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College of Medicine and Health Sciences

Department of Midwifery

Magnitude of Low Birth Weight and Its Associated Factors Among newborns In Attat Hospital, Southern Ethiopia

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Wolkite Ethiopia

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DECLARATION

We here declare that, this is our original work and has not been presented for degree in any other university and all source of material used for this thesis have been fully acknowledged.

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WOLKITE UNIVERSITY

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ADVISOR'S APPROVAL PAPER

This is to certify that the thesis entitled "M**agnitude Of Low Birth Weight And ItsAssociated Factors Among Newborns In Attat Hospital,Southern Ethiopia,** submitted in partial fulfillment of requirements for degree of bachelor in MIDWIFERY, undergraduate program and has been carried out by SEID JEMAL AND KEYREDIN Under our supervision. Therefore, we recommend that the students have fulfilled the requirements and hence, here by submit the thesis to the department.

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Acronyms and Abbreviations

ANC	Ante natal care
BMI	Body Mass Index
BSC	Bachelor science
EDHS	Ethiopian Demographic and Health Survey
ELBW	Extremely Low Birth Weight
GA	Gestational Age
ICCM	Initiative, and Integrated Community Case Management
IFA	Iron and Folate
IMNCI	Integrated Management of Newborn and Childhood Illness
LBW	Low Birth Weight
MUAC	Mid upper arm circumference
NBC	Newborn Corner Initiative
NICU	Neonatal Intensive Care Unit
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations International Children's Emergency Fund
WHO	World health organization
WKU	Wolkite University

Abstract

Background: Globally, WHO estimates that about 30 million low birth weight babies are born annually (23.4% of all births), and they often face short and long-term health consequences. Efforts were made to reduce low birth weight worldwide; however, it remains a global public health problem especially in sub-Saharan Africa. Furthermore, LBW is a risk for inter-generational assaults of malnutrition as it is the risk for sub optimal growth until adulthood, affecting women's and male's reproductive capabilities. **Objectives**: This study is aimed to assess the magnitude of low birth weight and its associated factors among newborns in Attat Hospital Southern Ethiopia, 2021

Methodology: Institution based cross sectional study was conducted from June15, 202 to July 15, 2021 in Attat hospital on 283 mothers/baby pairs who delivered during the study period selected by using a simple random sampling technique. Data was collected by using a pretested interviewer-administered questionnaire; entered and analyzed by using **SPSS** version 21. Factors with p-value < 0.2 in bivariate analysis were entered in to Multivariable logistic regression and finally statistical significance was considered at p-value < 0.05 with a 95% Confidence Interval (CI).

Result: In this study, the prevalence of low birth weight was 18.1%. Maternal age <20 years (AOR: 3.78, 95% CI, 1.02–13.97), rural residence (AOR: 3.49, 95% CI, 1.48–8.24), having antenatal care follow-up (AOR: 3.79, 95% CI, 1.08–13.23), gestational age <37 weeks (AOR: 3.82, 95% CI, 1.55–9.42), and history of LBW (AOR: 3.37, 95% CI, 1.17–9.72) were significantly associated with low birth weight.

Conclusion and Recommendations: The proportion of LBW in this study is comparable to the estimated global prevalence. Maternal age, residence, antenatal care, gestational age, and previous history of LBW were significantly associated variables with low birth weight. Therefore, special attention should be given to antenatal care services and preventive strategies for preterm delivery

1. Introduction

1.1 Background

The low birth weight (LBW) rate is an indicator of a public health problem that includes long-term maternal malnutrition, ill health and poor health care at population level during pregnancy. On an individual basis, it is an important predictor of newborn health and survival [1, 2].

LBW is defined by the World Health Organization (WHO) as weight at birth of less than 2,500g irrespective of the gestational age. It can be resulted from preterm birth (birth before 37 completed weeks) or small for term gestation (intra uterine growth restriction) or preterm as well as small for gestational age [3, 4].

Epidemiologically, term LBW is mostly the problem of developing countries which is highly linked to low socioeconomic status and poor health care during pregnancy. While, LBW related to preterm birth is the problem of developed countries and usually related to congenital anomaly [5].

Globally, WHO estimates that about 30 million low birth weight babies are born annually (23.4% of all births), and they often face short and long-term health consequences [3]. According to the Ethiopia Demographic and Health Survey (EDHS) 2016, the prevalence of LBW in Ethiopia based on women's self-report is reported to be 13% [1].

