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**FACULTY OF CHEMICAL AND FOOD ENGINEERING**

**DEPARTMENT APPLIED HUMAN NUTRITION.**

**MSC THESIS ON:-**

# DETERMINANT OF LOW BIRTH WEIGHT AMONG MOTHER WHO GAVE BIRTH AT PUBLIC HEALTH HOSPITALS IN ADDIS ABABA, A FACILITY BASED CASE CONTROL STUDY IN ADDIS ABABA ETHIOPIA.

**BY**

**MASTWAL KEBEDE**

**OCTOBER, 2024**

**BAHIR DAR, ETHIOPIA**

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**By**

**MASTWAL KEBEDE**

**A Thesis submitted to Bahir Dar Institute of Technology, Faculty of Chemical and Food Engineering, Department of Applied Human Nutrition for the Partial Fulfillment of Requirements of Master of Science.**

**Advisor:- Zewdie Aderaw] (PHD)**

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**OCTOBER, 2024**

**BAHIR DAR, ETHIOPIA**

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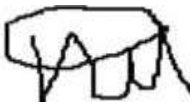
## Declaration

This is to certify that the thesis entitled ‘‘Determinants Of Low Birth Wight Among Mothers Who Gave Birth At Public Health Hospital In Addis Ababa, A Facility Based Case Control Study In Addis Ababa Ethiopia.’’, submitted in partial fulfillment of the requirements for the degree of Master of Science in (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.



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**Approval of Thesis for Defense Result**

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## ABBREVIATIONS

| | |
|---|---|
| ANC | Ante Natal Care |
| AOR | Adjusted Odds Ratio |
| BMI | Body Mass Index |
| CI | Confidence Interval |
| DD | Dietary Diversity |
| EDHS | Ethiopian Demographic and Health Survey |
| ELBW | Extremely Low Birth Weight |
| FAO | Food and Agriculture Organization |
| IFA | Iron-Folic Acid |
| IUGR | Intrauterine Growth Retardation |
| LBW | Low Birth Weight |
| MDDS | Maternal Dietary Diversity Score |
| MCH | Maternal and Child Health |
| OR | Odds Ratio |
| SES | Socioeconomic Status |
| SGA | Small size for Gestational Age |
| VLBW | Very Low Birth Weight |
| WHO | World Health Organization |

## ABSTRACT

**Background**: Low birth weight (LBW), according to WHO, defined as an infant weighing less than 2500g at birth, poses significant global health concerns. It contributes to increased morbidity and mortality rates in newborns, with long-term implications for health and development. **Objective**: To determine factors associated with low birth weight among mothers who gave birth in public hospital, in Addis Ababa, Ethiopia.

**Methods**: facility based Un-matched case-control study design was conducted among women who delivered in public hospitals of Addis Ababa city. Data was collected using a structured questionnaire through interview and medical record review of mothers. Sample size was calculated by Epi-info version 7.0 to get a final sample size of 275(cases=85 and controls=190). SPSS version 20 was used for analysis. Bivariate and multivariate logistic regression analysis was used to determine the effect of the independent variables on birth weight. Presence of significant association was determined using OR with its 95%CI. A P value of less than 0.05 was considered to declare statistical significance. Table, graphs and texts were used to present the data.

**Results:** Multivariable binary logistic Regression analysis was computed to identify the association between potential factors with new born birth weight. In the multivariable logistic regression, newborn babies with gestational age of below 36 were strongly linked to low birth wight (AOR=28, 95% CI: 10.74, 75.5). Conversely, mothers who avoid heavy work load (AOR= 3.8, 95%CI (3.8 (1.2, 12.4)) notably, the risk of low birth weight was significantly higher for mothers with shorter gestation and high workload during the pregnancy period.

**Conclusion :** The study confirmed that Gestational age, Intended (planned) Pregnancy, Taking Iron/folate, Taking coffee, Taking additional food, Workload during pregnancy, Illness during pregnancy, and Getting professional Advice during the pregnancy were found to be significantly associated with low birth weight.


**Key words:** dietary diversity, low birth weight

# 1 INTRODUCTION

## 1.1 BACKGROUND

Birth weight is the first weight of the newborn obtained from birth. Globally Low birth weight (LBW) is a significant public health challenge, with over 20 million infants born with LBW each year. This condition predominantly affects low- and middle-income countries, where approximately 90% of LBW cases occur. The prevalence of LBW is particularly high in South Asia, where it affects 28% of live births, followed by sub-Saharan Africa at 13% and Latin America at 9%. In Ethiopia, the estimated LBW rates have increased from 15.0% in 2000 to 20.3% in 2005, reflecting an annual rise of 1.1%. By 2016, the Ethiopian Demographic and Health Survey (EDHS) reported LBW rates of 11% in 2011 and 13% in 2016 (Sielu Alemayehu Desta, Ashenafi Damte, & Tsehay Hailu, 2020). Regional studies in Ethiopia have shown LBW prevalence ranging from 6% to 29.1%, indicating a significant public health issue that requires urgent attention ((Bekela et al., 2020a , Tessema, A. A., & Gebremedhin, H. G., 2018).

The implications of LBW are profound, contributing to 60% to 80% of neonatal mortality and morbidity (Ahmed et al., 2018; Girma et al., 2019). The effects of LBW resonate through both short- and long-term health consequences, particularly in developing nations. The burden of LBW is notably concentrated in South Asia and sub-Saharan Africa, where the need for effective interventions is critical. Although there has been a slight global decline in LBW prevalence—from 17.5% in 2000 to 14.6% in 2015—this progress varies significantly across regions. Countries with the highest initial LBW rates have seen the most rapid reductions, contrasting with slower progress in high-income countries and Latin America (Blencowe et al., 2019).

A systematic analysis in 2015 highlighted a global LBW prevalence of 14.6%, reflecting an overall decline of 16.6% from 2000 to 2015. This decrease corresponds to an average annual reduction rate of 1.23%. In a more recent study conducted in 2021, the pooled prevalence of LBW in sub-Saharan Africa was reported to be 9.76%, with Ethiopia exhibiting the highest prevalence at 16.21% ((Tessema, Tamirat, Teshale, & Tesema, 2021). This data underscores the urgent need for targeted research and intervention strategies to address the factors contributing to LBW in vulnerable populations.

Maternal health and nutrition are critical determinants of birth outcomes, including birth weight. The World Health Organization defines low birth weight as an infant weighing less than 2500 grams at birth, regardless of gestational age. Research indicates a strong link between maternal dietary practices during pregnancy and the likelihood of giving birth to a low-birth-weight infant. Limited dietary variety is associated with increased risk of LBW, particularly in developing countries, where maternal nutrition may be compromised. Understanding these dietary patterns is vital for improving birth outcomes and reducing LBW rates ((S. Kheirouri & M. Alizadeh, 2021, Quansah, D. Y., & Boateng, D. J. H. , 2020).

In Ethiopia, studies have shown variations in LBW prevalence across different regions, emphasizing the need for localized assessments of maternal health and nutritional practices. Research has indicated that a diverse diet during pregnancy can positively influence birth weight, highlighting the importance of maternal nutrition as a factor in reducing LBW rates. Women's access to a variety of foods during pregnancy can serve as a crucial indicator of their overall nutritional health and, consequently, the health of their newborns.

Given the significant health problems associated with LBW, including stunted growth, learning difficulties, and chronic diseases, this study aims to assess the determinant factors associated with newborn birth weight in Addis Ababa. By focusing on this association, the research seeks to contribute valuable insights into effective interventions that can enhance birth outcomes. Through understanding the factors influencing LBW, it is possible to develop targeted strategies to reduce its prevalence and mitigate its long-term health impacts.

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## 1.2 STATEMENT OF THE PROBLEM

Low birth weight (LBW) is a critical global health issue, affecting an estimated 15-20% of all births, which translates to over 20 million infants annually. This problem is particularly severe in low- and middle-income countries, with South Asia experiencing the highest prevalence at 28%, followed by sub-Saharan Africa at 13% and Latin America at 9%. In Ethiopia, studies have reported LBW rates ranging from 6% to 29.1% across various regions, with the 2016 EDHS indicating that 13% of newborns fell into this category (Tessema & Gebremedhin, 2018; Sielu Alemayehu Desta et al., 2020). LBW is associated with significant health risks, contributing to

60% to 80% of neonatal mortality and morbidity, as well as long-term complications such as stunting, developmental delays, and chronic diseases later in life (Kheirouri & Alizadeh, 2021; Ahmed et al., 2018; Girma et al., 2019).'

Different studies have identified several factors linked to LBW, such as maternal socio-demographic factors, maternal life style, health care service utilization, maternal nutritional status and dietary intake, etc. Demographic and socio-economic factors also play a role, with studies indicating that maternal age is a significant predictor of LBW, particularly for mothers under 20 years old (Jember et al., 2020). Additionally, the sex of the newborn and place of residence have been associated with LBW risks, with rural mothers facing higher chances of delivering low-birth-weight infants compared to their urban counterparts (Abebe et al., 2022; Jember et al., 2020).

Pre-pregnancy underweight and inadequate dietary diversity during pregnancy are significant contributors to LBW, accounting for 7% of the global disease burden and a considerable proportion of maternal morbidity (Assefa et al., 2019; Ashenafi et al., 2019; Hidru et al., 2020).

Moreover, inadequate utilization of maternal healthcare services, including insufficient antenatal care (ANC) visits, has been linked to higher rates of LBW. Research in Addis Ababa found that mothers with fewer than three ANC visits were significantly more likely to have low-birth-weight infants (Abebe et al., 2022). The impact of birth spacing is also notable; mothers with birth intervals of less than 24 months are at a significantly increased risk for LBW compared to those with longer intervals (Toru & Anmut, 2020). Additionally, late antenatal booking further elevates the odds of LBW, highlighting the importance of timely healthcare access (Mingude et al., 2020).

To combat LBW, various global and national strategies are currently in place. International efforts, including the WHO's Global Nutrition Strategy and the Scaling Up Nutrition (SUN) movement, focus on enhancing maternal nutrition and promoting prenatal care in regions with the highest LBW rates. These initiatives aim to strengthen health systems and ensure access to quality maternal care, with comprehensive approaches advocated by programs like theEvery Newborn Action Plan and the Global Strategy for Women's, Children's, and Adolescents' Health.

In Ethiopia specifically, significant programs are underway that integrate nutrition, immunization, maternal health, and disease prevention initiatives to reduce the burden of LBW. A prioritized package of 39 high-impact interventions for newborn and child survival aims to improve health outcomes, with coverage targets set for 2024. The strategic goal for the next five years is to ensure universal access to quality newborn and child health services while empowering communities to enhance service utilization and demand for these essential interventions.

