategy collaboration with stakeholders to increase food security and diversify foods like Perma-gardening strategy for allowing high yields of nutrient-dense, seasonal fruits and vegetables to be available year round.
 - We also recommended for those pregnant women who were from house hold food insecurity should be linked to TSFP before seven months
- **To Amhara health bureau, South Wollo zonal health department ,Mekdella health office**
- Should follow the implementation of determinates of acute malnutrition of pregnant women in collaboration with different stakeholders including mass media to address at ground level of the community
- **To health professions**
 - Provision of focus antenatal care to all pregnant women creating awareness to the community collaborating with health development army
 - Health workers should be provide Pregnant conference at outreach program with ceremony to increase ANC flow to health centers and hospitals
 - Nutrition education in health centers, health posts and women organizations should be given to increase the nutritional knowledge to advance their diversify food intake
- **To health extension workers**
 - Should be strength health extension packages with active involvement of health development army
- **For researchers**
 - Finally we recommend further comparative cross sectional study should be carried out by comparing model households with non-model household relation to pregnant women acute nutrition

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Appendixes :1 Identification and informed consent

English Version

My name is----- I am on behalf of Kedir Mohammed student of Bahir Dar University department of Biostatistics and Epidemiology. He is conducting a research for the partial fulfillment of masters of public health in field Epidemiology on “determinants of acute malnutrition among pregnant women in Mekdella district”. you are selected randomly to participate in this study and there are others who are going to be selected in the distract. Therefore I am going to ask you some questions about those factors associated with acute malnutrition and your Mid upper Arm circumference will be measured using measuring tapes. The investigator as received permission from Bahir Dar University institute of health science , Mekdella district health office and cluster health centers to conduct the study .

The result of this study will be used by the government and the district health office to base their rational decision to develop appropriate strategies to combat this problem. The research will benefit the pregnant women in community and participating in this study will not bring any risk to you . The questionnaire requires maximum of 30 minutes to complete. Your participation is entirely voluntarily and you can quit from the study any time you want. You will have no penalty if you fail to show desire to participate. Your name and other personal identity will not be used, and hence the information we will collect from you will completely be kept confidential and will not be disclosed to any third persons .For any question you want to ask us, you can use the contact address here.

May I now begin the interview? If yes, continue interviewing

Addresses

Tel:0914361131

Email:kedromub@gmail.com

Amharic Version

የፍቃደኝነት መጠየቂያ ና የግንዛቤ መስጫ ፎርም

ጤና ይስጥልኝ እኔ-----እባላለሁ። በባህር ዳር ዩኒቨርሲቲ በህክምና ፋኩሊቲ በህብረተሰብ ጤና ትምህርት ክፍል በህብረተሰብ ጤና ሳይንስ የሁለተኛ አመት የማስተርስ ድግሪ ተማሪ ለሆነው ለ አቶ ከድር ሙሃመድ በወረዳው ለሚካሂደው ጥናት መረጃ እየሰበሰብኩ ሲሆን በዚህ ወረዳ ውስጥ የሚገኙ ነፍሰ ጡር እናቶችን የሚያጋጥሟቸውን የምግብ እጥረት በሽታ መንስኤዎቹን በተመለከተ ጥናት እያደረገ ይገኛል። ጥናቱን ለማካሄድ ከሚመርኩት የባህር ዳር ዩኒቨርሲቲ የጤና ሳይንስ ትምህርት ክፍል ህጋዊ ፍቃድ ተሰጥቶታል። ከዚህ ጥናት የሚገኙ መረጃዎች ለመንግስት ለመንግስት እና ለዚህ ወረዳ ጤና ጥበቃ ጽ/ቤት በሽታውን ለመግታት አስፈላጊ የሆኑ እቅዶችንና ስልቶችን ለመንደፍ ጥቅም ላይ ይውላሉ። ስለሆነም በዚህ ጥናት ውስጥ በመሳተፍ መላው ማህበረሰብ ከምግብ እጥረት በሽታ ጋር ተያይዞ በሚመጡ ችግሮች ነፍሰጡር እናቶች እንዳይጠቁ ለማድረግ ያግዛል።ጥናቱ ውስጥ መሳተፍ ቀጥተኛ የሆነ ጥቅም ጥቅም የሌለው ሲሆን ፤ እንደሁም ጥናቱ ውስጥ በመሳተፍ የሚመጣ ምንም አይነት ችግር ወይም ጉዳት የለውም። ከእርስዎ መረጃ ለመሰብሰብ ቃለ መጠይቅና የላይኛው መሃል ከንድ ዙሪያ ልኬታ ይደረጋል። የጥናቱ መጠይቅ ና ልኬታው ቢበዛ 30 ደቂቃ ሊወስድ ይችላል። ጥናቱ ውስጥ መሳተፍ የሚፈልጉ ነፍሰጡር እናቶች በፈቃደኝነት ላይ ብቻ የተመሰረተ መሆኑን ላስገነዝበዎት እወዳለሁ። ባለመሳተፍዎ ምክንያት የሚመጣ ምንም አይነት ችግር እንደለለ ላረጋግጥለዎት እወዳለሁ። ከእርስዎ የምናገኘው ማንኛውም አይነት መረጃ ከእኛ ጥናት ውስጥ ከምንሳተፈው ሰዎች ውጪ ለማንኛውም ሰነድ ወገን እንደማይደርስ እና ምስጢራዊነቱ የተጠበቀ እንደሚሆን ላረጋግጥለዎት እወዳለሁ። መጠየቅ ለሚፈልጉት ማንኛውም አይነት ጥያቄ የሚከተለውን አድራሻ መጠቀም ይችላሉ። አሁን ቃለ መጠይቁን መጀመር እችላለሁኝ? አዎ ካሉ ቃለ መጠይቁን ይቀጥሉ።