There is high health related costs among families of LBW baby [6]. LBW is closely associated with fetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life [3]. Mainly, LBW babies experience more morbidity, both in the short and long term. Among these, respiratory distress, sleep apnea, heart problems, jaundice, anemia, chronic lung disorders, mental retardation, and cerebral palsy are the morbidities related to LBW newborns [7, 8].

Numerous factors affect the duration of gestation and fetal growth, which in turn affects the birth weight. Those factors which cause LBW are related to the fetus, the mother, or the physical environment or combination of such factors [3, 9, 10].

LBW is a multifactorial problem. According to different studies; maternal age of <20years, maternal body mass index (BMI) <18.5), pregnancy interval of <2years, gestational age of <37weeks, no formal education, and being unmarried were found to be the significant predictors of LBW [9, 10].

Review conducted by Bililign N. (2018) states Socio-demographic (maternal education level, occupation, income and place of residence), maternal/obstetric (maternal age, antenatal care visit, maternal weight and stature, preterm birth and parity), obstetric and medical disorders during pregnancy (hypertensive disorders of pregnancy, anemia and malaria) and fetal factors (infant sex and congenital malformations) are the common risk factors for low birth weight in Ethiopia [11].

Avoiding preventable factors of LBW is important to reduce the magnitude of LBW. Whereas, fully integrated appropriate neonatal and post neonatal medical and nutritional care for pre-term and small for gestational age infants are vital strategies to prevent morbidities and mortalities related to non-avoidable risk factors of LBW [5].

1.2 Statement of the problem

Globally, WHO estimates that about 30 million low birth weight babies are born annually (23.4% of all births), and they often face short and long-term health consequences [3,4]. The pooled prevalence of newborn babies' low birth weight measured at birth in Sub-Saharan Africa was 9.76%, with a 95% confidence interval from 9.63% to 9.89%. The highest LBW was recorded in Ethiopia, 16.21%, with its 95% confidence interval of 14.71 to 17.83 [12].

According to several studies individual and contextual factors attributed to the occurrence of LBW, as the age of the mother increased the odds of low birth weight were decreased. The odds of LBW among mothers age 20–29, 30–39 and 40–49 were decrease by 25% (AOR = 0.0.75, 95% CI: 0.71, 0.80), 24% (AOR = 0.076, 95% CI: 0.71, 0.82), and 14% (AOR = 0.86, 95% CI: 0.78, 0.95) than mothers aged 15–19 years, respectively [24–26]. This could be attributed to problems of child marriage and malnutrition in adolescent girls in Africa [13].

Similarly, some women and husbands' education levels are associated with decreased odds of LBW than uneducated women and men. [14,15]. Furthermore, middle, rich wealth status, those who had occupation associated with a reduced probability of LBW compared to the poor and those who had no occupation, respectively [14,16,17].

The odds of LBW for multiparous and birth intervals (above 24 months) were reduced than primiparous women, thus most of the pregnancy-related symptoms diminished as the parity and gravidity increased, which could impact the nutritional status of women in addition, strengthening of focused ANC follow up for primiparous mothers, counseling, and nutritional help [18].

Several studies showed one or more antenatal care (ANC) visits were associated with reduced odds of LBW compared to those who had no follow-ups which is packaged with clinical evaluations, provision of therapy, and recognition of danger signs, and iron supplementation [12].

Study conducted on intimate partner violence on birth outcome stated divorced and separated women have poor psychological and social support, which could impact adverse birth outcomes. Moreover, a mother who has poor marital relationships may experience intimate partner violence that leads to premature rupture of membrane and onset of preterm labor [19].

WHO Report in 2004 in Geneva stated, mothers' body composition during conception, pre-conception BMI and maternal nutrition during pregnancy including life style (substance or drug abuse), maternal short stature, residing at high altitudes, congenital anomalies, genetic factors and medical disorders during pregnancy including hypertensive disorders were risk factors of LBW babies[20, 21].

LBW is considered as the single most important predictor of infant mortality especially of death within the first month of life. It is also a significant determinant of infant and childhood morbidity, particularly of neurodevelopment impairment such as mental retardation and learning disabilities; therefore, being low birth weight is associated with fetal and neonatal morbidity and mortality, impairment of growth and development and also chronic disease later in life. Half of all prenatal and one third of all infant death are directly or indirectly related to LBW. It was approximated that every ten seconds an infant die of low birth weight related diseases [22, 23].

