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MAGNITUDE OF ADDITIONAL MEAL INTAKE AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE AT BAHIR DAR HEALTH CENTER, BAHIRDAR, NORTH WEST ETHIOPIA

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BAHIR DAR INSTITUTE OF TECHNOLOGY
SCHOOL OF GRADUATE STUDIES
FACULTY OF CHEMICAL AND FOOD ENGINEERING
DEPARTMENT OF APPLIED HUMAN NUTRITION

MSc thesis on:

**MAGNITUDE OF ADDITIONAL MEAL INTAKE AND ASSOCIATED FACTORS
AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE AT BAHIR DAR HEALTH
CENTER, BAHIRDAR, NORTH WEST ETHIOPIA**

BY

ABEL GETACHEW

JANUARY – 2022
BAHIR DAR, ETHIOPIA



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CENTER, BAHIRDAR, NORTH WEST ETHIOPIA

By

ABEL GETACHEW

A THESIS SUBMITTED

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN APPLIED HUMAN NUTRITION

PROFESSOR TEFERA BELACHEW (MD, MSc, PhD)

JANUARY - 2022

Bahir Dar, Ethiopia

Declaration

This is to certify that the thesis entitled “MAGNITUDE OF ADDITIONAL MEAL INTAKE AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE AT BAHIR DAR HEALTH CENTER, BAHIRDAR, NORTH WEST ETHIOPIA, “submitted in partial fulfillment of the requirements for the degree of Master of Science in Department of Applied Human Nutrition, under Faculty of Chemical and Food Engineering, Bahir Dar Institute of Technology, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Abel Getachew

24/02/2022

Name of the candidate

signature

Date

APPROVAL OF THESIS FOR DEFENSE

I hereby certify that I have supervised, read, and evaluated this thesis titled “MAGNITUDE OF ADDITIONAL MEAL INTAKE AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE AT BAHIR DAR HEALTH CENTER, BAHIRDAR, NORTH WEST ETHIOPIA “prepared by Abel Getachew under my guidance. I recommend the thesis to be submitted for oral defense.

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Approval of thesis for defense result

I hereby confirm that the changes required by the examiners have been carried out and incorporated in the final thesis.

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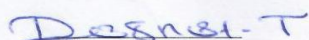


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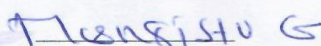


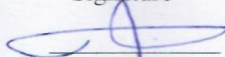
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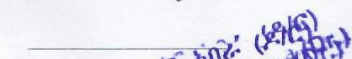


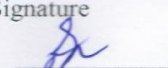
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ABBREVIATIONS AND ACRONYM

ANC	-----	Antenatal Care
BDU	-----	Bahir Dar University
BMI	-----	Body Mass Index
CI	-----	Confidence Interval
CSA	-----	Central Statistical Agency
EDHS	-----	Ethiopian Demographic Health Survey
FMH	-----	Federal Ministry of Health
GDM	-----	Gestational Diabetes Mellitus
HEG	-----	Hyper-emesis gravid arum
KJ	-----	Kilo Joule
Kcal	-----	Kilo Calorie
LBW	-----	Low Birth Weight
MCH	-----	Maternal and Child Health
MUAC	-----	Mid upper arm circumference
NE	-----	-- Nutrition Education
NNP	-----	National Nutrition Program
SPSS	-----	Statistical Package for Social Science
RDA	-----	Recommended Dietary Allowance
TM	-----	Trimester
WHO	-----	World Health Organization

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Table Contents

Declaration	i
Approval of Thesis for Defense	ii
Abbrevations and Acronym	iii
Acknowledgment	v
List of figures	viii
Abstract	ix
1. Introduction	1
1.1. Background	1
1.2. Statement of the problem	2
1.3. Significant of the Study	4
1.4. Objective	4
1.4.1. General objective.....	4
1.4.2. Specific objective.....	4
2. Literature review.....	5
2.1. Conceptual framework.....	7
3. Methodology.....	8
3.1. Study area and Period	8
3.2. Source population and Study population	8
3.3. Study Design.....	8
3.4. Sampling procedure.....	8
3.4. Sample Size Determination.....	9
3.5. Inclusive criteria.....	9
3.6. Exclusive criteria	9
3.7. Data collection procedure and quality control	9
3.8. Data management and analysis technique	9
3.9. Variable of the Study	10
3.9.1 Independent variable.....	10
3.9.2 Dependent variable – Additional meal consumption during perinatal period..	10
3.10 Operational Definition	10
3.11. Ethical Consideration	10
3.12. Dissemination of the Results.....	10
4. Results	11
4.1. Socio-Demographic Characteristics	11

4.2. Obstetric history and health care related	12
4.3. Socio cultural status and Nutritional Information & Counseling Services.....	12
4.4. Magnitude of additional meals during perinatal period	14
4.5. Associated Factors for additional meal during pregnancy	14
5. Discussion.....	16
6. Conclusion	18
7. Recommendation	18
8. References	19
9. Annexes - Research Questionnaires (English Version).....	23

List of Table

Table 1- socio- demographic charactrestics of pregnancy among attending anc (n=378)table1. socio-demographic characteristics of pregnancy among attending antenatal care at bahir dar health center (n=378).....	11
Table 2 - obstetric history and health care related during pregnancy among attending antenatal care at bahir dar health center (n=378)	12
Table 3 socio cultural status and nutritional information & counseling services during pregnancy among attending antenatal care at bahir dar health center (n=378).	12
Table 4: - logistic regression analysis of significant independent variables about additional meal during pregnancy among attending antenatal care at bahir dar health center, west ethiopia. (n= 378).....	15

List of figures

Figure 1- Adopted from different literature.....	7
Figure 2- Magnitude of additional meal intake during pregnancy (n=378).....	14

Abstract

Background: Adequate nutritional status and good dietary intakes during preconception and pregnancy have been recognized as a major contributor to healthy birth outcome. A pregnant mother needs optimal nutrition to ensure sufficient energy intake to maintain her pregnancy and meet the requirement of growing fetus. Assessment of maternal nutrient intake and additional meal pattern during pregnancy suggested that more calories consumed and reduced the risk of preterm delivery. There was no any study that documented the magnitude of additional meal intake among pregnant women in the study area.

Objective- To assess the magnitude and associated factors of additional meal among pregnant women who has ANC follow up at Bahir Dar health centers vision maternity care department.

Methodology:- Institution based quantitative cross sectional study was conducted from March to April 2020 among pregnant women who attend ANC follow up at Bahir Dar health centre vision Maternity care department. Systematic sampling technique was used to select 394 pregnant women, data were collected through face to face interviews using structured questioner. Bivariate and multivariable logistics regression analyses were applied to know the association between dependent and independent variables. Finally the results were presented by Charts and tables and report AOR, CI. P-value <0.05 were considered statistically significant.

Results – Two third (63.2%) of the pregnant women consumed additional meal during pregnancy. On multivariable logistic regression model after adjust ting for other variables. Educational status of college and above (AOR: 5, CI: 2.2-11.7), household monthly income above 3000ETB (AOR: 3.7: CI: 0.96 – 14.0), nutritional counseling (AOR= 4.7, CI: 2.8 – 8.1) and ANC follow up more than two times (AOR= 3.9, CI: 1.9 – 8.0) were significant independent predictors of additional meal intake during pregnancy.