### 1.3 SIGNIFICANCE OF THE STUDY

This study plays a crucial role in prioritizing the delivery of targeted maternal and newborn healthcare services for ANC clients in public health facilities. By identifying key factors associated with LBW, the findings provided valuable insights for program planners and health officials. These insights will likely aid in designing tailored interventions aimed at improving birth outcomes, thereby reducing neonatal morbidity and mortality rates. Addressing LBW not only alleviates immediate health challenges but also mitigates the long-term developmental consequences, making it essential for enhancing overall maternal and child health in Ethiopia.

Moreover, the result of this study is shared to Bahir Dar University and will be disseminated to significant stakeholders, including the Addis Ababa Regional Health Bureau. By sharing findings with relevant entities, the research aims to contribute to strengthening and informing the ongoing maternal and child health initiatives.

## 2 OBJECTIVES

The objective of the study was to assess the determinants of low birth weight among mothers who gave birth in public hospitals in Addis Ababa, Ethiopia. A facility based case control study.

## 3 LITERATURE REVIEW

### 3.1 MATERNAL DIETARY DIVERSITY PRACTICES

Dietary diversity is a proxy for adequate micronutrient density of foods. Minimum dietary diversity assesses food intake from at least four food groups. Consumption of food from at least

five food groups means that the child has a high likelihood of consuming at least one animal source of food and at least one fruit or vegetable in addition to a staple food (grains, roots, or tubers) (WHO 2008). The five food groups should come from a list of ten food groups: grains, roots, and tubers; legumes and nuts; dairy products (milk yogurt, cheese); flesh foods (meat, fish, poultry, and liver/organ meat); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables. Women of reproductive age are often nutritionally vulnerable because of the physiological demands of pregnancy and lactation. Requirements for most nutrients are higher for pregnant and lactating women than for adult men (National Research Council, 2006; World Health Organization [WHO]/Food and Agriculture Organization of the United Nations [FAO], 2004). Outside of pregnancy and lactation, other than for iron, requirements for WRA may be similar to or lower than those of adult men, but because women may be smaller and eat less (fewer calories), they require amore nutrient-dense diet (Torheim & Arimond, 2013)

A study in Central India on the association between maternal dietary diversity and low birth weig ht revealed maternal weight gain during the pregnancy period was found to be a contributing fact or to low birth weight where mothers with LBW child gained 6.6 kg during their pregnancy perio d compared to 7.5 kg among mothers without LBW child. The same study in Central India indica ted that women dietary diversity practices during the pregnancy period were associated with low birth weight; there were 20% lesser chance of giving LBW child with increasing maternal dietary diversity score(Shantanu Sharma, Sonali Maheshwari, & Sunil Mehra, 2021).

A study in Malawi on dietary diversity and food taboo indicated that the minimum dietary divers ity –women score was found to be 4.0 and the mean women's dietary diversity was 3.9. Similar s tudy in Malawi further indicated that many of the participant (69%) did not meet the minimum di etary diversity (≥5 of the 10 recommended food group) and none of the participant consumed mil k or other dairy products (Walters, Bendulo, & Stoecker, 2019). A study conducted in Northern r egion of Ghana demonstrated a direct association between household wealth index and maternal dietary diversity practices. Dietary diversity of pregnant women with low household wealth inde x were 48% less likely of meeting the minimum dietary diversity (Saaka, Mutaru, & Osman, 20 21).

A community based cross sectional study in rural southwest Ethiopia indicated that women with adequate dietary diversity was found to be 52%. The same study conducted in the south west Eth

iopia found that having home garden for fruit/vegetables /for consumption and sale was positivel y associated with maternal dietary diversity practices.(Kuma, Tamiru, & Belachew, 2021).

### 3.2 MATERNAL DEMOGRAPHIC AND SOCIO-ECONOMIC FACTOR AND LOW BIRTH WIGHT

Many studies showed demographic and socio-economic factors as a contributing factor for low birth weight. A case control study in Gandi, Yekatit 12 and Zewditu hospital in Addis Ababa reported that maternal age was significantly associated with giving low birth weight babies. Another study conducted in 2020 in Ethiopia also revealed maternal age a factor associated with low birth weight where age of the mother below 20 years likely increase the chance of giving low birth weight (Jember et al., 2020).Similarly , sex of newborn was significantly associated with low birth weight (p value of $\leq 0.001$) (Abebe et al., 2022). Similarly, place of residence was also found to be a contributing factor for newborn birth weight. Previous studies conducted in Ethiopia reported living in the rural residence compared to urban areas found to increase the chance of giving low birth weight (Jember et al., 2020).Overall, socio economic factors such as location of the house, family income level and household size can significantly influence household food security that usually linked with maternal dietary diversity score and infant birth weight.

### 3.3 MATERNAL NUTRITIONAL STATUS AND HISTORY OF ILLNESS AND LOW BIRTH WIGHT

Maternal nutrition during pregnancy is a key factor influencing birth outcomes. Pregnant women are at increased risk of various micronutrient deficiencies, particularly in developing countries(S. Kheirouri & M. J. P. H. N. Alizadeh, 2021). Nutritional status of the mother had direct effect on LBW which remains a major health problem and is responsible for one-third of all infant and child mortality, and more case were reported from developing countries. Maternal malnutrition is often resulted due to the consumption of dietary nutrients either insufficiently or exclusively, and also it is described as a condition that results from taking an unbalanced diet in which certain nutrients are lacking, in excess (too high), or the wrong proportions. A cross sectional study in Butajera shows mothers MUAC measurement is 23 cm and above were at a lower risk of giving LBW newborns (Toru & Anmut, 2020).A study in mekele also mothers who's height <150 cm

was found as significant predictor of LBW and pregnancy weight gain <12 kg was another significant predictor of LBW (S. A. Desta, A. Damte, & T. Hailu, 2020).Maternal nutritional status has important implications for the health of mothers and children. Women in poor nutritional health face a greater risk of an adverse pregnancy and are more likely to give birth to children who are not healthy. According to EDHS 2016, Child malnutrition is associated with childbirth size and maternal malnutrition. Children who are smaller at birth are more likely to be stunted, wasted, or underweight than children who are normal or larger at birth. Likewise, children whose mothers are thin (with BMI less than 18.5) are more likely to be stunted, wasted, or underweight than children whose mothers have a normal BMI, or those children whose mothers are overweight or obese. Indicated that poor maternal nutritional status at conception, low gestational weight gains due to inadequate dietary intake or due to excess expenditure of calories (hard work), and short maternal stature resulting from early childhood under nutrition are the possible causes of SGA or low birth weight. Related with the nutritional status, previous and current medical history of the mother that include acute infections such as malaria, anemia and chronic illness like DM, HIV could result in subsequent LBW infant(Quansah & Boateng, 2020).

### 3.4 LOW BIRTH WIGHT AND MATERNAL HEALTH CARE SERVICE UTILIZATION

The other contributing factor for LBW is poor maternal health care service utilization that includes lack of ANC follow up and delivery service. For instance, a case control study in Addis Ababa ,mothers who had fewer than three ANC visit were significantly associated with low birth weight (Abebe et al., 2022). Butajiras studies finding shows mothers who gave birth interval less than 24 months between the last and current pregnancy were eleven time at an increased risk to give LBW when compared with having a birth interval greater than 24 month(Toru & Anmut, 2020). A Gamogofa zone case control study findings shows newborns from mother who had birth interval of 2 or more years were less likely to be LBW as compared to their counterpart and the odds of LBW was 1.87 times higher for newborns from mother who had late antenatal booking as compared to new bourns from mother who had ANC booking early (Mingude, Gebretsadik, Misker, & Woldeamanuel, 2020). A case control study in Mekele public health hospital, mothers who did not follow ANC were three times more likely to have low birth weight

baby than mothers who have 3-4 ANC follow up(S. A. Desta et al., 2020). Similar studies conducted in three hospitals located in Addis Ababa found planned and unwanted pregnancy as important factors for giving low birth weight.

In general, different studies in different parts of developing and developed countries agreed that socio-demographic, medical and obstetric factors, nutritional related factors, behavioral related factors, infant and environmental-related factors are potential risk factors for the occurrence of low birth weight(Ahmed et al., 2018). The relationship between the main exposure variable and the outcome (infant birth weight) as well as the direct and indirect of other independent factors are clearly presented in the following conceptual framework.

### 3.5 CONCEPTUAL FRAMEWORK

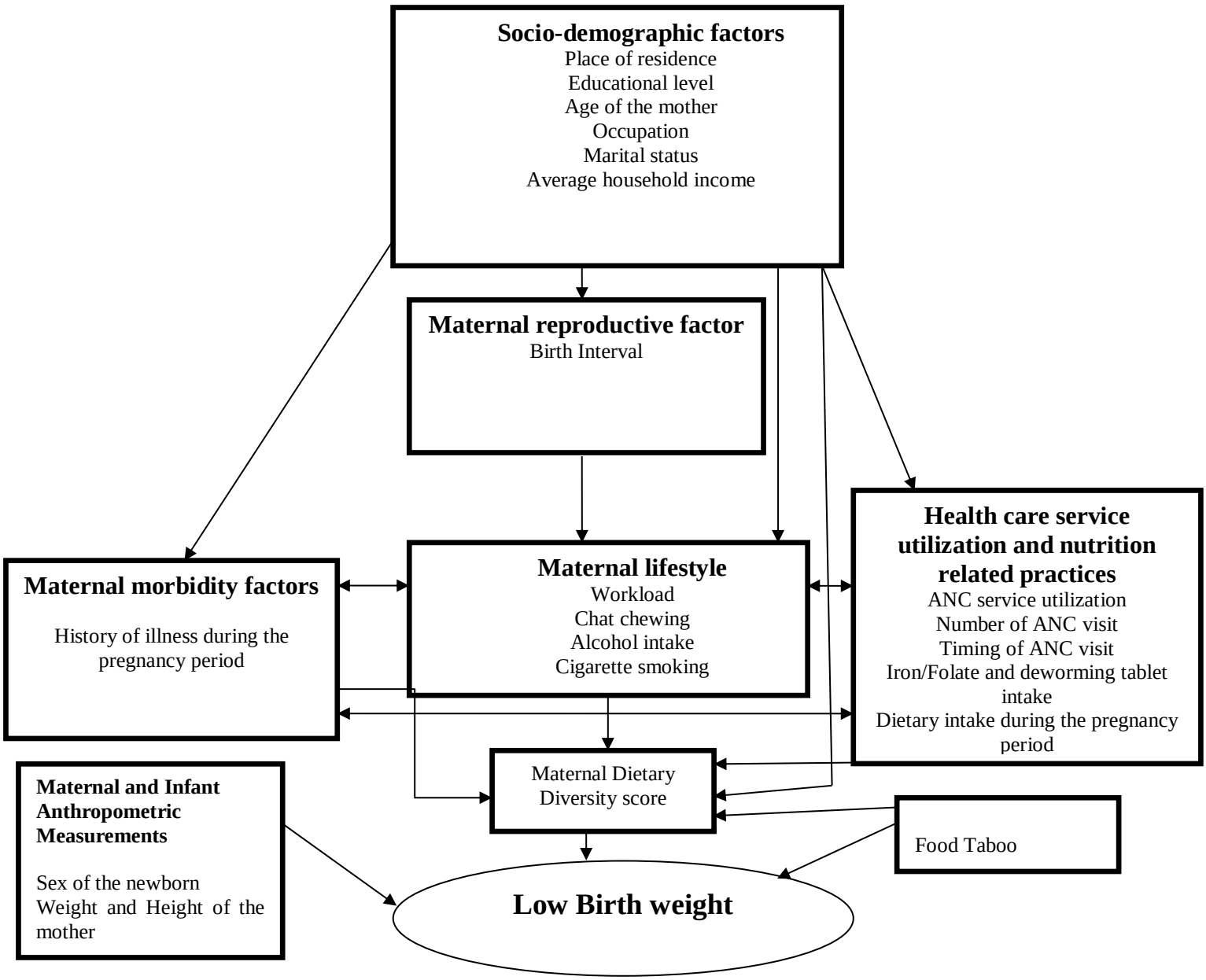


Figure 1: Conceptual framework visualizing inter-relationships between different factors of low birth wight, Addis Ababa Ethiopia 2023