Affordable, accessible, and appropriate health care services are significant for preventing and treating LBW. But, little attention is paid to birth weight improvement as a means of reducing child mortality in most developing countries including Ethiopia. The government of Ethiopia is striving to reduce neonatal mortality by setting targets through establishing intervention at facility and community levels such as Integrated Management of Newborn and Childhood Illness (IMNCI), Newborn Corner Initiative (NBC), Neonatal Intensive Care Unit (NICU) Initiative, and Integrated Community Case Management (ICCM) [10]. Despite such initiatives have been undertaken by the government of Ethiopia and support bodies, neonatal mortality is sustained to be a great challenge [1, 10].

These study were conducted in Gurage zone public hospital on which study on magnitude of low birth weight and its predictors were not available, studies in other parts of Ethiopia cannot represent a current study area because most of studies were facility based and the results of the studies were inconsistent; factors that had an association in some studies may be had no association in other studies and vice-versa plus difference in socio-cultural, and health-seeking behavior across the regions.

1.3. Significance of the study

To achieve the targets of reducing child mortality of the Sustainable Development Goals (SDGs)-2030, it is necessary to generate adequate evidence on the magnitude of low birth weight and associated factors to contribute to the development of timely interventions

There are various studies done on the LBW; despite the studies LBW is still the great issue for newborn mortality, so this study will help to determine prevalence and factor associated with low birth weight. By doing this it helps to provide solution for problem and helps to achieve Sustainable Development Goals by reducing child mortality rate.

The study will provide information to understand the current situation, increase attention to low birth weight in Ethiopia and to inform dialogue and action among stakeholders. Data can be used to identify the most important risk factors to target and gaps in care in order to identify and implement solutions for improved outcomes. In addition findings from this study will provide baseline data for further researches and intervention on the magnitude and associated factors of low birth weight.

Finally, the study may be useful to policy makers and researchers as reference material while conducting further studies on similar problems and Identification of maternal risk factors associated with LBW is also essential in order to guide program planning, and organizing care for mothers and their newborns. It is expected that identifying those risk factors will enable to reverse the increasing trend of LBW in Ethiopia particularly in Attat hospital and there by its immediate and long term consequences

2. Literature Review

2.1 Magnitude of low birth weight

According to the UNICEF and EDHS reports the prevalence of LBW in Ethiopia estimated to be 15% and 11%respectively [3, 1]. Additionally, different epidemiological studies showed 11.2%, 14.6%, 17.1%, 18%, 28.3% and 22.5% prevalence's of LBW in different parts of the country [10, 24-27]. Similar findings were reported in studies done in Kenya (12.3%), Tanzania (13.6% & 14%), Central Africa (9%-23%) and Chennai (25.8%) [14, 28-31]. Higher prevalence of low birth weight was reported in a study conducted in Nigeria (45%) [32]. the difference is due to inclusion of only malaria patients in the Nigerian study.

Neonatal morbidity and mortality, particularly relating to the LBW babies is still unacceptably high in the Sub-Saharan including Ethiopia. LBW was associated with increased odds of perinatal mortality in some regions of Ethiopia [33]. In Ethiopia, 15% of babies were reported to be LBW in 2000[24]. In 2011, the prevalence decreased to 11%.However only 5% of children were weighed at birth [1]. In Ethiopia, in 2014, there were 27,243 deaths due to low birth weight accounting 4.53% of the total deaths [34].

Descriptive studies conducted in Gondar Tigray region and Jimma zone of Ethiopia reported 11.2%, 14.6% and 22.5% prevalence of low birth weight respectively [14, 28-31]. Another cross-sectional studies conducted in University of Gondar referral hospital reported that the prevalence of low birth weight was 17.1% [23]Cohort studies showed 18% and 28.3% prevalence of low birth weight in Ethiopia [31,32].

The global prevalence of LBW is 15.5% which amount to 20 million LBW infant born each year's 96.5% of them in developing countries. Half all LBW babies are in south central Asia where 27% are all 2500 g at birth [35]. In India, the prevalence of LBW infant is about 33%: as compared to 4.5% in industrialized developed countries. In 2011, India statically institute reported nearly 20% of newborn have LBW is in India [36-38].