Recommendation - This study showed that the overall consumption of additional meal intake during pregnancy was suboptimal .Promoting educational status of the mother, increasing household income, promoting and encourage ANC follow up, nutritional information and counselling are recommended to improve additional meal consumption during pregnancy.

Key words: -Additional meal, attending Antenatal Care, Prenatal period, Bahir`Dar.

1. Introduction

1.1. Background

Pregnancy is a critical period which is maternal nutritional status impacts both the mother and the fetus, so adequate nutritional status and good dietary intakes during preconception and pregnancy have been recognized as a major contributor to healthy birth outcome¹. Maternal nutrition plays a crucial role in modifying a comfortable change for pregnancy outcome². The pregnant mother needs more nutrition to ensure sufficient energy intake to maintain her pregnancy and meet the requirement of growing fetus³. The increasing of maternal diet has been a common practice in attempting to reduce the risk of disease in the infant⁴. During pregnancy adequate nutrient intake and diet quality are one of the most important components for promoting both the health of the mother and the health and development of the fetus^{5, 6}. A women nutritional status before conception and during pregnancy reduces the risk of maternal and child morbidity and mortality, and also pregnant women dietary behavior and intake of food during pregnancy are strongly influenced by different socio-cultural practices^{7,8}. Assessment of maternal nutrient intake and additional meal pattern during pregnancy suggested that more calories consumed and reduced the risk of preterm delivery⁹.

At first ANC visit, all pregnant women should receive nutritional advice to consume well-balanced and more diversified food during perinatal period and similarly pregnant women who attend regular ANC utilization exhibits good knowledge and practice of the nutritional status during pregnancy^{10,15}. Enhancement of maternal diet quality, amount of food consumed and adequate weight gain during pregnancy are through determinant for consumption of sufficient and balanced diet. Sufficient nutrition intake during pregnancy has enormous potential for promoting the nutritional status of the mother and her child^{11,14}. Inadequate nutritional intake during pregnancy can lead to growth retardation in the uterus and also the possibility of low birth weight¹². Perinatal period is a critical time to identify a risk group with inadequate intake of nutritional status in order to deliver appropriate nutritional advice during perinatal period¹³. Insufficient access to food and inadequate consumption of diet have a critical role during pregnancy, it is major cause of low birth weight^{16,17}.

The relationship prevails between pregnant women, food intake and the health of foetus, therefore pregnancy is a vital period when adequate and balanced diet intake is important¹⁸. Maternal nutritional status during time of conception until two years post-partum is a critical period for the mother and child health¹⁹. Dietary advice must be evident, based on weight and body mass before without having been planned food intake of each pregnant women²⁰. Adequate nutritional intake during pregnancy has a fundamental role in health benefit for the mother and foetal development and ensure satisfactory birth outcome²¹⁻²³.

Consumption of the recommended meal frequency of three main meals and at least one additional meal per day has a protective effect against preterm delivery²². On the contrary, inadequate nutritional intake during pregnancy can cause nutritional anaemia²⁴. Additional nutrient consumption is necessary during pregnancy for the growth of the foetus as well as the development of maternal tissue that support foetal development. Healthy and adequate diet and micronutrients supplement during pregnancy had reduced the risk of chronic disease and mortality²⁶⁻²⁹.

Gestation is the most important period of nutritional demanding of every mother's life³⁰. In the developing world including Ethiopia, the prevalence of maternal and child under nutrition is very high³¹. Perinatal period is a vital time in the life cycle during which additional nutrients are required to meet the recommended demands of foetal growth³². Nutritional intervention during perinatal period were improved the nutritional knowledge and practice of pregnant women^{33,34}. Adequate food item consumption during pregnancy is a basic determinant of foetal growth, birth weight and infant morbidity³⁵. During pregnancy, the foetus receives all its nutrients from mother tissue restore. Due to increased nutritional requirement, pregnancy is a critical period for meeting the baby's demand for macro-micro nutrients³⁶⁻³⁸. Pregnant women who have sufficient amount of essential nutrients in the body they will be fit for physiological and psychological to lead their life and their infant³⁹⁻⁴¹. During ANC follow up nutritional assessments and provide nutritional counselling services for pregnant women should promote adequate intake of diversified food and additional meals during antenatal and postnatal periods⁴².

1.2. Statement of the problem

The nutritional status of the mother is one of the most important determinants affecting the foetus increased the risk of preterm delivery and low birth weight¹. Nutrition in prenatal period is really important because growth and development of the child depends upon the food taken by the mother²

The consequences of poor nutritional status and inadequate nutritional intake for women during pregnancy not only directly affects women's health status, but may also have a negative impact on birth weight and early development of the child^{2,3}.

Perinatal period represents a life experience for a woman that can impact on her current health and that of her fetus and can also generate nutrition awareness that may affect her nutritional behavior in the longer term ⁵. The studies done by Journal Midwifery Women's Health, skipping meal between food intakes can harmful effects for both mother and fetus ⁶. Insufficient balanced diet during pregnancy increases the risk of low birth weight, preterm delivery of the fetus and intrauterine fetal retardation ⁸⁻¹¹. Maternal malnutrition is the most serious public health concern as it not only cause complications during and after pregnancy but also causes a destructive effect on neonate¹². Deficiencies in intake of macro and micro nutrients during perinatal period may have a point change on health outcome in later adult life ^{13, 14}. A healthy maternal dietary pattern, along with adequate maternal body composition, metabolism and placental nutrient supply, reduces the risk of maternal, fetal and long-term effects in the offspring ¹⁵. Insufficient nutritional intake during pregnancy leads to increased risk of fetal morbidity and mortality and post- natal growth retardation and also impaired physical and cognitive development¹⁶ although under nutrition and suboptimal diets with energy and micronutrient deficiencies during pregnancy have been associated with impaired fetal growth, preterm delivery poor infant survival and lead to an increased risk of cardiovascular disease in later life¹⁷⁻²⁰. In developing countries due to poor dietary habit micronutrient deficiencies during pregnancy are largely distributed²¹. Pregnant women who eat less frequent food intake has lower energy intake during pregnancy ²²⁻²⁴. Inadequate maternal recommended food intake and poor nutritional quality of diet are known for a negative impact on birth weight and fetal development²⁵⁻³⁰.

Ethiopia is among the nations with the highest infant and maternal mortality rates in the world and the Intergenerational effect of Protein energy under nutrition and micronutrient deficiencies has been attributed as a major cause of maternal and infant mortality^{33,34}. Pregnant women who had low meal frequency and inadequate nutrition leads to the risk of developing nutritional anemia^{35,37}. Poor nutritional status and poor dietary pattern during pregnancy is one of the main causes of anemia in pregnancy ³⁶. However, to what extent pregnant women practiced on additional meal consumption in Ethiopia remains largely unknown. Thus, this study aimed to evaluate the determinant factors and magnitude of additional meal consumption during pregnancy that has ANC follow at Bahir Dar health center vision maternity department Bahir Dar.