አይሆንም ካሉ ደግሞ ያመስግኑና መጠይቁን ያቁሙ።

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Appendix: 2 Questionnaires

English Version

Part I. Socio-Demographic factors

S.no.	Questions	Response options	Skip
101	Respondent code _____		
102	Age	_____ Years	
103	Residence	1. Rural 2. urban	
104	Religion	1. Muslim 2. Orthodox 3. Protestant 4. Other	
105	Current marital status	1. Married 2. Single 3. Divorced 4. Widowed	
106	Educational level	1. illiterate 2. Able to read and write 3. Primary(1-8) 4. Secondary(9-12) 5. Higher education	
107	What is your main Occupation	1. Housewife 2. Government employee 3. Merchant 4. Daily laborer	
108	How many people are currently living in your house hold , including yourself ?	_____	
109	What is your Family monthly income? (in Birr	_____	
Part II. Socio cultural factors			
201	History of teenage pregnancy	1. Yes 2. No	
202	Age of marriage	_____years	

203	Time of dishing of Mother's portion during meal	1. Along with husband 2. After husband 3. Before husbands and children	
204	Is there any prohibition of certain foods during pregnancy ?	1. yes 2. No	If No (skip to Q301)
205	What is the reasons prohibition of foods?	1. Reliogion 2. Cultural 3. Make the baby big 4. Makes delivery difficult 5. Others-----	

Part III. Reproductive / Obstetric/ Factors

301	Number of pregnancy before this pregnancy	_____	
302	How much in month is your current pregnancy	_____	
303	Birth interval between past and current pregnancy in year	_____	
304	Did you have any still birth before this current pregnancy	1. Yes 2. No	
305	Did you have a history of children having congenital at birth previous pregnancy?	1. yes 2. No	
306	Attending antenatal care in the health facility in the current pregnancy	1. Yes 2. No	

Part IV. Nutritional factors

401	Is there any house hold food insecurity	1. Yes 2. No	
402	Do you access information about nutrition during pregnancy ?	1. yes 2. No	
403	Change in feeding habit during pregnancy	1. yes 2. No	

404	Do you avoid any food or diet in the current pregnancy ?	1.yes 2.No	If No (skip to Q406)
405	What is the reasons for avoiding foods?	1.Heart burn 2.Vomiting 3. Loss of appetite 4. Others	
406	What is your Feeding status during pregnancy ?	1. Extra meal 2. No difference 3.Reduce any meal	
407	What is your current diet frequency of meal per day ?	_____	
408	Did you Supplementation iron foliate during pregnancy?	1.yes 2. No	

Part V. Dietary Diversity 24hurs recall

501	Did you eat starchy staple yesterday?	corn/maize, rice, wheat, sorghum, or any other grains or foods made from these	Yes= 1 No = 2
502	Did you eat Dark green leafy vegetables yesterday?	dark green/leafy vegetables like cabbage, spinach, etc including wild ones	Yes= 1 No = 2
503	Did you eat Other vitamin A rich fruits and vegetables yesterday?	pumpkin, carrots, sweet potatoes, red sweet pepper	Yes= 1 No = 2
504	Did you eat other fruits and vegetables yesterday?	other vegetables (e.g. tomato, onion, garlic) including wild vegetables, other fruits, including wild fruits	Yes= 1 No = 2
505	Did you eat organ meat yesterday?	liver, kidney, heart or other organ meats or blood-based	Yes= 1

		foods	No = 2
506	Did you eat flesh meat yesterday?	beef, pork, goat, chicken, or other birds	Yes= 1 No = 2
507	Did you eat eggs yesterday?	chicken, guinea fowl or any other egg	Yes= 1 No = 2
508	Did you eat legumes/ nuts yesterday?	beans, peas, lentils, nuts, seeds or foods made from these	Yes= 1 No = 2
509	Did you eat milk and milk products yesterday?	milk, cheese, yogurt or other milk products	Yes= 1 No = 2