# 4 METHODOLOGY

## 4.1 STUDY AREA AND PERIOD

With a population of more than 3.6 million people, Addis Ababa is Ethiopia's largest city and the geographic epicenter of the country. The city is geographically located at the heart of the nation, 9o2'N latitude and 38o45'E longitude. Its average altitude is 2,400 meter above sea level, with the highest elevations at Entoto Hill to the north reaching 3,200 meters. This makes Addis Ababa one of the high-altitude capital cities of the world. Addis Ababa occupies a total of 540 sq. km land area surrounded by mountainous landscape. Regarding access to health facilities, there was a total of 13 hospitals and 98 health centers under the Addis Ababa city administration health bureau ((https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ET).

The research was conduct in randomly selected three government hospitals in Addis Ababa Ethiopia, namely Ababach Gobena MCH hospital (affiliation with Yekatit 12 hospital and medical college), Zewditu Memorial hospital and Minielik Memorial hospital, the study was conducted from March 1, 2023- May30,2023 in Addis Ababa Ethiopia.

## 4.2 STUDY DESIGN

Facility based unmatched case control study design.

## 4.3 SOURCE POPULATION

The main sources of the study targeted population are mothers who gave live birth in sampled three public hospitals at the time of the data collection. Thus, mothers who gave live birth in the sampled hospitals were the study population.

## 4.4 STUDY POPULATION

The study targeted populations are live birth new born children from mothers who give birth in sampled three public hospitals collection during the study period. Thus, newly born a live baby are the main target population where case and controls were defined based on their weights measured at the time of delivery.

### 4.4.1 Inclusion and Exclusion criteria

#### 4.4.1.1 *Inclusion criteria*

All women who were gave birth in selected hospital were considered as main source of the study population and live singleton babies were used to define cases and controls based on the following criteria.

**Cases:** Alive singleton baby with birth weight less than 2500 gm. at birth.

**Controls:** Those with birth weight of 2500 gm. and above.

#### 4.4.1.2 *Exclusion Criteria*

Twin's birth and neonates with major congenital anomalies and those live births from mothers with mental health problem and new born above 4000 gm. were excluded from the study.

## 4.5 SAMPLE SIZE DETERMINATION

The sample size was determined using a proportional difference approach for case-control study using Epi-Info statistical software package (Version-7) and STATA. The following mathematical formula is considered in the EPI-Info software to calculate the sample size;

$$n\ (each\ group) = \frac{(p_0 q_0 + p_1 q_1)\left(z_{1-\alpha/2} + z_{1-\beta}\right)^2}{(p_1 - p_0)^2}$$

Maternal dietary diversity was considered as the main exposure variable for estimating low birth weight. Previous study report that describes the expected risk difference between the main exposure and outcome variable was taken as the baseline information. As described by(Bekela et al., 2020a).compared those mother with normal dietary diversity score, the odds of low birth weight was more than three times higher (with AOR= 3·75; 95% CI 1·64, 8·57) among mothers with inadequate dietary diversity score (Bekela et al., 2020b). Another study shows that the proportion of LBW was higher in women who had low DDS during pregnancy (60.7%) compared to women who had high DDS during pregnancy (39.6%) ($p < 0.001$(Quansah & Boateng, 2020). Accordingly, the required sample size is determined based on the above baseline information that also considered the basic statistical assumptions with 95% confidence level, 80% power of the study and expected correlation of exposure between case and controls (0.5).

Thus, taking 2:1 ratio of control to case and after adding 10% non-response rate to each comparison groups, a total of 275 participants (85 cases and 190 controls) was included in the study.

- Assumptions and inputs used to calculate the samples size:
  - *Percent of controls exposed: 39.6%*
  - *Percent of cases exposed: 60.7%*
  - *Odds ratio: 2*
  - *95% confidence level*
  - *80% power*
  - *2:1 ratio of control to case*
  - *10% non-response*

### 4.6 SAMPLING PROCEDURE

A systemic sampling technique was used to select the study subject based on the following procedures/steps;

- Step 1: Past three months data on live birth from each hospital were collected. Based on the collected data, PPS technique was used to distribute the calculated sample to the three hospitals.
- Step 2: Sampling frame for expected numbers of cases and controls were prepared based on the average daily number of deliveries reported from the respective hospital.
- Step 3: The average number of daily deliveries were divided by the number of data to be collected for each day to get the sampling interval "K".
- Step 4: After having the first eligible case (mother with live birth of baby weighting < 2500 g), all the remaining cases and controls were randomly recruited based on our sampling interval and eligibility criteria. Recruitments of cases and control were continued until allocation sample size is reached for each of the comparison groups.

## 4.7 STUDY VARIABLE

**Dependent variable**: The dependent variable which was birth weight measured as dichotomized data where infant with birth weight of <2500 g was considered as cases while those with birth weight of ≥2500 g referred as controls.

**Independent variable:**

**Socio-demographic factors:** Place of residence**,** educational level**,** Age of the mother**,** Occupation**,** Marital status and Average household income.

**Maternal reproductive factor:** Birth Interval

**Maternal morbidity factors:** History of illness during the pregnancy period

**Maternal lifestyle**: Workload, Chat chewing, Alcohol intake, and Cigarette smoking.

**Health care service utilization and nutrition related practices:** ANC service utilization**,** Number of, ANC visit**,** Timing of ANC visit**,** Iron/Foliate and deworming tablet intake**,** and Dietary intake during the pregnancy period.

**Maternal and Infant Anthropometric Measurements:** Sex of the newborn and Weight and Height of the mother

**Maternal Dietary Diversity**

**Food Taboo**

## 4.6 OPERATIONAL DEFINITION

**Cases:** newborn with birth weight of <2500 g

**Controls:** newborn with birth weight of ≥2500 g

**Dietary diversity:** Dietary diversity defined as the number of different food groups consumed over a given period of time.

**Minimum Dietary Diversity of Pregnant Women:** Dietary diversity score of pregnant women receiving at least five food groups out of ten.

**Low Birth Weight:** a live birth infant weighing below 2500 gm (5.5 pound) at birth irrespective of the gestational period (WHO Global nutrition targets 2025: low birth weight policy brief).

**Maternal Eating Pattern:** In this study, eating pattern implies either decreased or increased frequency of meal and portion of foods consumed within a single day during the pregnancy period as defined by the respondents

### 4.7 DATA COLLECTION TOOL AND PROCEDURE

The main outcome variable which is birth weight was measured at the time of delivery and the hospital delivery team was collect related data including neonatal sex from birth registration book within 24 hours after delivery. Standard checklist was placed for gathering data related with utilization of routine health care services such as antenatal care and dietary diversity practices of mothers. A modified version of check list was used to collect information related with maternal health care service utilization that such as previous history of gravidity, parity, birth interval, antenatal care (ANC) service which include number of ANC visits.

The data collection was conducted by three experienced midwifes recruited in each hospital staffs that are permanently working in the delivery and postnatal units. Brief orientation about the tool was given for the recruited midwives and following the orientation, the tool was pilot tested to examine its feasibility and clarity. In addition, one supervisor who is a senior public health professional was also engaged during the data collection period to ensure the quality of the data. The supervisor was responsible to regularly check the collected data for completeness and consistency and accordingly feedback was given on daily bases if there were any issues that need corrective measures.

Structured quantitative survey questionnaire was used to collect basic information related with those independent variables that included the socio demographic and medical history of mothers. The Socio-demographic characteristics that include maternal age, marital status, educational status, place of residence, occupation, and monthly income was obtained through face-to-face interview. The structured questionnaire was also use to collect history medical illness for recent pregnancy (having any illness such as hypertension and diabetes) and pregnancy-related complications (gestational hypertension, premature rupture of membrane, ante partum hemorrhage, gestational age, and anemia status). Substance use-related factors such as cigarette smoking, alcohol drinking, and chat chewing during and after pregnancy was obtained from structured questionnaire interview collected from primary and secondary data.

## 4.8 QUALITY CONTROL TECHNIQUES

The weight of the newborns was measured within one hour upon delivery using a weight scale. The weight scale was calibrated at every morning and when the instruments move apart that will be also validated and checked using the scales by 1 kg metal iron sheet to keep their reliability. The Minimum Dietary diversity score of mothers was estimated using the standard criteria used for women of reproductive age (MDD-W). The food items was aggregated into 10 food groups based on the FFQ as outlined by the Food and Agriculture Organization (FAO, 2016).

The data collection tool was prepared based on the objective of the study and literature review. Other standard and validated data collection tools were review and adapted in the process of preparing the questionnaire. The data collection was first prepared in English and was translated to Amharic. In addition, the translated questionnaire was also back translated to English to ensure its consistency. Before the actual implementation of the data collection task, the tool was pretested in other hospital found in Addis Ababa. The pretest was conducted on 10% of the total sample size of the study. Moreover, bachelor holder health professionals were recruited to carry out the data collection task in the study hospital. Besides, a senior health professional that was the staff of the study hospital was selected to closely supervise the data collection process. Both the data collectors and supervisor were trained for one day before the commencement of the data collection activities.