The findings of this study may contribute to the Region of Amhara and also the nations in improving nutritional status of pregnant women to identify strategies that improve nutritional status during the perinatal care.

1.3. Significant of the Study

Adequate additional meal during pregnancy is mainly aimed to proper weight gain during pregnancy and to prevent various nutrient deficiencies. To reduce low birth weight babies is one other aspect of additional meal.

In general this study would give theoretical as well as practical significance for health care provider, program planner, researchers, policy makers to use as baseline data to conduct large scale on the level and factors to develop the intervention plan that makes good nutritional status during perinatal care. There was no any study that documented the magnitude of additional meal intake among pregnant women in the study area.

1.4. Objective

1.4.1. General objective

- ✓ To assess the magnitude and associated factors of additional meal among pregnant women who has ANC follow up at Bahir Dar health centers vision maternity care department, Bahir Dar, Ethiopia 2020.

1.4.2. Specific objective

- ✓ To determine the magnitude of pregnant women taking additional meal during pregnancy.
- ✓ To identify factors associated with additional meal intake among pregnant women among who has ANC follow up at Bahir Dar health center vision maternity care department, Amhara Region, Ethiopia.

2. Literature review

The study conducted in Isfahan, Iran revealed that daily pattern of food consumption during pregnancy significantly improves after nutritional intervention¹. Similarly, A study done by Garg & Kashyap (2006) showed that nutritional intake after nutritional education significantly increase in the amount of almost all the food groups consume². A study conducted in South –West region of Khulna division, Bangladesh showed that 25% of study participant of pregnant women who have did not intake at least one food item during pregnancy³.

The study conducted in Turku and South-West Finland showed that the mean daily intake of energy as a proportion of estimated energy requirement was 89 % ⁴. In Israel, 50% of pregnant mother had inadequate intake of nutrients ⁵.The study done by Journal of Midwifery Women's Health, skipping meal between food intakes harmful effects for both mother and fetus⁶. Studies done in Sweden and Norway were intake of additional nutrients consumption is lower than the Recommended Dietary Intake, ^{7,13}. A study done in Islamabad, Pakistan reported that 12% of pregnant women were underweight ⁸. Pregnant women studied in Ireland, Dublin showed that pregnant mother increased consumption of occasional and additional meal during pregnancy ⁹.

The study conducted in Karnataka reported that majority of pregnant women had inadequate intake of protein and energy consumption during pregnancy and Nutrition education and counseling generally improved maternal diets including dietary practices and consumption of specific macro and micronutrients^{10 ,11}.The study conducted in a rural area of district Rawalpindi, Pakistan reported that 46.4% of pregnant women consume additional meal during pregnancy ¹². The study conducted in Pannala, Sri Lanka reported that dietary intake of nutrients met the RDA value ¹⁴. The study conducted in urban slums of North-east District of Delhi, India, the majority of Pregnant and Recent Delivery Women the dietary intake specially protein and micronutrients was suboptimal¹⁵.The study conducted in a rural area of western china reported that more than half of the pregnant women had inadequate intake of essential nutrients ¹⁶.A study conducted in Bogor district, Indonesia showed that pregnant women with their habitual diet intake of nutrients could not meet their nutrient requirement¹⁷. A cross-sectional study conducted in Egypt, argued that the practiced of pregnant women a recommended food servings of meal per day 42.4% was consumed diary product ¹⁸. A study conducted in Niger showed that among pregnant women consumption of energy intake was lower than the estimated energy requirement ¹⁹. In Algeria and Malawi Pregnant women had consumption of snack a day had 33.85%, and 26% respectively ^{20,22}.

The study conducted in Dale Woreda Sidama Zone was reported that prevalence of additional meal consumption during pregnancy was 31.4%, 26.4% eat at least one additional meal, 43.5% of pregnant women craving at least one food during pregnancy, 67.8% of pregnant women was avoided at least one food item²³. The study conducted in Mekele, Tigray region was 20.4% of pregnant women consume more than three times per day²⁴. The magnitude of under nutrition among pregnant women in Gambella town was 28.6%²⁵ Among Pregnant Women Attending Antenatal Clinic in Shashemane, Oromia, Ethiopia: 20.3% of pregnant women taking of additional meal, 23.2% had adequate meal frequency²⁶. The study conducted in Misha and Durame district, South Ethiopia showed that pregnant women consume additional meal was 36.9%, 32.4% respectively^{27,28}. The study conducted in Illu Aba Bora district south east Ethiopia showed that under nutrition during pregnancy was 17.4%,²⁹. A community based cross-sectional study conducted in Bahir Dar showed that 70.8% of pregnant women took additional meal, 48.17% one times, 49. % two times day additional meal consumption during pregnancy³⁰. The study conducted in Silte zone south Ethiopia 68.3% of pregnant women has adequate recommended meal frequency³¹. The study conducted in Julle Tumuga and Dessie district East Amhara Region showed that 44.7% and 75.4% had intake of additional meal respectively^{32,33}. The studies conducted in Addis Ababa and Boricha district, South Ethiopia, 68% and 30.2% of pregnant women eat additional meal respectively^{34,35}. A study conducted in Sendafa Bekie Town, Oromia Regional State, Ethiopia was showed that 30% pregnant mother eats additional meal and In Dejen District East Gojjam 62.2% were eating at least one additional meal during pregnancy^{36,37}. A study conducted in Wondo Genet South Ethiopia, 75.2% did not get additional meal and 21.6% of pregnant women eat at least one additional meal³⁸. The study in West Gojjam and Northern Ethiopia, Alamata General Hospital 2017, pregnant women under nutrition was 16.7% and 23.2% respectively^{39,40}.

Ethiopian demographic health survey (EDHS 2016), was revealed that 22% of women was under nourished⁴¹. The study conducted in Addis Ababa revealed that 66.5% have knowledge on the need to eat more during pregnancy than their non-pregnant state, 69.7% of the participants have added at least one additional meal during their current pregnancy⁴³.