Part VI. Medical factors

601	Did you have a history of nausea and vomiting during the first 3 months of pregnancy ?	1.yes 2.No	
602	Have you had goiter ?	1.yes 2.No	
603	Have you had Diabetics Mellitus currently?	1.yes 2.No	
604	Do you have malaria currently?	1.yes 2.No	
605	Did you have a history of hypertension ?	1.yes 2.No	
606	Do you have a history of Tuberculosis during pregnancy ?	1.yes 2.No	
607	HIV AIDS status ? (Observe Registration , Chart)	1. Negative 2. Positive	

Part VII. Behavioral factors			
701	Do you smoking cigarette during pregnancy ?	1.yes 2.No	
702	Do you drink alcohol during pregnancy ?	1.yes 2.No	if No (skip to Q704)
703	If yes how many drinks per week?	_____	
704	Do you chewing khat during pregnancy?	1.yes 2.No	if No(skip to Q801)
705	If yes how many times per week?	_____	
Part VIII. Water sanitation and hygiene factors			
801	House hold condition under health Extension program	1.Model HH 2. non Model HH	
802	What is your Sources of drinking water?	1. Pipe 2.Spring 3.Rive 4. Others	
803	Is latrine available? (Observation)	1. Yes 2. No	(if No skip to 901)
804	Is latrine functional?	1.yes 2.No	
805	Is there soap or detergent or ash near the hand washing place? (observe)	1. yes 2. No	
Part IX. Physical Assessment (Anthropometric Measurement)			
901	MUAC	_____cm	

Thank you for your cooperation!!

Amharic Version
ክፍል 1 .ማህበራዊ ና ስነ-ህዝባዊ መረጃዎች መጠይቅ

ተ ቁ	ጥያቄዎች	አማራጭ መልሶች	ምርመራ
101	የተጠያቂዎች እናት መለያ ቁጥር	_____	
102	እድሜዎ /ሽ ስንት ነው?	_____ ዓመት	
103	የዘወትር መኖሪያ አድራሻ	1. ገጠር 2. ከተማ	
104	ሀይማኖት	1. ሙስሊም 2. ኦርቶዶክስ 3. ፕሮቴስታንት 4. ካቶሊክ	
105	የጋብቻ ሁኔታ	1. ያገባች 2. ያላገባች 3. የፈታች 4. የሞተባች	
106	የትምህርት ደረጃ (ነፍሰጡር እናት)	1. ምንም ያልተማረች 2. መፃፍና ማንበብ የምትችል 3. ከ1ኛ - 8ኛ ክፍል 4. ከ9ኛ - 12ኛ ክፍል 5. የከፍተኛ ትምህርት	
107	ዋናዉ የስራ ድረሻሽ ምንድነው?	1. የቤት እመቤት 2. የመንግስት ሰራተኛ 3. ነጋዴ 4. የቀን ሰራተኛ	
108	እርሰዎን ጨምሮ ስንት ቤተሰብ በቤት ውስጥ ይኖራል?	_____	
109	አማካይ የቤተሰቡ የወር ገቢ መጠን ስንት ነው?	_____	

ክፍል 2. የማህበራዊ አኗኗር / ልማድ/ ሁኔታ			
201	ከ13-19 አመት የእድሜ ክልል ውስጥ እንዳለሽ አርግዘሽ (ፀንሰሽ) ታወቁያልሽን	1. አዎ 2. የለም	
202	ያገባሽው በስንት አመትሽ ነው ?	_____	
203	ምግብ የምትመገቢው መቼና ከማን ጋር ነው	1. ከባሌ ጋር 2. ባለቤቱ ከበላ በኋላ 3. ከባለቤቱ ና ከልጆቹ በፊት	
204	በእርግዝናሽ ወቅት የምትከለከይው ወይም የማትመገቢው ምግብ አለን?	1. አዎ 2. የለም	መልሱ የለም ከሆነ ወደ ጥያቄ 301 ይለጉ
205	ለመከልከልሽ ምክንያቱ ምንድነው	1. ሀይማኖታዊ 2. ባህሉ ስለማይፈቅድ 3. የህፃኑ መጠን እዳይጨምር 4. ለመውለድ ከባድ ስለሚሆን	