## 4.9 DATA MANAGEMENT AND STATISTICAL ANALYSIS

The raw data were entered in to SPSS Version 20 software and basic data management activities such as sorting, labeling, ordering, recording and computing new variables was performed. Additional data management techniques such as identification of missed cells and outliers was conducted, and appropriate measures was applied as part of the data quality control measure. In checking the model of fitness test, observed and expected frequencies of outcomes across different groups were compared using Hosmer-Lemes how Test. Descriptive statistics such as frequencies, percentages, summary measures, tables, and graphs were used to describe the results of the respondents. Furthermore, a bivariate and multivariable logistic regression analysis model to identify independent predictors of low birth weight. This helped to identify variables with strong or statistically significant associations. Moreover, stepwise selection (analysis) was

applied to identify variables based on their statistical significance. Variables that have no significant contribution during model development was excluded through stepwise backward elimination technique depending on AIC (Akaike's information criteria) value and the clinical significance of the study variables. Finally, the adjusted odds ratio (AOR) with 95% confidence interval (CI) was reported to reflect the magnitude of association between the different variables in relation to the outcome variable; thus, a P-value <0.05 was used to declared level of significant and the adjusted odds ratio (AOR) used to present strength of statistical associations.

### 4.10 ETHICAL CONSIDERATION

After ethical clearance was obtained from Bahir Dar University institutional review board and Addis Ababa public health research and emergency management directorate all the study subjects were given verbal consent and only participated in the study after clear explanation of the major points included in the consent form. In this study every measure to protect the rights of the human subjects who participate in this study and adhere to the ethical principles of respect, beneficence, and justice of research in Ethiopia.

# 5 RESULTS AND DISCUTION

## 5.1 RESULT

#### *5.1.1 socio-demographic Characteristics of the Study Population*

In these study A total of 275 subjects were enrolled (190 control and 85 case) with 100% respondent's rate. The majority of the mother age was lies between18 to 28, 104 (54.7%) control and 44(51.8%) case. About 132(72.1%) control and 55(64.7%) case respondents were Orthodox Christians by religion. Majority of respondents 166 (87.4%) control and 73 (64.7%) case were urban residents and only 24(12.6%) control and 12(14.1) case of women were from the rural areas. Regarding the occupation of respondents, 85 (44.7%) control and 36(42.4) case were housewife, 26 (13.7%) control, and 16(8.8%) case were government employed and 31(16.3%) control and 10(11.8%) private employees respectively. majorities of the respondents have attended formal education where 41 (21.6%) control and 14(16.5) case have diploma and above education and only 13(4.7%) of the study subjects 8(4.2) control and 5(5.9) case have no formal

education. About 175(92.1%) control and 73(85.9) case of women were married during the study period. The average household monthly income of the respondents was 6,000 Birr.

*Table 1 Socio - demographic characteristics of the mother2023 Addis Ababa, Ethiopia.*

| Variable | Category | Controls: n (%) 190 (68.9) | Cases: n (%) 85 (31.1) | Total N =275 | P-value (chi-2) |
|---|---|---|---|---|---|
| Name of the Hospital | Abebech Gobena MCHH | 95(50.5) | 54(63.5) | 149(54.6) | |
| | Menilik Hospital | 32(17.0) | 9(10.6) | 41(15.0) | 0.119 |
| | Zewuditu Memorial Hospital | 61(32.5) | 22(25.9) | 83(30.4) | |
| Age of the respondent | | | | | |
| ≤ 28 Years | | 104 (54.7) | 44 (51.8) | 148(53.8) | 0.648 |
| Above 28 Years | | 86(45.3) | 41(48.2) | 127(46.2) | |
| Religion | | | | | |
| Orthodox | | 137(72.1) | 55(64.7) | 192(69.8) | |
| Protestant | | 23(12.1) | 14(16.5) | 37(13.5) | 0.375 |
| Muslim | | 25(13.2) | 15(17.7) | 40(14.6) | |
| Others | | 5(2.6) | 1(1.2) | 6(2.2) | |
| Place of residence | | | | | |
| Urban | | 166(87.4) | 73(85.9) | 239(86.9) | |
| Rural | | 24(12.6) | 12(14.1) | 36(13.1) | 0.736 |
| Occupation | | | | | |
| No occupation (Housewife) | | 85(44.7) | 36(42.4) | 121(44.0) | |
| Merchant (trader) | | 16(13.7) | 10 (11.8) | 36 (13.1) | |
| Government employee | | 26(13.7) | 16(18.8) | 42(15.3) | 0.608 |
| Private employee | | 31(16.3) | 10(11.8) | 41(14.9) | |
| Farmer | | 3(1.6) | 2(2.4) | 5(1.8) | |
| Daily laborer | | 7(3.7) | 5(5.9) | 12(4.4) | |
| Student | | 4(2.1) | 3(3.5) | 7(2.6) | |
| Others | | 9(4.7) | 2(2.4) | 11 (4.0) | |
| Educational level | | | | | |
| No formal education (illiterate) | | 8(4.2) | 5(5.9) | 13(4.7) | |
| Primary first cycle (1-4) | | 31(16.3) | 10(11.8) | 41(14.9) | |
| Primary second cycle (5-8) | | 44(23.2) | 17(20.0) | 61(22.2) | |
| Secondary education (9-10) | | 40(21.1) | 27(31.8) | 67(24.4) | 0.545 |
| Preparatory (11-12) | | 8(4.2) | 4(4.7) | 12(4.4) | |

| | | | | |
|---|---|---|---|---|
| Certificate (10+ (Level I-IV) | 18(9.5) | 8(9.4) | 26(9.5) | |
| Diploma and above education | 41(21.6) | 14(16.5) | 55(20.0) | |
| Marital status | | | | |
| Married | 175(92.1) | 73(85.9) | 248(90.2) | |
| Single | 13(6.8) | 10(11.8) | 23(8.4) | 0.268 |
| Divorced | 2(1.1) | 2(2.4) | 4(1.5) | |
| Average household income in Birr | | | | |
| ≤ 6000 ETB | 94(49.5) | 48(56.5) | 142(51.6) | 0.027 |
| Above 6000 ETB | 96(50.5) | 37(43.5) | 133(48.4) | 0.283 |

### 5.1.2 Maternal Obstetric History and Healthcare Services Utilization

For about 145(76.3%) of control and 45 (52.9%) of case mothers, the pregnancy was intended (planned). The average gestational age of the present pregnancy was 39 weeks, ranging from 28-42 week .78(41.1%) of control 35(41.2%) of case was there first delivery. About171(90%) of control and 78(91.8%)case women had ANC visit during their pregnancy period. Among mothers who gave normal birth weight babies. Close to 93 (54.4%) of control and 36(46.2%) of case mothers have received four and above ANC visit during their pregnancy period and 44(25.7%) of control and 16(20.5%) of case had four visit and 25(14.6%) of control and 21(26.9%) of case has three ANC visits respectively during their most recent pregnancy period. About 161 (84%)of control and 56 (65.9%) of case mothers have received iron-folate and 58(30.5%)of control and 25(29.4%)of case mother take de-worming tablets respectively during their pregnancy period. 16(37.2%) of control and 12(38.7%) of case mothers encountered at least one type of illness during pregnancy and the majority 78.2% (215) of mothers 163(85.8)of control and 52(61.3%) of case have got health advice during their pregnancy period from health professionals.

*Table 2 History of pregnancy and maternal reproductive health,2023, Addis Ababa, Ethiopia*

| **Maternal history** | **Controls: n (%) 190 (68.9)** | **Cases: n (%) 85 (31.1)** | **Total N =175** | **P-value (Chi-2)** |
|---|---|---|---|---|
| Intended (planned)? | | | | |
| Yes | 145(76.3) | 45(52.9) | 190(69.1) | |
| No | 45(23.7) | 40(47.1) | 85(30.9) | < 0.001 |
| Gestational age | | | | |
| Less28- 32 weeks | 4 (2.1) | 27 (31.8) | 31 (11.3) | |
| 32-36 weeks | 12 (6.3) | 23 (27.1) | 35 (12.7) | < 0.001 |

| | | | | |
|---|---|---|---|---|
| Above 36 weeks | 174 (91.6) | 35 (41.2) | 209 (76.0) | |
| Numbers of children | | | | |
| One | 78(41.1) | 35(41.2) | 113(41.1) | |
| Two | 52(27.4) | 30(35.3) | 82(29.8) | |
| Three | 44(23.2) | 14(16.5) | 58(21.1) | |
| Four | 11(5.8) | 4(4.7) | 15(5.5) | 0.622 |
| More than five children | 5(2.6) | 2(2.4) | 7(2.6) | |
| Sex of the newborn | | | | |
| Male | 85(44.7) | 46(54.1) | 131(47.6) | |
| Female | 105 (55.3) | 39(45.9) | 144(52.4) | 0.15 |
| ANC follow up | | | | |
| Yes | 171(90.0) | 78(91.8) | 249(90.6) | |
| No | 19(10.0) | 7(8.2) | 26(9.5) | 0.644 |
| Numbers of ANC Visit | | | | |
| Once | 1(0.6) | 0(0.0) | 1(0.4) | |
| Twice | 8(4.7) | 5(6.4) | 13(5.2) | |
| Three times | 25(14.6) | 21(26.9) | 46(18.5) | |
| Four times | 44(25.7) | 16(20.5) | 60(24.1) | 0.167 |
| Four & above | 93(54.4) | 36(46.2) | 129(51.8) | |
| Did you take Iron/foliate | | | | |
| Yes | 161(84.7) | 56(65.9) | 217(78.9) | |
| No | 29(15.3) | 29(34.1) | 58(21.1) | < 0.001 |
| Did you receive de-worming tablet | | | | |
| Yes | 58(30.5) | 25(29.4) | 83(30.2) | |
| No | 132(69.5) | 60(70.6) | 192(69.8) | 0.852 |
| Did you get any illness | | | | |
| Yes | 43(22.6) | 31(36.5) | 74(26.9) | |
| No | 147(77.4) | 54(63.5) | 201(73.1) | 0.017 |
| Have you been hospitalized for the illness? | | | | |
| Yes | 7(25.0) | 14(56.0) | 21(39.6) | |
| No | 21(75.0) | 11(44.0) | 32(60.4) | 0.021 |
| History of chronic disease (illness) | | | | |
| Yes | 16(37.2) | 12(38.7) | 28(37.8) | |
| No | 27(62.8) | 19(61.3) | 46(62.2) | 0.896 |
| Advice from health professional | | | | |
| Yes | 163(85.8) | 52(61.2) | 215(78.2) | |
| No | 27(14.2) | 33(38.8) | 60(21.8) | < 0.001 |

### 5.1.3 Maternal Dietary Diversity Practice and Lifestyle during Pregnancy

Dietary diversity practice and maternal lifestyle during pregnancy were considered as part of paramount factors that can have possible effect on both maternal health and inter-generational

birth outcomes, such as low birth weight. Thus, mothers were asked about their dietary practice during pregnancy and the recent experience related to the foods and drinks that you ate or drank yesterday during the day or night. Accordingly, the overall eating pattern was somehow improved and increased in frequency 106(55.8%) of control and 38(44.7) of case mothers increased the amount and about 140(73.7%) of control and 42(49.4%) of case mother took additional foods during pregnancy. In this study, only 172(90.5%) of control and 74(87.1%) of case mothers reported as they eat more than five out of the ten recommended type of food items. Among mothers who gave normal birth weight babies. About 64(33.7%) of control and 33(38.8%) of case mothers were under fasting during pregnancy period and for some of them had bad lifestyle such as taking coffee and alcohol that affect their health and the outcome (weight of new born baby). Similarly, the majority 56(29.5%) of control and 47(44.7%) of case mothers did not take adequate rest during pregnancy and relatively higher proportion of mothers having infants with low birth had high workload.