2.1. Conceptual framework

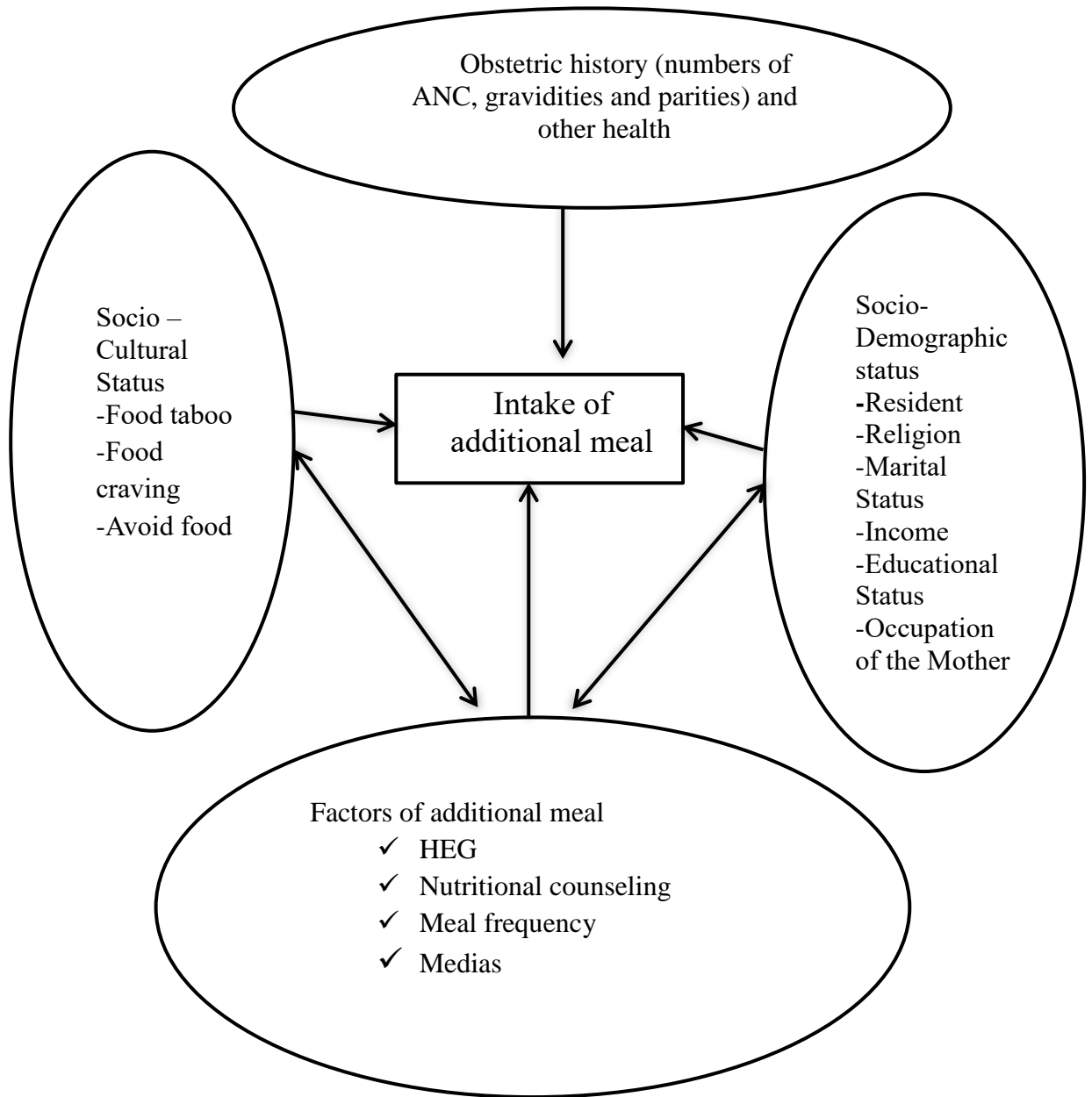


Figure 1- adopted from different literature ^(23,27,38)

3. Methodology

3.1. Study area and Period

The study were conducted at Bahir Dar city , Bahir Dar city is the capital of Amhara regional state of northwest Ethiopia, 560 km from Addis Ababa via the Debre Markos road. The region has an elevation of 1801 meters above sea level. According to the Bahir Dar City Health Department Office, Bahir Dar city administrative health office has ten Health centers, from these Bahir Dar health center vision maternity care department is a huge capacity to serve for more than Ten thousand pregnant women annually. The catchment population was around fifty thousand. The study was conducted from March to April, 2020.

3.2. Source population and Study population

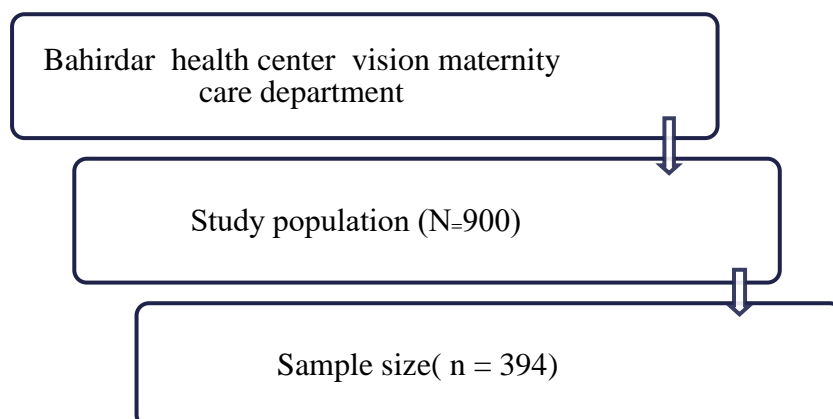
The source population was all pregnant women who resided in Bahir Dar health center vision maternity care catchment area. The study population was all pregnant women who have ANC follow up in Bahir Dar Health Center at vision maternity care department.

3.3. Study Design

Institutional based cross sectional study was conducted to determine the magnitude and associated factors of additional meal among pregnant women who has ANC follow up in Bahir Dar Health Center at vision maternity care department.

3.4. Sampling procedure

Systematic sampling technique was conducted pregnant mothers who have ANC follow up in Bahir Dar health center at vision maternity department. The interval K value was determined by dividing the number of units in the population (N) by the desired sample size (n), ($K=N/n$ =interval size). The first respondent was selected by lottery method (every 3 respondent), and then continuing to every respondent based on the interval until the desired sample size was attained.



3.5. Sample Size Determination

The sample size was calculated by using a single population proportion formula, by taking the proportion of additional meal during pregnancy from **Misha Woreda in South Ethiopia; Dietary practice and associated factors among pregnant women a community-based cross-sectional study(36.9%)**. A z-value of 1.96 was be used at 95% confidence level and margin error of 5% with 10% of non- respondent rate.

$$n = \frac{Z^2 P(1-p)}{D^2}$$
$$= \frac{(1.96^2)(0.37)(0.63)}{0.05^2}$$

the total sample size was 394.

3.6. Inclusive criteria

All pregnant women who had ANC follow up in Bahir Dar health center at vision maternity department.

3.7. Exclusive criteria

Pregnant women who had not to start ANC follow up.

3.8. Data collection procedure and quality control

Data were collected using an interviewer- guided structural questioner then entered and analysis by using SPSS version 21. The questioner has socio- demographic variables of the pregnant mothers, obstetric history and other medical illnesses. Two BSc nurses collected the data. After taking, training about the interview technique, the concept of the study, the questioner & the sampling procedure. Prior to the primary data collection process, a pre-test was performed at another health center to check the data collection tool and we were edited the questioners of the previous test.

3.9. Data management and analysis technique

The data were checked for completeness and consistency. It was also coded and entered in to version 21 SPSS. The data were cleaned and Descriptive statics was used to summarize socio-demographic characteristics of the pregnant women. Multivariable logistic regression analyses were performed. Variables with the p-value <0.25 in the Bivariate logistic regression analysis was performed for analyzed in the multivariable logistic regression analysis. Adjusted Odds Ratio (AOR) with 95% confidence interval was used as a measure of strength of association to present the results. Variables having p-value<0.05 from the multivariable analysis were considered to have a significant association with the outcome variable.