In Iran, two thirds of mortality among infant in first 24 hours after birth happen in weight in how weight newborn infant as well. Since last two decades, the rate of low birth

weight infant has decreased [39]. Every year, over 20 million ORV (in world 15.5%) newborn infant in the world are born with low weight. This rate is 7% in developed countries, 16.5% in less developed or developing countries. A research has shown the prevalence of LBW in Iran is 11.56% in 2003 and 8% in 2007. This rate was reported in Istahan In sub-Saharan Africa the level of LBW is estimated about 15%.Most of babies Africa at risk of being born preterm. The situation is different for south Asia where rate of LBW is almost twice that of Africa but majority of LBW babies are term babies who are small for gestational age. Preterm babies have a higher risk of death compared to full term babies [40].

The prevalence of LBW in Kenya is estimate at 11% by WHO and UNICEF. The Kenya Demographic Health Survey of 2009 estimates LBW to be 6%. The LBW is major cause of morbidity and mortality in Kenya [41].Data on incidence of LBW worldwide regularly collected by WHO revealed the incidence of LBW range from 7%in Ethiopia 14%in Africa and 31%in Middle East Asia [42].

Information on associated factor of LBW in Ethiopia is scarce. But different study finding were documented at different time and place on prevalence of LBW. Study conducted on birth weight in Addis Ababa and Gondar town document the prevalence of LBW to 9.4% in Addis Ababa and 13.4% in Gondar [43]. In 1998 the average prevalence of LBW in twelve health institution in Gondar administrative zone was reported to be 11.1% [44]. Another study conducted to determine prevalence of LBW in all hospital in Addis Ababa reported at rate of 12.6% and 8.1% in 1972 and 1982 respectively. In1985 the incidence of LBW in Tikur Anbesa Hospital was 12.4%, while in Desire Hospital was 7.2% [45].

2.2 Risk factors of low birth weight

Different descriptive and analytical studies showedthe common risk factors for low birth weight in Ethiopia are preventable causes. In this review, the risk factors for low birth weight are categorized as socio-demographic factors, maternal and other obstetrical factors, hypertensive disorders of pregnancy and other medical disorders during pregnancy, fetal factors and environmental factor

2.2.1 Socio-demographic risk factors

Some epidemiological studies conducted in Ethiopia showed association of socio-demographic factors with LBW. Deprived socio-economic status can increase the incidence of LBW. In-depth analysis of the 2016 EDHS revealed maternal literacy level, paternal educational status and presence of radio/television in the household were predictors of LBW [1].

According to the 2016 EDHS, low birth weight was more common among children of the youngest mothers, age less than 20 (13%) and older mothers, age 35-49 (17%), and children of birth order six and above (16%). In Amhara region, 28% of babies reported to be small and the factors associated with LBW were place of residence, educational status and economic status [46].

Another case-control study in Oromia regional state of Ethiopia showed monthly income <26 United States Dollar (USD), lack of formal education and being merchant were associated with LBW [9]. Mothers residing in rural areas were also more likely to have small babies than their urban counterparts [26, 29].

Observational cohort studies conducted in Southern, Oromia regions of Ethiopia highlighted maternal illiteracy, and poverty and longer time to walk to the nearest health facility were predictors of LBW infants [18, 47].

One Tanzanian study showed maternal educational status and marital were associated with LBW [31]. Additionally, different systematic reviews and meta-analyses revealed deprived socio-economic status (educational level, occupation, income, marital status and extremes of maternal age) as risk factors for LBW in developing countries [29, 48-50]. Another review also noted socio-demographic deprivation was associated with adverse birth outcomes [51]. This might be an indication of empowering women through education and work opportunities.

2.2.2 Maternal and other obstetric risk factors

In Ethiopia, different studies showed that, obstetric characteristics of mothers play a role on occurrence of LBW. Prim-parity, short maternal stature, Maternal thinness, history of preterm birth, maternal age during delivery, Maternal Mid Upper Arm

Circumference (MUAC) and lack/infrequent of antenatal care follow-up were factors associated with LBW [25,47].

A cohort study conducted in Kersa district showed maternal body mass index <18 kg/m2, maternal height <1.5 m and inter-pregnancy interval <2 years were predictors of LBW [26]. A prospective study done in southwest Ethiopia showed unwanted pregnancy as risk factor for LBW [27].