		5. ሌላ ካለ ይገለፅ-----	
ክፍል 3. የስነ-ተዋልዶ መረጃ			
301	ከዚህ በፊት ስንት ጊዜ አርግዘሻል ?	_____	
302	የአሁኑ እርግዝናሽ ስንት ወሩ ነው?	_____	
303	የበፊቱ እርግዝና እና የአሁኑ እርግዝና ምን ያህል ጊዜ ይራራቃሉ (በአመት)	_____	
304	ከዚህ በፊት የእርግዝና ጊዜሽ / የጠፋ/ ሞቶ የተወለደ ህፃን ነበረሽ?	1. አዎ 2. የለም	
305	ከአሁን በፊት ሲወለድ የጤና እንከን ያለበት ልጅ ነበረሽ?	1. አዎ 2. የለም	
306	የቅድመ ወሊድ ክትትል ጤና ጣቢያ ወይም ሆስፒታል አድርገሽ ታወቁ ያለሽ?	1. አዎ 2. የለም	
ክፍል 4. በእርግዝና ወቅት ስላለው የስነ-ምግብ ሁኔታ መጠይቅ			
401	የምግብ ዋስትና አለመኖር (የምግብ ክፍተት አለባችሁ? (ሴፍትኔት ተጠቃሚ ናችሁ?)	1. አዎ 2. የለም	
402	በእርግዝናሽ ወቅት ስለአመጋገብሽ የተሟላ ግንዛቤ ተፈጥሮልሽ ነበርዎይ	1. አዎ 2. የለም	
403	በእርግዝናሽ ወቅት የአመጋገብ ልምድሽን ትቀያይሪ ያለሽ?	1. አዎ 2. የለም	
404	በአሁኑ እርግዝናሽ ጊዜ የሚያስጠላሽ ወይም የማይስማማሽ ምግብ አለ?	1. አዎ 2. የለም	መልሱ አይደለም ከሆነ ወደ ጥያቄ 406 ይለፉ
405	ምክንያትሽ ምንድነው	1. ልቤን ስለሚያቅረኝ 2. ስለሚያስታወክኝ 3. የምግብ ፍላጎት ስለሌለኝ 4. ሌላ ካለ ይገለፅ-----	
406	በቀን ስንት ጊዜ ትመገቢያለሽ	_____	
407	በእርግዝናሽ ወቅት የአመጋገብ ሁኔታሽ እንደት ነው	1. ከበፊቱ የተሻለ 2. እንደበፊቱ ነው 3. ከበፊቱ ቀንሻለሁ	
408	የደም ማነስ እንክብሎች/ መድሃኒት በየቀኑ ትወስጃለሽ?	1. አዎ 2. የለም	
ክፍል 5. በ24 ሰዓታት ውስጥ የተበሉ ምግቦች መጠይቅ			
501	ትላንትና ሃይል ሰጭ ምግቦችን በልተሻልወይ	በቆሎ፣ ስነዴ፣ ፍጥጥ፣ ማሽላ የመሳሰሉት ወይም ከእነዚህ የእህል ዘሮች የተሰሩ	በልቻለሁ = 1 አልበላሁም =