3.10. Variable of the Study

3.10.1 Independent variable – age, marital status ,income , educational status of partner, number of parity, gravidity ,socio cultural status , religion, occupational status of the partner, number of ANC visit, gestational age, nutrition information, and nutrition counseling.

3.10.2. Dependent variable – Additional meal consumption during perinatal period.

3.10.3. Operational Definition

Additional meal – intake of additional meal in the form of any food available at home, mean than non-pregnant state⁴².

3.11. Ethical Consideration

Ethical approval was obtaining from Bahir Dar University faculty of chemical & food engineering, department of applied human nutrition ethical committee, letter of co-operation was obtained from Bahir Dar city Administrative Health Office .

3.12. Dissemination of the Results

Results of this study will be disseminated through publication (local or international journals). A copy of this will be offered to Bahir Dar University, Amhara regional health bureau, Bahir Dar city Administration Health Office and other concerned bodies. The result will be presented at different scientific conferences

4. Results

4.1. Socio-Demographic Characteristics

Three hundred seventy-eight pregnant women were involved in this study with response rate of 96%. The mean (SD) age of the study sample was 27.39(\pm 4.5) year and the majority (47.1%) of participant age was between 25 -29 years. Three hundred twenty-two (85.2%) study participants were orthodox Christians. Regarding the level of education, 152 (40.2%) had Collage and above. Three hundred one (79.6 %) study participant were urban residence. The majority of the study participant 373(98.7%) were married,. Concerning occupation 111(29.4%) was public or private employees. Two hundred thirty-five (62.2%) of pregnant women had monthly household income of more than 3000Birr (Table1).

Table 1- socio- demographic characteristics of pregnancy among attending ANC (n=378)

Variables	Category	Frequency	Percentages
Age (years)	18–24 yrs.	98	25.9
	25–29 yrs.	178	47.1
	>30 yrs.	102	27.0
Religion	Orthodox	322	85.2
	Muslim	52	13.8
	Others	4	1.1
Educational status	Non formal	44	11.6
	Read and write	57	15.1
	Elementary/high school	125	33.1
	Collage and above	152	40.2
Marital status	Married	373	98.7
	Divorced	4	1.1
	Separated	1	0.3
Residence	Rural	77	20.4
	Urban	301	79.6
Occupational status	House wife	153	40.5
	Merchant	76	20.1
	Governmental /Private	111	29.4
	Un employment	30	7.9
	Others	8	2.1
Income(ETB)	<1500/month	11	2.9
	1501-3000/month	132	34.9
	>3000/month	235	62.2

4.2. Obstetric history and health care related

Among the study participants, majority 229(60.6%) were multigravida and the rest 149(39.4%) were Primgravida. Regarding number of parity 195(51.6%) were nulliparous. Regarding gestational age among study participants about 174(46%) was 1st trimester. Almost half of study participants 178(47.1%) and 123(32.5%) of the respondent had started ANC follow up with in the first trimester and second trimester of pregnancy respectively. Two hundred fifty-two (66.7%) of the study participant had no chronic illness. Among the study respondent One Hundred Sixty-Nine (44.7%) were having morning sickness during the first trimester pregnancy.

Table 2 - obstetric history and health care related during pregnancy among attending antenatal care at Bahir Dar health center (n=378)

Variable	Category	Frequency	Percentage
Numbers of gravidities	Primgravida	146	38.6
	Multigravida	232	61.4
Numbers of parities	Null Parity	195	51.6
	Multiparty	183	48.4
Gestational age	1 st TM	174	46
	2 nd TM	142	37
	3 rd TM	62	16.4
ANC follow up	First time	178	47.1
	Second times	123	32.5
	>2 times	77	20.4
Morning sickness during the 1 st TM of pregnancy	Yes	169	44.7
	No	209	55.3
History of gynaecological illness in the past	Yes	154	40.7
	No	224	59.3
Chronic illness during pregnancy	Yes	126	33.3
	No	252	66.7

4.3.Socio cultural status and Nutritional Information & Counseling Services

Regarding Socio cultural status, Nutritional Information & Counselling Services among participants who respond having food taboo 173(45.8%), Food craving 256(67.7%), Consume additional meal during pregnancy after nutritional counselling 282(74.6%). Among study participants majority of respondent Two hundred five (54.2%) there is no food taboo during their pregnancy period. the rest 173(45.8%) there is food taboo during their pregnancy period. In addition, more than two-third of study participants 256(67.7%) had food craving during pregnancy. Regarding to nutritional counseling during pregnancy period large proportion of the study participants 175(46.3%) received nutritional counseling during pregnancy.

Among the study participant One hundred forty-seven (38.9%) had consume more than three times intake per day and One hundred fifty three (40.5%) of study participants had more than four times meals consumed per day. From 378 total participants 191 (51.9%) of study participants they consumed at least one additional meal intake during pregnancy. Only Forty three (11.3%) of study respondent had consume more than two additional meal per day during pregnancy (Table 3).

Table 3- Socio cultural status and Nutritional Information & Counseling Services during pregnancy among attending antenatal care at Bahir Dar health center (n=378).

Variable	Category	Frequency	percentage
Food taboo	Yes	173	45.8
	No	205	54.2
food Avoid	Yes	165	43.7
	No	213	56.3
Food craving	Yes	256	67.7
	No	122	32.3
Nutritional counselling during pregnancy	Yes	175	46.3
	No	203	53.7
Types of nutritional counselling did you receive during pregnancy	individual counselling	160	42.3
	group counselling	131	34.7
	mass media	87	23.0
Nutritional counselling during the 1 st TM pregnancy	Yes	201	53.2
	No	177	46.8
Consume additional meal during pregnancy after nutritional counselling	Yes	282	74.6
	No	96	25.4
Number of additional meals during pregnancy	No additional meal	139	36.8
	at least one times	196	51.9
	more than two	43	11.3
How many meals consume per day	once	78	20.6
	Two to three times	147	38.9
	More than four times	153	40.5
Knowledge about variety of foods that has to be consumed	Yes	201	53.2
	No	177	46.8
Avoid foods for health or religious reasons	Yes	248	65.6
	No	130	34.4

4.4. Magnitude of additional meals during perinatal period

A total of 378 study participants were included in the study, among those 239 (63.2%) had taken additional meal intake while 139 (36.8%) had no taken additional meals during perinatal period (Figure 2).

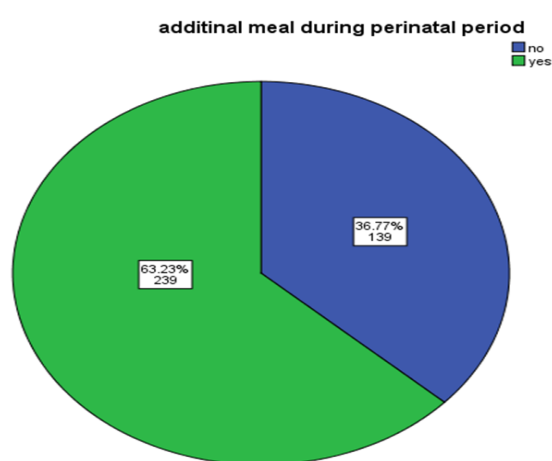


Figure 2- magnitude of additional meal intake during pregnancy (n=378)

4.5. Bivariate and multivariable Logistic regression analysis for Factors associated with additional meal during pregnancy.