Epidemiologic studies conducted in Mettu karl and University of Gondar referral hospitals of Ethiopia showed association of Hypertension during pregnancy(HDP) with LBW [10,24,28]. Additionally, LBW was significantly associated with anemia during pregnancy [34], presence of any medical illnesses [3, 24], being HIV positive 20] and prenatal depression [21].

In a study conducted from Tigray region and Gondar University referral hospital History of preterm delivery, current preterm baby were factors associated with LBW [3, 22]. Maternal age at delivery (less than 20 years) was also associated with LBW [3, 10].

Cross-sectional studies in Kenya and Tanzania showed significant association of LBW with previous history of low birth weight infant, premature rupture of membrane, preterm delivery, BMI and ANC visit [14, 31].

One study conducted in Tanzania noted preeclampsia/ Eclampsia, thromboembolic diseases, antepartum hemorrhage (placenta previa and abruption placenta) and tuberculosis were associated with increased odds of low birth weight [31]. Anemia [29,31,44-46] and malaria [32,33,35,45] during pregnancy were also highly associated with risk of LBW. Another systematic review revealed depression as risk factor for LBW [48]. Vasoconstriction resulted from activation of thromboxane A2 is believed to decrease utero-placental perfusion and subsequent occurrence of IUGR during hypertensive disorders of pregnancy [26]. Early recognition and management of complications during prenatal period is important.

Other systematic reviews by Kramer [48] and Özaltin et al. [52] identified pre-pregnancy maternal weight, parity, gestational weight loss/deprived caloric intake

and maternal short stature as risk factors for LBW. Micronutrient and folic acid supplementation and physical activity duringpregnancy were associated with increased birth weight [49, 53].

The total weight gain recommended for healthy pregnant women is 25 to 35 lb. Underweight women may gain up to 40 lb [54]. This indicates the need of prenatal care and nutritional supplementation during pregnancy.

2.2.3 Fetal risk factors

A prospective cohort study conducted in Sidama zone of Ethiopia revealed female sex of a newborn as risk factor for LBW [47]. Cohort studies conducted in Mekelle and Mettu showed LBW was significantly associated with congenital malformations or other adverse fetal outcomes [55, 56].

Additionally, Systematic review of case-control studies showed association between periodontal diseases with low birth weight [57]. A cross-sectional study in Kenya [14] and one review [48] showed significant association of infant sex with LBW. This may be due to the effect of Y-chromosome on weight of male fetus. Genetic screening to detect heterozygotes in the non-pregnant and, if not already evaluated, in the pregnant population is appropriate [54].

2.2.4 Environmental and life style risk factors

A case-control study conducted in Bale zone of Oromia regional state revealed using firewood/ kerosene for cooking wash hands with water only and not having separate kitchen room were risk factors for LBW [9]. Mother's experience of physical violence or intimate partner violence during pregnancy had LBW newborns [20, 28]. Lack of social support during pregnancy was also associated with low birth weight [21]. History of khat chewing was associated with LBW in one study [10].

A meta-analysis of determinants of LBW highlighted cigarette smoking, alcohol consumption, tobacco chewing and in utero exposure to diethylstilbestrol as predictors of LBW in developing countries [35]. Use of psychoactive substances (i.e., smoking) during pregnancy is associated with increased small size for gestational age as well as increased prematurity rate. The higher perinatal mortality rate associated with use of

these substances is attributable to intrauterine growth restriction [48]. This could be an indication for health education to pregnant mothers about the effects of substances to the fetus.