*Table 3 Maternal dietary diversity practice and lifestyle during pregnancy2023 Addis Ababa, Ethiopia.*

| **Practice and lifestyle** | **Controls: n (%) 190 (68.9)** | **Cases: n (%) 85 (31.1)** | **Total N =175** | **P-value (Chi-2)** |
|---|---|---|---|---|
| Eating pattern | | | | |
| Not changed | 57(30.0) | 29(34.1) | 86(31.3) | |
| Increased in frequency | 106(55.8) | 38(44.7) | 144(52.4) | |
| Decreased in frequency | 27(14.2) | 18(21.2) | 45(16.4) | 0.179 |
| Additional foods | | | | |
| Yes | 140(73.7) | 42(49.4) | 182(66.2) | |
| No | 50(26.3) | 43(50.6) | 93(33.8) | < 0.001 |
| Dietary diversity (MDD) | | | | |
| Below five foods | 18(9.5) | 11(12.9) | 28(10.5) | |
| More than five food type | 172(90.5) | 74(87.1) | 60(21.8) | 0.38 |
| Fasting during your pregnancy? | | | | |
| Yes | 64(33.7) | 33(38.8) | 97(35.3) | 0.410 |
| No | 126(66.3) | 52(61.2) | 178(64.7) | |
| Take coffee | | | | |
| Yes | 124(65.3) | 44(51.8) | 168(61.1) | |
| No | 66(34.7) | 41(48.2) | 107(38.9) | 0.034 |
| Alcohol history | | | | |
| Yes | 30(15.8) | 8(9.4) | 38(13.8) | |
| No | 160(84.2) | 77(90.6) | 237(86.2) | 0.157 |
| Rest during your pregnancy | | | | |

| | | | | |
|---|---|---|---|---|
| Adequate | 134(70.5) | 47(55.3) | 181(65.8) | |
| Not adequate | 56(29.5) | 38(44.7) | 94(34.2) | 0.014 |
| Workload during your pregnancy | | | | |
| Low workload | 50(26.3) | 15(17.7) | 65(23.6) | |
| Normal | 119(62.6) | 49(57.7) | 168(61.1) | < 0.01 |
| High workload | 21(11.1) | 21(24.7) | 42(15.3) | |

### 5.1.4 Factors Associated with Low Birth Weight

Both bivariable and multivariable binary logistic regression analysis was computed to identify potential association with New-born birth weight. Almost all of demographic information and most of independent variables did not find to have significant difference on the main outcome and hence exclude from the final multivariable analysis using back ward elimination techniques. According to the crude estimate [COR; 95% CI] and the corresponding P-value, Gestational age, intended (planned) Pregnancy, Taking Iron/foliate, taking coffee, taking additional food, Workload during pregnancy, Illness during pregnancy, and Getting professional Advice during the pregnancy were found to be significantly associated with low birth weight.

In the multivariable analysis as shown in table gestational age and work load during the pregnancy period were strongly associated with low birth weight. Thus, according to the adjusted estimate, the likelihood of having infant with low birth weight was relatively higher among mothers who gave birth before 36 weeks of gestational age; with AOR and 95%CI of 28.4(10.7,75.5) as compared to those having gestational age of above 36 weeks. On the other hand, those mothers who had high workload during pregnancy were three time more likely to give birth to have new born baby with low birth weight [AOR= 3.8, 95%CI (1.2,12.4)]. The risk for getting low birth weight baby was more than two times higher among mothers who got any type of illness during pregnancy [AOR= 2.2, 95%CI (1.1,4.7)].

*Table 4 Bivariable and multivariable Logistic Regression analysis used to identify potential factors association with birth weight,2023 Addis Ababa, Ethiopia.*

| **Factor variables** | **Control (n(%))** | **Cases (n(%))** | **COR (95% CI** | **AOR (95% CI** |
|---|---|---|---|---|
| Gestational age | | | | |
| Less 36 weeks | 16(8.4) | 50 (58.9) | 25.5(10.7,60.7)*** | 28.4(10.7,75.5) *** |
| Above36 weeks | 174(91.6) | 35(41.2) | 1 | 1 |
| Maternal dietary diversity | | | | |
| More than five | 18(9.5) | 11(12.9) | 0.7(0.3,1.6) | 0.5(0.2,1.6) |
| Below five | 172(90.5) | 74(87.1) | 1 | 1 |
| Did you take Iron/foliate | | | | |
| Yes | 161(84.7) | 56(65.9) | 1 | 1 |
| No | 29(15.3) | 29(34.1) | 2.9(1.6,5.2) | 1.7(0.6,4.7) |
| Take coffee | | | | |
| Yes | 124(65.3) | 44(51.8) | 1 | 1 |
| No | 66(34.7) | 41(48.2) | 1.8(1.0,2.9) * | 1.3(0.6,2.6) |
| Intended pregnancy | | | | |
| Yes | 145(76.3) | 45(52.9) | 1 | 1 |
| No | 45(23.7) | 40(47.1) | 2.9(1.7,4.9) ** | 1.2(0.4,3.4) |
| Illness during pregnancy | | | | |
| Yes | 31(36.5) | 43(22.6) | 1.8 (1.0,32) * | 1.6 (0.7,3.5) |
| No | 54(63.5) | 147(77.4) | 1 | 1 |
| Taking iron/foliate | | | | |
| Yes | 161(84.7) | 5665.9) | 1 | 1 |
| No | 29(15.3) | 29(34.1) | 2.6(1.4,4.8) ** | 1.2(0.4,3.4) |
| Taking coffee | | | | |
| Yes | 122(65.3) | 44(51.8) | 1 | 1 |
| No | 66(34.7) | 41(48.2) | 1.8(1.0,2.9) | 1.1(0.5,2.3) |
| Eating pattern | | | | |
| Not changed | 57(30.0) | 29(34.1) | 1 | 1 |
| Increased | 106(55.8) | 38(44.7) | 0.7(0.4,1.3) | 0.4(0.2,0.8) |
| Decreased | 27(14.2) | 18(21.2) | 1.3(0.6,2.8) | 0.6(0.2,1.7) |
| Take additional food | | | | |
| Yes | 140(73.7) | 42(49.4) | 1 | 1 |
| No | 50(26.3) | 43(50.6) | 2.9(1.7,4.9) *** | 1.3((0.6,2.9) |
| Workload | | | | |
| Low | 50(26.3) | 15(17.7) | 1 | 1 |
| Normal | 119(62.6) | 49(57.7) | 1.7(0.8,3.4) | 1.6(0.6,4.1) |

| | | | | |
|---|---|---|---|---|
| High | 21(11.1) | 21(24.7) | 4.4(1.9,10.4) *** | 3.8(1.2,12.4) * |
| Did you get any illness | | | | |
| Yes | 43(22.6) | 31(36.5) | 1.8(1.0,3.2) | 1.6(0.7,3.5) |
| No | 147(77.4) | 54(63.5) | 1 | 1 |
| Getting Advice from health professional | | | | |
| Yes | 163(85.8) | 52(61.2) | 1 | 1 |
| No | 27(14.2) | 33(38.8) | 3.5(1.91,6.3) *** | 2.2(0.8,6.0) |

*p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001

## 5.2 DISCUSSIONS

This study has tried to assess determinants of low birth weight among mother who gave birth in public hospital in Addis Ababa. Gestational age of the current pregnancy, eating pattern, workload during the pregnancy period, and illness during pregnancy were found to be strongly associated with low birth weight. The study found that the likelihood of having infant with low birth weight was relatively higher among mothers who gave birth before 36 weeks of gestational age; with AOR and 95%CI of 28.4(10.7,75.5) as compared to those having gestational age of above 36 weeks. The study finding on the association between gestational age and birth weight is consistent with previous studies conducted in Ethiopia. A study conducted in 2016 in Gonder University hospital revealed the presence of a strong positive correlation between gestational age and birth weight, indicating infants born prematurely are more likely to be low birth weight (LBW), defined as less than 2500 grams (Alem, G., et al. 2016).

In this study, gestational age of the current pregnancy was found to be strongly associated with low birth weight. The study found that the likelihood of having infant with low birth weight was relatively higher among mothers who gave birth before 36 weeks of gestational age; with AOR and 95%CI of 28.4(10.7,75.5) as compared to those having gestational age of above 36 weeks. The study finding on the association between gestational age and birth weight is consistent with previous studies conducted in Ethiopia. A study conducted in 2016 in Gonder University hospital revealed the presence of a strong positive correlation between gestational age and birth weight, indicating infants born prematurely are more likely to be low birth weight (LBW), defined as less than 2500 grams (Alem, G., et al. 2016).

While, in this study those mothers who had high workload during pregnancy were three time more likely to give low birth weight baby [AOR= 3.7, 95%CI 3.8 (1.2,12.4). The finding of the study in this regard is consistent with the study findings revealed in other similar developing

countries. A study conducted in Ghana indicated that heavy workload and physically demanding conditions during pregnancy pose a significant risk for LBW (Adu-Bonsaffoh et al., 2016). Similarly, a scoping review of occupational burdens on women in developing countries and associated effects on fetal outcomes provided similar finding where physically demanding work involving prolonged standing, bending, lifting, and carrying heavy loads is associated with higher LBW risk (Stewart, S. et al. 2017).

Moreover, the risk for getting low birth weight baby was more than two times higher among mothers who got any type of illness during pregnancy [AOR= 2.2, 95%CI (1.1,4.7)]. Previous studies indicated a significant association between maternal illness and an increased risk of low birth weight. A cross-sectional study conducted in Dire Dawa city administration found that diabetes, hypertension, and other chronic illnesses during pregnancy can increase LBW risk ((Assefa et al., 2019). Similar studies conducted in Africa and developing countries showed that conditions like severe anemia, hypertension, and preeclampsia can lead to impaired placental blood flow, restricting oxygen and nutrient supply to the fetus and contributing to LBW. Moreover, women with pre-existing illnesses like diabetes, kidney disease, or autoimmune disorders face a heightened risk of LBW due to complications arising from these conditions (Shobha, T., et al. 2014).

## STRENGTH AND LIMITATION OF THE STUDY

The study was institutional based case control study it may have the limited generalizability of the finding to the community.