In the Bivariate Logistic regression, Age, Education status, Monthly House Hold Income, Number of Gravidity, Gestational Age, Number of ANC follow up and Nutritional counseling were showed significant effect at P-value of less or equal to 0.2. The other variables were not showed association with additional meal during pregnancy. The variables with p-value 0.2 or less in the Bivariate Logistic regression result were entered in to multivariable Logistic regression analysis.

In multivariable analysis educational status of respondents, Income level, Number of ANC follow up and Nutritional counseling during pregnancy was found to be significantly associated with additional meal.

According to this finding those participants who are college and above were 5 times more likely to consume additional meal during prenatal than those participants with non- formal education AOR= 5 (2.2-11.7)

Number of ANC follow up showed a significant effect, those participants who had more than 2 times ANC follow up 3.9 times more likely to additional meal during prenatal compare to those participants who had one times ANC follow up with AOR= 3.9(1.9 – 8.0) and those participants who had 2 times ANC follow up 2.5 times more likely to additional meal during prenatal compare to those participants who had one times ANC follow up with AOR= 2.5(1.4 – 4.4)

Based on the multivariable logistic-regression analysis, Nutritional counseling revealed a significant effect, So those participants who had received Nutritional counseling during pregnancy were 4.7 times more likely to meal additionally during prenatal than those participants who had no received Nutritional information and counseling during pregnancy AOR= 4.7(2.8 – 8.1).

Table 4: - logistic regression analysis of significant independent variables about additional meal during pregnancy among attending antenatal care at Bahir Dar health center, west Ethiopia. (n= 378).

Variable	Categories	Additional meals		COR (95% CI)	P-value	AOR (95% CI)	P-value
		Yes	No				
Age	18-24yrs	51	47	1			
	25-29yrs	120	58	1.9(1.15-3.1)			
	>30yrs	68	34	1.8(1.04-3.2)	0.030		
Education	Non-formal education	18	26	1		1	
	Read and write	25	32	1.1(0.5-2.5)		1.1(0.42-2.4)	
	Elem/high school	71	54	1.8(0.9-3.8)		1.2(0.58-2.8)	
	Collage and above	125	27	6.6(3.2-13.8)	<.001	5.1(2.2-11.7)	<0.001
Income status	<1500birr/month	6	5	1			
	1501-3000birr/mnth	67	65	0.85(0.25-2.9)		2.1(0.55-8.5)	
	>3000birr/mnth	166	69	2(0.59-6.7)		3.7(0.96-14)	0.03
Number ofGravidity	Primigravida	86	60	1			
	Multigravida	153	79	1.3(0.88-2.7)	0.16		
Gestational Age	1 st TM	102	72	1			
	2 nd TM	92	50	1.29(0.82-2.0)			
	3 rd TM	45	17	1.86(0.99-3.5)	0.13		
ANC follow up	1 st times	90	88	1		1	
	2 nd times	89	34	2.55(1.56-4.1)		2.5(1.4-4.4)	
	More than 2 time	60	17	3.4(1.8-6.3)	<0.001	3.9(1.9-8.0)	<0.001
Nutritional counseling	No	144	30	1		1	
	Yes	95	109	5.2(3.2-8.5)	<0.001	4.7(2.8-8.1)	<0.001

5. Discussion

This study mainly assessed the magnitude and associated factors of additional meal intake during pregnancy. The concept of consumption of additional meal during pregnancy has become a major concern, but not enough studies that assessed this critical issue to identify the problem related to dietary practice of pregnant women during pregnancy. Our findings showed the magnitude of additional meal intake and associated factors among pregnant women attending ANC at Bahir Dar health center vision maternity care, North West Ethiopia.

It was observed that the magnitude of additional meal intake among pregnant women in Bahir Dar was 63.2 %. Whereas, 36.8% of study participant did not intake additional meal during pregnancy. A previous community based cross sectional study conducted at Bahir Dar showed that 70.8% of the pregnant women consumed an additional meal³¹. This finding is higher than the study done in Sidama zone (31.4%), Misha woreda (36.9%), Sendafa Bekie (30%) and Wondo Genet (24.8%)^{23,27,36,38}. The reason for this discrepancy might be differences in socio demographic characteristics. Another possible reason may be due to recent increase health care services promotion and time of the studies.

Among the study participants 51.9% of pregnant women were consumed at least one additional meal and only 11.3% of the study participant had more than two additional meals. This is lower than the report of studies in Boricha (91.3%), Sendafa Bekie (86.07%) and Addis Ababa (69.7%) of pregnant mothers had consumed at least one additional meal during pregnancy^{35,36,43}. In this study 38.9% of the study participant consumed two to three times and 40.5% of pregnant women consumed more than four times per day of meal frequency. This finding was lower than the study reported in Egypt¹⁸, Sidama zone²³ and Wondo Genet³⁸.

The study showed that when educational status of the study participants increased their consumption of additional meal pattern improved. The educational level is the most significant predictor of consumption of additional meal intake. It showed that increasing the level of maternal educational was significantly associated with consumption of additional meal during pregnancy compared to those pregnant women who had no formal education. The finding is similar with the study done in Bangladesh³, Egypt¹⁸, Shashemene²⁶, Julle Tumuga³² and Guto Gida Woreda⁴⁴. The possible reason for this might be due to those pregnant mothers who are college and above were more likely easily to access information regarding nutrition requirement and understanding nutritional knowledge. For this reason, the educational status increases frequency of meal intake during pregnancy is also to be increased.

The study revealed that as the household income increased the consumption of additional meal also increased. Those participants who have higher monthly income were more likely to have consumption of additional meal during pregnancy compared to those participants who had lower household monthly income. This is similar reports from studies in Shashemene²⁶, Bahir Dar³¹ and Addis Ababa³⁴.

The possible reason for this might be the fact that those pregnant women with higher monthly income may have better purchasing power which could be more likely to afford to have adequate food as compared to pregnant women from a lower household monthly income.

Attending ANC follow up during pregnancy was significantly associated with consumption of additional meal intake. Which also documented by studies conducted in Malawi²² and Dessie³³.

This could be explained by the fact that when pregnant women's attend ANC follow up they get nutritional information from health professionals about consumption of additional meal and healthy dietary intake during perinatal period.

In this study receiving nutritional information and counselling during pregnancy showed a significantly association on consumption of additional meal compared to participant who did not received nutritional counselling during pregnancy. This is also supported by the studies done in India², Atlanta (USA)¹¹, Julle Tumuga³² and Guto Gida Woreda⁴⁴, in which nutritional information and counseling was important for consumption of additional meal. This might be due to the fact that those receiving nutritional information and counseling will have good knowledge and understanding to increase consumption of additional meal than those who did not get nutritional counseling. After nearly two decades of implementing essential nutritional actions, findings such a low proportion of pregnant women taking an additional meal implies the need for revamping and strengthening public health intervention attracting nutrition literate society with due emphasis on pregnant women. This is clearly implicated in the newly endorsed food and nutrition policy and strategy⁴⁵⁻⁴⁶.