		ምግቦች	2
502	ትላንትና አረንጓዴ ቅጠል ያላቸው አትክልቶችን በልተሻልወይ?	ጎመን፤ ሰላጣ፤ ቆስጣ፤እስፒናች የመሳሰሉት	በልቻለሁ= 1 አልበላሁም = 2
503	ትላንትና ሌሎች በቫይታሚን ኤ የበለጸጉ ፍራፍሬዎች እና አትክልቶችን በልተሻልወይ?	ዱባ፤ካሮት፤ስኳር ድንች፤ ቀይ ቃሪያ	በልቻለሁ= 1 አልበላሁም = 2
504	ትላንትና ሌሎች ፍራፍሬዎች እና አትክልቶችን በልተሻልወይ?	ቲማቲም፤ቀይ ሽንኩርት፤ነጭ ሽንኩርት፤ ሌሎች አትክልቶች እና ፍራፍሬዎች እንዲሁም የጫካ ፍራፍሬዎች	በልቻለሁ= 1 አልበላሁም = 2
505	ትላንትና ከእንስሳት የውስጥ የሰውነት ክፍሎች የተገኘ ስጋ በልተሻልወይ?	ጉቦት፤ኩላሊት፤ልብ፤ከደም የተሰራ ምግብ፤ እና ሌሎች	በልቻለሁ= 1 አልበላሁም = 2
506	ትላንትና ስጋ በልተሻልወይ?	የኩብት ሥጋ፤የበግ ሥጋ፤የፍየል ሥጋ፤የዶሮ ስጋ፤የአሳማ ሥጋ፤የቆቅ ስጋ እና ሌሎች	በልቻለሁ= 1 አልበላሁም = 2
507	ትላንትና እንቁላል በልተሻልወይ?	የዶሮ እንቁላል፤ የጅግራ እንቁላል እና ሌሎች	በልቻለሁ= 1 አልበላሁም = 2
508	ትላንትና ጥራትሬዎችን እና ከእነሱ የተሰሩ ምግቦችን በልተሻልወይ?	ባቄላ ፤አተር፤ምስር፤ለውዝ እና የመሳሰሉ እንዲሁም ከእነዚህ የተሰሩ ምግቦች	በልቻለሁ= 1 አልበላሁም = 2
509	ትላንትና ወተት እና የወተት ውጤቶችን ጠጥተውበልተሻልወይ?	ወተት፤አይብ፤እርጎ፤ እና ሌሎች የወተት ውጤቶች	በልቻለሁ= 1 አልበላሁም = 2
ክፍል 6. የጤና ህክምና ምርመራ በተመለከተ			
601	በመጀመሪያዎቹ ሶስት ወራት ማቅለሽለሽ ና ማስመለስ ነበረሽ?	1. አዎ 2. የለም	
602	እንቅርት አለብሽ?	1. አዎ 2. የለም	
603	የስኳር በሽታ አለብሽ?	1. አዎ 2. የለም	
604	አሁን የወባ በሽታ አለብሽ?	1. አዎ 2. የለም	
605	የደም ግፊት አለብሽ?	1. አዎ 2. የለም	
606	የትቢ በሽታ ከአሁን በፊት ይዞሽ ያወቅነበር?	1. አዎ 2. የለም	
607	HIV AIDS status ? (Observe Registration , Chart)	1. Negative 2. Positive	
ክፍል 7. ስነ-ባህሪ			
701	ሲጋራ ታጨሻለሽ?	1. አዎ 2. የለም	
702	በእርግዝናሽ ወቅት አልኮል ትጠጫለሽ?	1. አዎ 2. የለም	መልሱ አይደለም ከሆነ ወደ

			ጥያቄ 704 ይለፉ
703	መልሰዎ አዎ ከሆነ በሳምንት ስንት ጊዜ ትጠመኔለሽ?	_____	
704	በእርግዝናሽ ወቅት ጫት ትቅሚያለሽ?	1. አዎ 2. የለም	መልሱ አይደለም ከሆነ ወደ ጥያቄ 801 ይለፉ
705	መልሰዎ አዎ ከሆነ በሳምንት ስንት ጊዜ ትቅሚያለሽ?	_____	

ክፍል 8. የአካባቢ ጤና ሁኔታ:

801	በጤና ኤክስቴንሽን መርሀ-ግብር ፓኬጅ ያለበት ደረጃ ምን ይመስላል?	1. በሞደል የተመረቀ 2. በሞደል ያልተመረቀ	
802	የመጠጥ ውሃ የምትጠቀሙት ከየት ነው?	1. ከቧንቧ 2. ከምንጭ 3. ከወንዝ	
803	መጻዳጃ ቤት አላችሁ (ቤቱን በመቃኘት የሚመለስ)	1. አዎ 2. የለም	መልሱ የለም ከሆነ ወደ ጥያቄ 901 ይለፉ
804	መጻዳጃ ቤቱ አገልግሎት ይሰጣል?	1. አዎ 2. አይሰጥም	
805	መጻዳጃ ቤቱ አጠገብ ውኃ፣ የእጅ መታጠቢያና እጅ መታጠቢው አጠገብ ሳሙና ወይም አመድ አለን / ምልክታ	1. አዎ 2. የለም	
ክፍል 9. አካላዊ ልኬታ			
901	የላይኛው መሀል ክንድ ዙሪያ ልኬታ	_____ ሴ.ሜ	

ለትብብረዎ አመሰግናለሁ!!

Declaration

I, the undersigned, declare that this thesis is my original work and has never been presented by another person in this or any other University and that all the source materials and references used for this thesis have been duly acknowledged .

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