# 6. CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusions

The study confirmed that Gestational age, Intended (planned) Pregnancy, Taking Iron/foliate, Taking coffee, Taking additional food, Workload during pregnancy, Illness during pregnancy, and Getting professional Advice during the pregnancy were found to be significantly associated with low birth weight.

The findings of this study confirm that gestational age is a critical factor influencing birth weight. Mothers who gave birth before 36 weeks of gestation had a significantly higher likelihood of delivering LBW infants. This aligns with previous studies in Ethiopia, reinforcing the importance of prenatal care that focuses on monitoring gestational age to mitigate risks associated with preterm births.

The study also highlights the detrimental effects of high maternal workload during pregnancy on birth weight outcomes. Mothers engaged in physically demanding activities were three times more likely to have LBW babies. This finding is consistent with research from other developing countries, which indicates that occupational burdens can adversely affect fetal health. Therefore, addressing maternal workload through policy and community support is critical for improving birth outcomes.

The discrepancies between this study and existing literature suggest a need for further research to explore the nuanced relationships between different maternal factors and birth weight in varying contexts. Understanding these dynamics could inform interventions aimed at improving maternal and infant health outcomes. Future studies should consider a broader range of variables and potential confounders to develop a comprehensive understanding of the factors influencing birth weight in different populations.

## 6.2 Recommendations

- Given the strong association between gestational age and low birth weight, it is essential to enhance prenatal care programs that emphasize timely monitoring of gestational age. Targeting interventions for high-risk groups could significantly improve birth outcomes.
- The findings highlight the detrimental effects of high maternal workload on birth weight. It is crucial to develop community programs that address the physical demands placed on pregnant women. Policies should promote maternal health by providing resources for safe working conditions, and offering support systems for pregnant women to reduce their physical strain.
- Given the established links between maternal illnesses and low birth weight, it is vital to implement screening and management strategies for chronic conditions such as diabetes and hypertension during pregnancy. Healthcare facilities should ensure that pregnant women receive appropriate medical care for existing health issues, thereby reducing the risk of adverse birth outcomes.
- The study suggests that unmeasured variables may significantly impact birth weight. Future research should explore these factors, including socio-economic status, access to healthcare, and local dietary practices. A comprehensive approach to data collection that includes qualitative methods may provide deeper insights into the complexities of maternal health and nutrition.

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**ANNEXE**

DRAFT DATA COLLECTION TOOL

**ASSOCIATION BETWEEN MATERNAL DIETARY DIVERSITY AND LOW BIRTH WEIGHT, A FACILITY BASED CASE CONTROL STUDY IN ADDIS ABABA ETHIOPIA**

**Participant Information Sheet and Consent Form**

My name is……. I am working as a data collector for the study being conducted in this Hospital by Mastwal Kebede who is studying for her master's degree at Bahir Dar University. I kindly request you to lend me your attention to explain you about the study and being selected as the study participants.

**Purpose/aim of the study**

The finding of this study can be of a paramount importance to plan different nutritional and health related programs for pregnant women to decrease the prevalence of LBW and inter-generational effect of malnutrition in the population.

**Procedure and duration**

I will be interviewing you using a questionnaire to provide me with pertinent data that is helpful for the study. I will fill the questionnaire by interviewing you. The interview will take about 30 minute, so I kindly request you to spare me this time for the interview.

**Risk and benefits**

The risk of being participating in this study is very minimal, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for l health planners.

**Confidentiality**

The information you will provide us will be confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study community and will not reflect any thing particular of individual persons or housing. The questionnaire will not include your name. No reference will be made in oral or written reports that could link participants to the research.

**Rights**

Participation for this study is fully voluntary. You have the right to declare participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time

and this will not label you for any loss of benefits which you otherwise are entitled you do not have answer any questions that you do not want to answer.

**Contact Address**:

If there are any questions or enquiries any time about the study or the procedure, please contact: Mastwal Kebede by Mobile Phone: +251902506036 or Email Address: mastu2007@yahoo.com

**Declaration of informed consent**

I have clearly understood the purpose of the research, the procedures, the risk and benefits issues of confidentiality, the rights of participating and the contact address of any queries. I have been given the opportunity to ask questions for the things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any questions that I do not want. Therefore, I declare my voluntary consent and provide my verbal consent to participate in this study.

Yes agreed to participate ___ No_____

Name of the Data collector_____

Date_____

Signature_____

| **PARTICIPANT IDENTIFICATION CODE:_____** | | |
|---|---|---|
| **SECTION ONE: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE MOTHER** | | |
| SN | Questions | Response (Choices) |
| 101 | Age of the respondent | _____(in complete year) |
| 102 | Religion | 1. Orthodox<br>2. Protestant<br>3. Muslim<br>4. Catholic<br>5. Other (Specify)_____ |
| 103 | Place of residence | 1. Urban<br>2. Rural |
| 104 | Occupation | 1. No occupation (Housewife)<br>2. Farmer<br>3. Merchant |

| | | |
|---|---|---|
| | | 4. Small scale trader<br>5. Government employee<br>6. Daily laborer<br>7. Student<br>8. Private employee<br>9. Other (Specify)_____ |
| 105 | Educational level | 1. No formal education (illiterate)<br>2. Primary first cycle (1-4)<br>3. Primary second cycle (5-8)<br>4. Secondary education (9-10)<br>5. Preparatory (11-12)<br>6. Certificate (10+ (Level I-IV)<br>7. Diploma and above education |
| 106 | Marital status | 1. Married<br>2. Single<br>3. Divorced<br>4. Other |
| 107 | Average household income in Birr | _____ (ETB) |
| 108 | How many children do you have? | 1. This is my first baby→ Go to Q 110<br>2. Two children including this one<br>3. Three children including this one<br>4. Four children including this one<br>5. More than five children |
| 109 | Birth interval from your preceding birth | _____ (in months) |
| 110 | Gestational age of your present pregnancy | _____ (in months) |
| **SECTION TWO: HEALTH SERVICE UTILIZATION DURING PREGNANCY** | | |
| 201 | Have you ever attended ANC follow up for your current pregnancy? | 1. Yes<br>2. No→ go to Q 204 |
| 202 | If yes for question 201 how many | 1. Once |

| | | |
|---|---|---|
| | times did you visit for ANC? | 2. Twice<br>3. Three times<br>4. Four times<br>5. Four & above |
| 203 | At what time did you start your ANC visit? | 1. During the first trimester (within 1-3 months)<br>2. During the second trimester (within 4-6 months)<br>3. During the third trimester (within 7-9 months) |
| 204 | Did you take Iron/foliate during your pregnancy? | 1. Yes<br>2. No→ go to Q 206 |
| 205 | If your answer for Q 204 is yes, for how long did you take the tablets? | 1. For less than a month<br>2. For one month<br>3. For two months<br>4. For three months<br>5. For four months<br>6. For five months<br>7. For six and above months |
| 206 | Have you ever received advice from health professional about dietary intake and other important advices during your pregnancy? | 1. Yes<br>2. No→ go to Q 208 |
| 207 | What kind of advice did you received? (Multiple response possible) | 1. Take additional meal especially snacks during pregnancy<br>2. Diversified food intake during pregnancy<br>3. Take iron folate during pregnancy<br>4. Take deworming tablets<br>5. Wash hands with water and soap or ash at critical times<br>6. Take adequate rest<br>7. Other (Specify)_____ |
| 208 | Did you receive de-worming tablet | 1. Yes |

| | | |
|---|---|---|
| | during your pregnancy? | 2. No |
| 209 | Is your present pregnancy intended (planned)? | 1. Yes<br>2. No |
| SECTION 3. MATERNAL NUTRITION AND SUBSTANCE USE PRACTICE DURING PREGNANCY | | |
| 301 | How was your eating pattern during your pregnancy? | 1. Same with before I get pregnant<br>2. Changed and increased in frequency<br>3. Changed and decreased in frequency |
| 302 | How many times did you commonly take a meal during your pregnancy? | _____ (specify in number) |
| 303 | Did you eat any additional foods during your pregnancy time? | 1. Yes<br>2. No |
| 304 | Did you take adequate rest during your pregnancy? (Compared with prior to pregnancy) | 1. Yes<br>2. No |
| 305 | Did you take coffee or tea during your pregnancy while you take your meal? | 1. Yes<br>2. No→ go to Q306 |
| 305 | Frequency of taking coffee or tea | 1. Always<br>2. Sometimes<br>3. Occasionally |
| 306 | Did you chew chat during your pregnancy? | 1. Yes<br>2. No→ go to Q308 |
| 307 | Frequency of taking chat | 1. Always<br>2. Sometimes<br>3. Occasionally |
| 308 | Did you take alcohol during | 1. Yes |

| | | |
|---|---|---|
| | your pregnancy? | 2. No→ go to Q310 |
| 309 | Frequency of taking alcohol | 1. Always<br>2. Sometimes<br>3. Occasionally |
| 310 | Did you take any other substance during your pregnancy? | 1. Yes<br>2. No→ go to |
| 311 | Frequency of taking other substances | 1. Always<br>2. Sometimes<br>3. Occasionally |
| SECTION FOUR: HISTORY OF ILLNESS DURING PREGNANCY | | |
| 401 | Did you ever get any illness during your pregnancy? | 1. Yes<br>2. No→ go to Q405 |
| 402 | What kind of symptoms did you encounter during your pregnancy? | 1. Dizziness, headache and fatigue<br>2. Blurred vision<br>1. Edema of the leg<br>2. Generalized edema<br>3. Abnormal vaginal gushing of fluid<br>4. Gushing of blood<br>5. Fading out of fetal movement<br>6. Other (Specify)_____ |
| 403 | Did you visit health facility for the above illness? | 1. Yes<br>2. No→ go to Q405 |
| 404 | Did you hospitalized for the illness? | 1. Yes<br>2. No |
| 405 | Do you have any chronic disease (history of illness)? | 1. Yes<br>2. No→ end |
| 406 | What chronic disease do you have? | 1. Hypertension<br>2. Diabetic Mellitus<br>3. Cardiac related problem<br>4. Other (Specify)_____ |

| SECTION FIVE: MATERNAL DIETARY DIVERSITY PRACTICES | | |
|---|---|---|
| Now I'd like to ask you about foods and drinks that you ate or drank yesterday during the day or night, whether you ate it at home or anywhere else. Think about all the food you ate yesterday after you woke up in the morning, in the afternoon and at night. | | Yes =1<br>No = 0 |
| 501 | Grains/ white roots/ tubers | _\| |
| 502 | Pulses [beans/ peas and lentils] | _\| |
| 503 | Nuts and seeds | _\| |
| 504 | Milk and milk products | _\| |
| 505 | Meat/ poultry/ fish and organ meat | _\| |
| 506 | Eggs | _\| |
| 507 | Dark leafy green vegetables | _\| |
| 508 | Vitamin A-rich fruits/ vegetables/ roots and tubers | _\| |
| 509 | Other vegetables | _\| |
| 510 | Other fruits | _\| |

| SECTION SIX: ADDITIONAL NEWBORN DATA | | |
|---|---|---|
| 601 | Weight of the newborn | _____ (in mg) |
| 602 | Sex of the newborn | 1. Male<br>2. Female |
| 603 | Hight of the mother in cm | |
| 604 | Wight of the mother at first trimester | |
| 605 | Wight of the mother at second trimester | |
| 606 | Wight of the mother at theerd trimester | |