The limitation of the study was it is institution based and does not represent the whole pregnant women in the community and the findings may not be generalized to the general population of pregnant women. Secondly, the study did not assess food intake in terms of specific nutrients consumed and anthropometric data of the pregnant women.

6. Conclusion

This study revealed that the overall consumption of additional meal during pregnancy was found to be suboptimal. The results showed that pregnant women's educational attainment, higher household monthly income, numbers of antenatal follow up and receiving nutritional counseling were positively associated with additional meal intake during pregnancy.

7. Recommendation

Based on this finding, the Bahir Dar health center with different stakeholders is needed to improve numbers of ANC follow up and provide nutritional information and counseling in the health center should be given for pregnant women concerning additional meal intake during perinatal period.

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9. Annexes - Research Questionnaires (English Version)

Annex 1 – Informed Consent Form

Instruction: Circle the appropriate response of each closed ended question and write correct response for each open ended question.

1 - Socio- demographic characteristic

s.no	Question	Respondents possible answer	code	skip
101	How old are you?	1----- years 2- unknown		
102	Where is your place of resident?	1-Urban 2- Semi urban 3- Rural		
103	What is your level of education?	1-Non formal education 2- read and write 3-elementary/high school 4-College and above		
104	What is your occupation?	1-House Wife 2-Marchant 3-Government/Private Employee 4-UnEmployeed 5-Others Specify-----		
105	Monthly income of the family	-----/Birr		
106	What is your Religion	1-Orthodox, 2- Muslim 3 – Other		
107	What is your Marital status	1-maried 2-divorced 3-separated 4-widowed		
108	What is the educational level of your husband?	1-Non formal education 2 -read & write 3-Primary/high school 4-College and above		
109	What is the occupation of your husband?	1- Daily labourer 2-Marchant 3-Government/private employee 4- unemployed 5-Others specify-----		

Part 2 - obstetric history and health care related

S.No	Questions	Respondents possible answer	code	skip
201	Numbers of gravidities	1-primigravida 2-multigravida		
202	Numbers of parities	1-nuliparity 2-multiparty 3-grand multiparty		
203	Gestational age	1 -1 st TM pregnancy, 2 - 2 nd TM pregnancy 3 - 3 rd TM pregnancy		
204	Did you follow ANC	1-yes 2- no		
205	How many times did you receive ANC follow up?	1 -first time 2 - second times 3 - more than two times		
206	Do you have morning sickness during the 1 st TM of pregnancy?	1 -yes 2 - no		
207	Do have history of gynaecological illness in the past	1 -yes 2 - no		
208	Do you have other chronic illness during pregnancy?	1 -yes 2 - no		
209	Do you know any food that is taboo for you?	1 -yes 2 - no		

Part 3 - Nutritional Information & Counseling Services

S. No	Questions	Respondents possible answer	code	skip
301	Have you Receiving nutritional counselling?	1- yes 2- no		
302	How many times did you received nutritional counselling from health care providers?	1 -none 2 - 1-2 times 3 - more than 2 times.		
303	What types of nutritional counselling did you receive during pregnancy?	1-individual counselling 2-group counselling 3- mass media		
304	Did you receive nutritional counselling during the 1 st TM pregnancy?	1- yes 2- no		
305	Do have think to receive nutritional counselling about nutrition & weight gain during pregnancy?	1-Yes 2- no		
306	Do you try to limit the amount or kind of food you eat to control your weight?	1-Yes 2- no		
307	Did you know additional meal is important during pregnancy	1-yes 2-no		
308	How many meals should a pregnant women have consume per day?	-----meal/day		
309	Did you consume additional meal during pregnancy after nutritional counselling?	1-yes 2-no		
310	How many additional meal should have consume during pregnancy?	-----meal/day		
311	How many additional meals should a pregnant women have more than what she use to have during non-pregnant state?	1- at least one times 2 -two to three times 3 - more than three times		
312	Do you have any knowledge about variety of foods that has to be consumed?	1-Yes 2- no		
313	Did you receive nutritional counselling regarding healthy eating?	1-yes 2- no		
314	Do you avoid foods for health or religious reasons?	Yes 2-no		
315	Do you know any food that is craving for you?	1 -yes 2 - no		
316	Have you received nutritional counselling about iron in your food source	1-yes 2-no		
317	Have you received nutritional counselling about folic acid in your food source	1-yes 2-no		
318	Have you received Nutritional counselling about iodine in your food source	1-yes 2-no		
319	Are you frequently bothered by any of the following?	1-Nausea 2- Vomiting 3-Heartburn 4-Constipation		

(Amharic Version)

የሚጃዝርዝር እና የስምምነት ቅጽ

ሰላም፤ እኔ ስሜ----- ይባላል፤ የዋናው አጥኚ ስም አቤል ጌታቸው ይባላል፤ በባ/ዳር ዩኒቨርሲቲ የስራዓተ ምግብ ት/ት ክፍል የሁለተኛ ዲግሪ ተማሪ ሲሆን፤ ይህ ማከዋቅር በባህርዳር ጤና ጣቢያ ክትትል ያላቸው ነብሳቸው እና ቶች በጤና ባለሙያ በሚሰጣቸው የአመጋገብ ምክክር ዙሪያ የተዘጋጀ ጥናት ነው፡፡

አሰራሩ፤ ጥናቱ በባ/ዳር ከተማ አስተዳደር በባ/ዳር ጤና ጣቢያ ክትትል የሚያደርጉ ነብሳቸው እና ቶች በቀን ምን ያክል ተጨማሪ ምግብ ተማበች እንዲሁም የአመጋገብ ሁኔታ በምን ምክንያት ተጨማሪ ምግብ ተማበች በሚል ይሆናል፡፡ ለመሳተፍ ፍቃደኛ ከሆንሽ ከነብሳቸው እና ቶች ውስጥ ካሉ ተሳታፊዎች አንዱዎች እንድትሆኑ ተመረጣል፡፡ በሚጨረሻም በቃለ-ማከዋቅር ውስጥ ትክክለኛው ማለስ እንድትሰጡበትህ ትና እጠይቃለሁ፤

መቀጠል እችላለሁ? ☐

አልፈልግም ☐

ክፍል አንድ - የሚበራዊና የስነ ህዝብ ጥያቄዎች

	ጥያቄዎች	የተሳታፊ ማለስ	ኮድ	ወደሚመለስበት
101	እድሜ ስንት ነው?	1- ----- 2- አላወቀውም		
102	የምትኖረበት አካባቢ የት ነው?	1-ከተማ 2-ከተማቀመጥ 3- ገጠር		
103	የት/ት ደረጃ	1-አልተማረኩም 2- ማፍናማንበብ 3- አንደኛ ወይም ሁለተኛ ደረጃ 4- ኮሌጅ ወይም ከዚያ በላይ		
104	ስራሽ ምን ድን ነው?	1 - የቤት እማኔት 2 - ነጋዴ 3- የመንግስት (የግል) ሰራተኛ 4-ስራ ፈላጊ 5- ሌላ ካለ ይገለፅ -----		
105	በወር የቤተሰብ ገቢ ምን ያህል ነው?	-----ብር በወር		
106	ሃይማኖትሽ ምን ድን ነው?	1- ኦርቶዶክስ 2- እስልምና 3- ሌላ		
107	የጋብቻ ሁኔታ	1- ያገባ 2- የፈታ 3- የተለያዩ 4- ባል የሞተበት		
108	የባለቤትሽ የት/ት ሁኔታ	1-አልተማረም 2- ማፍናማንበብ 3- አንደኛ ወይም ሁለተኛ ደረጃ 5- ኮሌጅ ወይም ከዚያ በላይ		

109	የባለቤትነት የስራ ሁኔታ	1- የቀን ሰራተኛ 2- ነጋዴ 3- የመንግስት (የግል)ሰራተኛ 4- ስራ ፈላጊ 5- ሌላ ካለይገለፅ----- -----		
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ክፍል ሁለት- እርግዝናንና የጤን ሁኔታ በተመለከተ ያሉ ጥያቄዎች

ተ.ቁ	ጥያቄዎች	የተሰታፊሙ	ከ	ወደሚ
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		ስ	ድ	ቀጥ
201	ስንት ልጆች አሉሽ ?	1-ምንም ልጅ የለኝም 2-አንድ ልጅ አለኝ 3-ከሁለት በላይ ልጆች አሉኝ		
202	የአሁኑ እርግዝና ስንተኛሽ ነ ዉ?	1-የመጀመሪያዬ 2-ሁለተኛዬ 3-ከሶስት በላይ		
203	የአሁኑ የእርግዝና ጊዜሽ ስንት ነ ዉ?	1-የመጀመሪያው ሶስት ወር 2-ከሶስት እስከ ስድስት ወር 3-ከስድስት ወር በላይ		
204	የእርግዝና ክትትል አለሽ?	1-አዎ 2-የለኝም		
205	ይህ ስንተኛሽ የእርግዝና ክትትልሽ ነ ዉ?	1-የመጀመሪያዬ 2-ሁለተኛዬ 3-ሶስተኛዬና ከዚያ በላይ		
206	ከአሁኑ እርግዝና ጋር የተያያዘ የመቅለሽለሽ እና የማስታወክ ህመም አለሽ ወይ?	1-አዎ 2-የለኝም		
207	ከአሁን በፊት የሚፀን ህመም ነ በረሽ ወይ?	1-አዎ 2-የለኝም		
208	የቆዩ የጤ ህመም አለሽ ወይ ?	1-አዎ 2-የለኝም		
209	ከእርግዝና ጋር የተያያዘ የምግብ	1-አዎ 2-የለኝም		

	ፍላጎት አለመኖር አለሽ?			
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ክፍል ሶስት- የእርግዝና አመጋገብ ሁኔታ እና የእርግዝና አመጋገብ ምክክርን በተመለከተ

ተ.ቁ	ጥያቄዎች	የተሳትፈ መልስ	ኮድ	ወደመቅ
01	በአሁኑ የእርግዝና ክትትል ወቅት የአመጋገብ ምክር አግንተሻል ወይ	1-አዎ 2-አይደለም		
02	በአሁኑ የእርግዝና ክትትል ወቅት አመጋገብ ምክር ከጤና ባለሙያ ስንት ጊዜ አግንተሻል ?	1-ምንም ዓይነት 2-ከአንድ እስከሁለት ጊዜ 3-ከሁለት ጊዜ በላይ		
03	በአሁኑ የእርግዝና ክትትል ወቅት ምን ዓይነት የአመጋገብ ምክር ከጤና ባለሙያ ተሰጥቶሃል?	1-አንድ አንድ ምክር 2-በቡድን ምክክር 3-በመሃል ምክር		
04	በመጀመሪያው የእርግዝና ጊዜ ሽያጭ የአመጋገብ ምክር ከጤና ባለሙያ አግንተሻል ?	1-አዎ 2-አይደለም		
05	የእርግዝና አመጋገብ ምክር መቀበል ለተመጣጠነ የአመጋገብና የክብደት መጠጫ ጥሩ ጎን አለው ብለሽ ታስቢያለሽ?	1-አዎ 2-አይደለም		
06	ክብደት ለመቆጣጠር አመጋገብን መቀየር ወይም የምግብ ዓይነት ለመቀየር ስትሞት ታስቢያለሽ?	1-አዎ 2-አይደለም		
07	በእርግዝና ወቅት ተጨማሪ ምግብ መመገብ ያስፈልጋል ብለሽ ታስቢያለሽ?	1-አዎ 2-አይደለም		
08	አንዲት ነብሳ ጤና እናት በቀን ስንት ጊዜ ምግብ መመገብ አለባት?	-----ያህል በቀን		
09	የአመጋገብ ምክር ከተሰጠሽ በኋላ ተጨማሪ ምግብ ተመግቦብ ታወቃለሽ?	1-አዎ ተመግቦብ አለሁ 2-አልተመግብኩም		
10	አንዲት ነብሳ ጤና እናት በቀን ስንት ጊዜ ተጨማሪ ምግብ መመገብ የሚያስፈልጋት ይመስልሃል?	-----ያህል በቀን		
11	ከመርገዝ በፊት ስትመገቡ ከነበረው ነብሳ ጤና ከሆነሽ በኋላ በቀን ምን ያህል ተጨማሪ ምግብ ትመገቡ ቢያለሽ?	1-ቢያንስ አንድ ጊዜ 2-ከሁለት እስከሶስት ጊዜ 3-ከሶስት ጊዜ በላይ		
12	አንዲት ነብሳ ጤና እናት በእርግዝና ጊዜ የተለያዩ ምግብ መመገብ አለባት ብለሽ ታስቢያለሽ?	1-አዎ 2-አይደለም		
13	የተሰጠሽ የአመጋገብ ምክር ለጤና ምክር አመጋገብ አስተዋፅኦ አድርጎልኛል ብለሽ ታምኜአለሽ?	1-አዎ 2-አላደርገልኝም		
14	በጤና ወይም በሃይማኖት ምክንያት ምግብ እንዳትመገቡ ተከልክላል?	1-አዎ 2-አይደለም		
15	ከእርግዝና ጋር የተያያዘ የምግብ ፍላጎት መጨመር አለሽ?	1-አዎ 2-የለኝም		
16	የተመጣጠነ ንጥረ ነገር (አይረንና ፎሊክ አሲድ) በምትመገቡ ምግብ ውስጥ እንዲኖር በጤና ባለሙያ የእርግዝና አመጋገብ ምክር ተሰጥቶሃል?	1-አዎ 2-አልተሰጠኝም		
17	የአይወደኝ ጭፍ በምትመገቡ ምግብ ውስጥ	1-አዎ		

	እንዲኖር በጠፍ ባለሙያ የእርግዝና አመጋገብ ምክር ተሰጥቶታል?	2-አልተሰጠኝም		
18	በተደጋጋሚ በተጠቀሱት የጠፍ ችግሮች በዚህ የእርግዝና ጊዜ ነበረሽ?	1-ማቅለሽለሽ 2-ማስታወክ 3-የደረትማቃጠል 4-የሰገራመድረቅ		ሁሉም ከሆኑ ያክብቡ)