**የስምምነት መግለጫ ቅጽ**

ስሜ ..... ይባላል፡፡ ማስተዋል ከበደ መስፍን በባህርዳር ዩንቨርሲቲ የድህረ ምረቃ ተማሪና በአሁን ሰዓት በዚህ ሆስፒታል ዉስጥ የመመረቂያ ጥናታቸዉን እየሰሩ ሲሆን እኔም የጥናቱ አጋር

በመሆን ለጥናቱ ከተመረጡ ድህረ ወሊድ አገልግሎት ካገኙ እናቶች ላይ መረጃዎችን እሰበስባለሁ::እናም ስለ ጥናቱ ምንነትና አላማ ገለጻ እንዳደርግሎት እንዲፈቀድልኝ በትህትና እጠይቃለሁ::

**የጥናቱ አላማ**

የዚህ ጥናት ግኝት ለነፍሰ ጡር ሴቶች የ LBW ስርጭትን እና በትውልድ-ትውልድ መካከል ያለውን የተመጣጠነ ምግብ እጥረት ተፅእኖ ለመቀነስ ለነፍሰ ጡር ሴቶች የተለያዩ የአመጋገብ እና የጤና ነክ ፕሮግራሞችን ለማቀድ ከፍተኛ ጠቀሜታ ሊኖረው ይችላል

**የቃለ መጠየቁ አካሄድና የሚፈጀው ጊዜ**

ለምጠይቆት ጥያቄዎች  የምመልሱኝ መልሶች ለጥናቱ እጅግ ጠቃሚዎች ናቸዉ:: መጠይቁን ቃለመጠይቅ በማደርጎት ወቅት እየሞላሁት እሆዳለዉ:: ቃለ መጠይቁ በአማካይ 30 ደቂቃዎች የሚፈጅ ሲሆን ለቃለ መጠይቁ ግዜዎትን እንዲሰጡኝ በማከበር እጠይቃለሁ::

**ጉዳትና ጥቅም**

በጥናቱ በማካፈል የሚደርስብዎ ጉዳት በጣም ጥቂት ነው ማለትም ጥቂት ደቂቃዎችን ብወስድብዎ ነው:: በጥናቱ በመካፈሎዎ የሚያገኙት ቀጥተኛ ክፍያ የለም፤ ነገር ግን የጥናቱ ውጤት  በጤናዉ ዘርፍ ለሚሰሩ ጤና ባለሞያዎች አስፈሊጊ ግብአት ይሆናል::

**ምስጢር ስለ መጠበቅ**

የሚሰጡን መረጃ በሚስጢር ይያዛል:: በቀጥታ እርስዎን የሚገልጽ መረጃ በዚህ ጥናት ዉስጥ አይሰበሰብም:: የጥናቱ ውጤት ጠቅላላ ማህበረሰቡን የሚገልጽ ሲሆን ማንኘውንም ሰው በቀጥታ አያመለክትም:: መጠይቁ ሲሞላ ስምን የማይጨምር ሲሆን የጥናቱ ውጤት በቃልም ሆነ በጽሁፍ ሲገለጽ በምንም መልኩ ተሳታፊዎችን ዋቢ አያደርግም::

**የጥናቱ ተሳታፊ መብት**

በዚህ ጥናት የርስዎ ተሳትፎ በፍጹም ፍቃደኝነት ላይ የተመሰረተ ነው:: በጥናቱ ለመሳተፍ ወይም ላለመሳተፉ ፍቃደኝነትዎን መግለጽ ይችላሉ:: በማንኛዉም ጊዜ መሳተፍ ከወሰኑም ቦኃሀ ማቋረጥ ከፈሀጉም በየትኛውም ሰዓት አቋርጣችሁ መውጣት ትችሊሊችሁ:: በዚህም ማግኘት የሚገባችሁን ማንኛውንም ጥቅም አያሳጣችሁም:: መመሀስ ያሌፈሀጋችሁትን ጥያቄ እንድትመሌሱ አትገደዱም::

**አድራሻ ቢያስፈልጎዎ**

የሚጠይቁት ወይም ማሳወቅ የሚፈልጉት ነገር ካለ ጥናቱን የሚያካሄዱትን ወ/ሮ ማስተዋል ከበደ  በሚከተለዉ አድራሻ ማግኘት ይችላሉ፤ ስልክ ቁጥር +251902506036 ወይም በኢሜል አድራሻ  mastu2007@yahoo.com ማግኘት ይችላሉ::

**ፍቃደኝነት ማሳወቂያ ቅጽ**

መረጃ ቅጹን አንብቤ የጥናቱ አላማ በደንብ ተረድቻለሁ፣ የጥናቱ አካሄድ፣ጥቅምና ጉዳቱ፣ ስለ ሚስጥር አጠባበቅ፣ ስለ ተሳታፍዎች መብት እንዲሁም ጥያቄ ቢኖረኝ አድራሻ ተነግሮኛል፤ግሌጽ ያሌሆነ ነገር ካለ እንድጠይቅ እድል ተሰጥቶኛል፡፡ ተሳታፊዎችም ከጥናቱ ማቋረጥ ቢፈልጉ በማንኛዉም ሰዓት እንደሚቻል እንዲሁም መመለስ ያልፈለጉትን ጥያቄዎች አለመመለስ እንደሚችለ ተነግሮኛል፡፡ ስለዚህ በጥናቱ ለመካፈል እና ለመሳተፍ መፍቀዴን በፊርማዬ አረጋግጣለሁ፡፡

**የተሳታፊዎች መለያ ኮድ :**_____

**ክፍል 1 የእናት ግላዊና ማህበራዊ ገጽታ**

| ተቁ | ጥያቄዎች | **ለምርጫ የቀረቡ ምላሾች** |
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| 101 | እድሜሽ ስንት ነው? | _____(በ ዓመት) |
| 102 | ሃይማኖት | 6. ኦርቶዶክስ<br>7. ፕሮትስታንት<br>8. ሙስሊም<br>9. ካቶሊክ<br>10. ሌላ_____ |
| 103 | መኖሪያሽ የት ነዉ? | 3. ከተማ<br>4. ገጠር |
| 104 | የስራ ሁኔታ | 10. የለኝም( የቤት እመቤት)<br>11. ገበሬ<br>12. ነጋዴ<br>13. ጥቃቅን እና ኣነስተኛ ንግድ<br>14. የመንግስት መስሪያ ቤት ውስጥ ተቀጠጣሪ<br>15. የቀን ሰራተኛ<br>16. ተማረ<br>17. የግል ድርጂት ውስጥ ተቀጠጣሪ |

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| | | 18. ሌላ _____ |
| 105 | የትምህርት ደረጃ | 8. መደበኛ ትምህርት አልተማርኩም<br>9. ኣንደኛ ደረጃ (1-4)<br>10. ኣንደኛ ደረጃ (5-8)<br>11. ሁለተኛ ደረጃ (9-10)<br>12. መሰናዶ (11-12)<br>13. ሰርተፊኬት (10+ (Level I-IV)<br>14. ዲፕሎማ እና ከዛ በላይ |
| 106 | የጋብቻ ሁኔታ | 5. ያገባ<br>6. ያላገባ<br>7. የተፋታ<br>8. ሌላ |
| 107 | ኣማካኝ ወርሀዊ የቤተሰብ ገቢ በ ብር | _____ (ብር) |
| 108 | ምን ያህል ልጆች ወልደሻል? | 6. 1 ይሄ የመጀመሪያ ልጄ ነዉ→ Go to ጥያቄ 110<br>7. ይሄኛዉን ልጅ ጨምሮ ሁለት ልጆች<br>8. ይሄኛዉን ልጅ ጨምሮ ሶስት ልጆች<br>9. ይሄኛዉን ልጅ ጨምሮ አራት ልጆች<br>10. ይሄኛዉን ልጅ ጨምሮ ከአምስት ልጆች በላይ |
| 109 | በአሁኑ እና ከዚህ በፊት በወለድሽዉ ልጅ መሀከል ያለዉ የጊዜ ሌዩነት ምን ያህል ነዉ? | _____ (በወራት) |
| 110 | የእርግዝና ቆይታሽ ምን ያህሌ ነዉ? | _____ (በ ሳምንት) |
| **ክፍል 2** በእርግዝና ወቅት የሚሰጡ የጤና አገሌግልቶችን አጠቃቀም | | |

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| 201 | በእርግዝናሽ ወቅት የጽንስ ክትትል ነበረሽ? | 3. አዎ<br>4. አይ አልነበረኝም→ go to Q20 |
| 202 | የ**201**ኛዉ ጥያቄ መልስሽ አዎ ከሆነ በአጠቃላይ ስንት ጊዜ ክትትል አድርገሽ ነበረ? | 6. አንድ ጊዜ<br>7. ሁለት ጊዜ<br>8. ሶስት ጊዜ<br>9. አራት ጊዜ<br>10. አራት እና ከዛ በላይ |
| 203 | በምን ጊዜ ነበር የእርግዝና ክትትልሽን የጀመርሽዉ? | 1. የመጀመሪያዉ ትራይሚስትር ጊዜ (ከ1-3 ወር ባለ ጊዜ ዉስጥ)<br>2. በሁለተኛዉ ትራይሚስትር ጊዜ (ከ4-6 ወር ባለ ጊዜ ዉስጥ)<br>3 በሶስተኛዉ ትራይሚስትር ጊዜ (ከ7-9 ወር ባለ ጊዜ ዉስጥ) |
| 204 | በእርግዝናሽ ወቅት የደም ማነስ የአይረን ፎሌት እንክብል ወስደሽ ነበር? | 1. አዎ<br>3. አይ → go to Q206 |
| 205 | የ**204**ኛዉ ጥያቄ መልስሽ አዎ ከሆነ ለምን ያህል ጊዜ ወሰድሽ? | 1. ከአንድ ወር በታች<br>2. ለአንድ ወር ጊዜ<br>3. ለሁለት ወር<br>4. ለሶስት ወር<br>5. ለአራት ወር<br>6. ለአምስት ወር<br>8. ለስድስት ወር እና ከዛ በላይ |
| 206 | በጽንስ ክትትልሽ ወቅት ስለ አመጋገብሽም ሆነ ሌሎች ጠቃሚ ምክሮች ተሰጥቶሽ ነበር? | 3. አዎ<br>4. አይ → go to Q 208 |
| 207 | ምን ምን ምክሮች ተሰጥተዉሽ ነበር (ሁሉም | 1. ተጨማሪ ምግቦችን እንድመገብ በተለይም መክሰሶችን እንድወስድ |

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| | የተጠቀሱ መልሶች ይከበቡ) | 2. የተለያዩ አይነት ምግቦችን እንድመገብ<br>3. የአይረን ፎሌት እንክብል እንድወስድ<br>4. የፀረ ትላትል እንክብል እንድወስድ<br>5. ወሳኝ በሚባሉ ጊዜዎች እጄን በዉሀ እና በሳሙና እንድታጠብ<br>6. በቂ እረፍት እንዳደርግ<br>8. ሌላ ካለ ይጠቀስ_____ |
| 208 | በጽንስ ክትትልሽ ወቅት ፀረ ትላትል መድሀኒት ወስደሻል? | 1. አዎ<br>2. አይ |
| 209 | ይሄኛዉ እርግዚናሽ ተፈልጎ የመጣ ነበር? | 1. አዎ<br>2. አይ |
| ክፍል 3. በእርግዝና ወቅት የአመጋገብ ሁኔታ እና ሌሎች ልምዶች | | |
| 301 | በእርግዝናሽ ወቅት የአመጋገብ ሁኔታሽ እነዴት ነበር? | 4. ነፍሰ ጡር ከመሆኔ በፊት እንደነበረዉ ነዉ<br>5. የአመጋገብ ሁኔታየ ተለዉጦዋል እንዲሁም ምግብ የምወስድበት ጊዜ ጨምራል<br>6. የአመጋገብ ሁኔታየ ተለዉጦዋል እንዲሁም ምግብ የምወስድበት ጊዜ ቀንሶል |
| 302 | በእርግዝናሽ ወቅት በቀን ስንት ጊዜ ትመገቢ ነበር ? | _____ (በቁጥር ይጠቀስ ) |
| 303 | በእርግዝናሽ ወቅት ከወትሮዉ የተለየ ተጨማሪ ምግቦች ትጠቀሚ ነበር? | 1. አዎ<br>2. አይ |
| 304 | በእርግዝናሽ ወቅት ከወትሮዉ በተለየ ሁኔታ በቂ እረፍት ትወስጂ ነበር? (ነፍሰ ጡር ከመሆንሽ በፊት ከነበረዉ ጊዜ ጋር ሲነጻጸር) | 1. አዎ<br>2. አይ |

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| 305 | በእርግዝናሽ ወቅት ምግብ በምትወስጂበት ወቅት ሻይ ወይም ቡና ትወስጂ ነበር? | 1. አዎ<br>2. አይ→ go to Q306 |
| 306 | የሻይ ወይም ቡና አወሳሰድ ሁኔታሽ እንዴት ነበር? | 1. ሁልጊዜ<br>2. አንዳንድ ጊዜ<br>3. በጣም አልፎ አልፎ |
| 307 | በእርግዝናሽ ወቅት ጫት ትቅሚ ነበር? | 1. አዎ<br>2. አይ→ go to Q308 |
| 308 | የጫት አቃቃም ሁኔታሽ እንዴት ነበር? | 1. ሁልጊዜ<br>2. አንዳንድ ጊዜ<br>3. በጣም አልፎ አልፎ |
| 309 | በእርግዝናሽ ወቅት አልኮል ትጠጪ ነበር? | 1. አዎ<br>2. አይ→ ወደ ጥያቄ311 ሂድ |
| 310 | የአልኮል አወሳሰድ ሁኔታሽ እንዴት ነበር? | 4. ሁልጊዜ<br>5. አንዳንድ ጊዜ<br>6. በጣም አልፎ አልፎ |
| 311 | በእርግዝናሽ ወቅት ሎሎች እጾችን ትጠቀሚ ነበር? | 1. አዎ<br>2. አይ→ go to Q313 |
| 312 | እጾችን አወሳሰድ ሁኔታሽ እንዴት ነበር? | 4. ሁልጊዜ<br>5. አንዳንድ ጊዜ<br>6. በጣም አልፎ አልፎ |
| 313 | በእርግዝናሽ ወቅት ከወትሮዉ በተለየ ሁኔታ በቂ እረፍት ትወስጂ ነበር? (ነፍአ ጡር ከመሆንሽ በፊት ከነበረዉ ጊዜ ጋር | 1.አዎ<br>2 አይ |

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| | ሲነጻጸር) | |
| 314 | በእርግዝናሽ ወቅት የነበረውን የስራ ጫና እንዴት ትገልጪዋለሽ | 1 አነስተኛ የስራ<br>2 መጠነኛ<br>3 ከፊተኛ የስራ ጫና |
| 315 | በእርግዝናሽ ወቅት የነበረውን የስራ ጫና እንዴት ትገልጪዋለሽ ነ በተለያዩ የቤት ውስጥ ስራ እና የእለት ተእለት የስራ ሁኔታ የነበረሽ ተሳትፎ እንዴት ነበር ከእርግዝናሽ በፊት ሲነጻጸር | 1 ተመሳሳይ ነው<br>2 ቀንሰዋል<br>3 ጨምርዋል |
| ከፊል አራት : በእርግዝና ወቅት ስለነበረ የጤና ሁኔታ | | |
| 401 | በእርግዝናሽ ወቅት ህመም ወይም የጤና እክል ገጥሞሽ ነበር? | 3. አዎ<br>4. አይ→ ወደ ጥያቄ 405 ሂድ |
| 402 | ለጥ.ቁ 401 መልስሽ አዎ ከነበረ በእርግዝናሽ ወቅት ምን አይነት የጤና እክል ገጥሞሽ ነበር? | 7. Dizziness , headache and fatigue<br>8. Blurred vision<br>9. Edema of the leg<br>10. Generalized edema<br>11. Abnormal vaginal gushing of fluid<br>12. Gushing of blood<br>13. Fading out of fetal movement<br>14. Other (Specify)_____ |
| 403 | በእርግዝናሽ ወቅት ላጋጠመሽ የጤና እክል ወደ ጤና ተቆም ሄደሽ ነበር? | 3. አዎ<br>4. አይ→ ወደ ጥያቄ 405 ሂድ |
| 404 | በእርግዝናሽ ወቅት ላጋጠመሽ የጤና እክል ሆስፒታል ተኝተሽ ነበር? | 3. አዎ |

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| | | 4. አይ |
| 405 | የቆየ ወይም ተላላፊ ያልሆነ ህመም አለብሽ? | 3. አዎ<br>4. ኤይ |
| 406 | ለጥ.ቁ 405 መልስሽ አዎ ከሆነ ተላላፊ ያልሆነ ህመም አለብሽ? | 1. የደም ግፊት<br>2. የስኮር ህመም<br>3. ከልብ ጋር የተያያዙ ህመሞች<br>5. ሌላ ካለ ይጠቀስ_____ |

## SECTION FIVE: MATERNAL DIETARY DIVERSITY PRACTICES

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| Now I'd like to ask you about foods and drinks that you ate or drank yesterday during the day or night, whether you ate it at home or anywhere else. Think about all the food you ate yesterday after you woke up in the morning, in the afternoon and at night. | | Yes =1<br>No = 0 |
| 501 | Grains/ white roots/ tubers | _\| |
| 502 | Pulses [beans/ peas and lentils] | _\| |
| 503 | Nuts and seeds | _\| |
| 504 | Milk and milk products /ወተት አና የወተት ተዋእ | _\| |
| 505 | Meat/ poultry/ fish and organ meat | _\| |
| 506 | Eggs /እንቁላል | _\| |
| 507 | Dark leafy green vegetables | _\| |
| 508 | Vitamin A-rich fruits/ vegetables/ roots and tubers | _\| |
| 509 | Other vegetables /ሌላ አትክልቶች | _\| |
| 510 | Other fruits /ሌላ ፍራፍሬዎች | _\| |
| 511 | ዋና ምግብሽ ምንድን ነው? | 1 የጤፍ እንጀራ እና ወጥ |

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| | | 2 በቆሎ እና ማሽላ<br>3 ፓስታ እና ሩዝ<br>4 አትክልት/ፍራፍሬ<br>5 ሌላ |
| 512 | በእርግዝናሽ ጊዜ ከወትሮ በተለየ ተጨማሪ ምግብ ትመገቢ ነበር? | 1 አዎ<br>2 አይ |
| 513 | ከእርግዝና በፊት በቀን ምን ያህል ጊዜ ትመገቢ ነበር? | 1 ሁለት ጊዜ<br>2 ሶስት ጊዜ<br>3 አራት ጊዜ<br>5 ከ አምስት ጊዜ በላይ |
| 514 | በእርግዝናሽ ጊዜ በቀን ምን ያህል ጊዜ ትመገቢ ነበር? | 1 ሁለት ጊዜ<br>2 ሶስት ጊዜ<br>3 አራት ጊዜ<br>5 ከ አምስት ጊዜ በላይ |
| 515 | በ እርግዝና ወቅት የሚከለከል ምግብ አለ? | 1 አዎ<br>2 አይ ወደ 518 |
| 516 | አዎ ካሉ ጥያቄ 515ን ምን አይነት ምግቦች ? | 1 የወተት ተዋእ(ወተት፣እርጎ)<br>2 ስጋ እና የስጋ ውጤቶች<br>3 ፍራፍሬዎች(ፓፓያ)<br>4 የአትክልት አይነቶች<br>5 ሌላ |

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| 517 | እነዚህ ምግቦች በእርግዝና ጊዜ ለምን ይከለከላሉ? | 1 በባህላዊ ምንገድ<br>2ህጻኑ ትልቅ ሆኖ በ ምጥ ጊዜ እንዳያስቸግር<br>3 ጽንሱ እንዳእቛረጥ<br>4 አላውቅም<br>5 ሌላ_____ |
| 518 | በእርግዝና ወቅት ትጾሚያለሽ? | 1 አዎ<br>2 አይ |
| 519 | ጥያቄ 518 አዎ ከሆነ በጾም ወቅት የሚከለከሉ ምግቦች የትኞቹ ናቸው? | 1 የወተት ተዋእ(ወተት፡እርጎ)<br>2 ስጋ እና የስጋ ውጤቶች<br>3 እንቁላል<br>4 አሳ<br>5 ሌላ_____ |

| ክፍል ስድስት: ተጨማሪ ስለ ህጻኑ መረጃ | | |
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| 601 | የህጻኑ ኪሎ | _____ (በግራም) |
| 602 | የህጻኑ ጾታ | 3. ወንድ<br>4. ሴት |
| 603 | የእናት ቁመት | _____ |
| 604 | የእናት ክብደት በአንደኛ ትራይሚስተር | |
| 605 | የእናት ክብደት በሁለተኛ ትራይሚስተር | |
| 606 | የእናት ክብደት በሶስተኛ ትራይማስተር | |