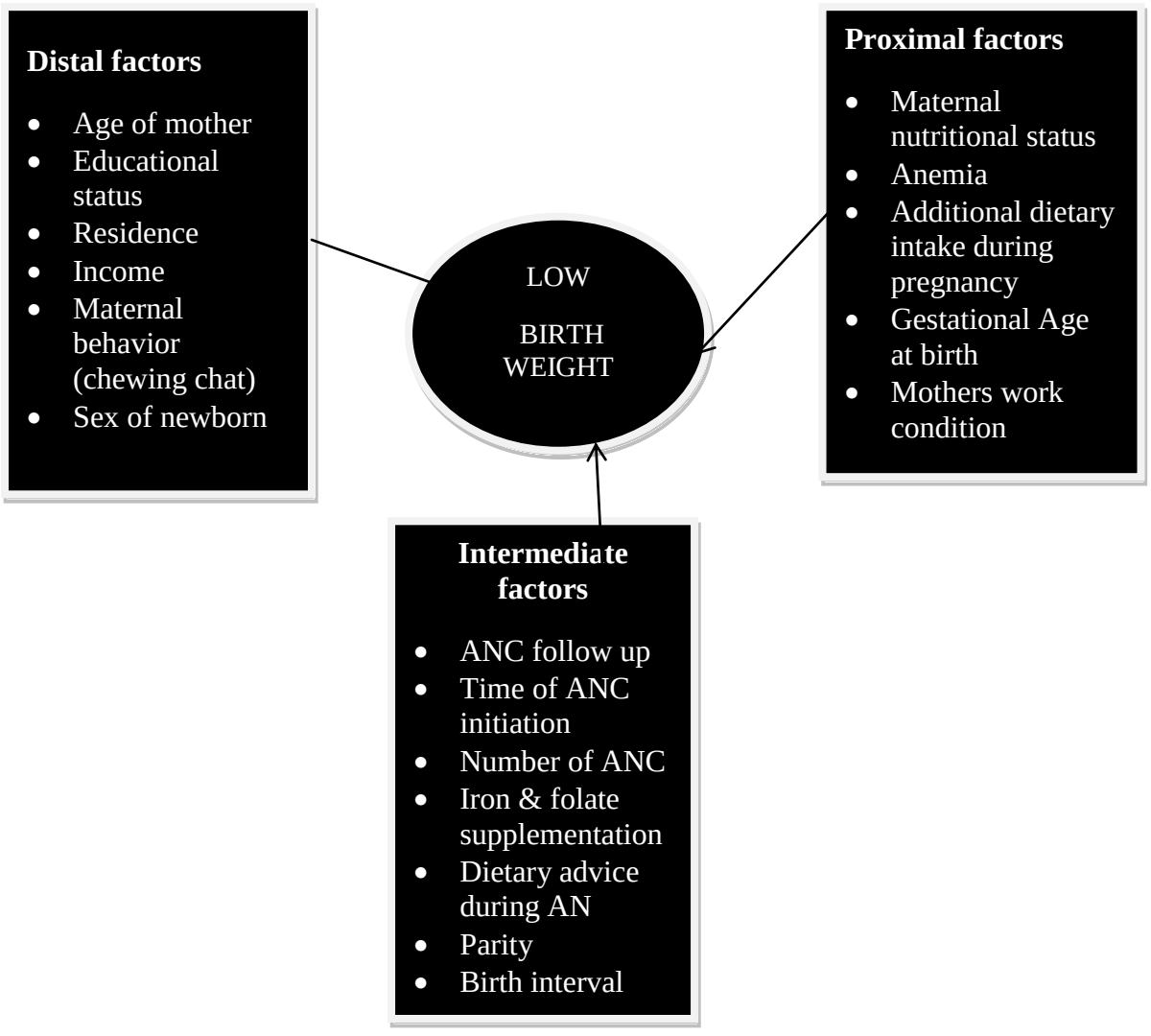


Figure1. Conceptual frame work for occurrence of low birth weight and its determinants

3. Objectives

3.1 General Objectives

- ✓ To assess magnitude and factor associated with low birth weight among newborn in Attat Hospital Southern Ethiopia, June15, 202 to July 15, 2021.

3.2. Specific Objectives

- ✓ To determine the magnitude of low birth weight among newborn at Attat Hospita,
- ✓ To identify factor associated with LBW among newborn at Attat Hospital,

4. Methods

4.1 Study period and Area

The study was conducted in Gurage zone, Attat hospital, about 187km south west of Addis Ababa along the Jimma road in the southern region of Ethiopia from June 15, 2021 to July 15, 2021. The hospital has been operating since 1969.The hospital provides services to both inpatient and outpatients. The hospital is serving approximately more than 500,000 peoples and had over 65 beds. In addition, there are 48 beds in the maternity waiting area, 13 beds in the nutrition rehabilitation unit, 3 labor beds and 2 delivery beds that are often used as over flow beds

4.2 Study Design

Institution based cross-sectional study design was used to conduct the study among mothers along with newborn in postnatal ward in Attat hospital.

4.3 Source Population

The source population was all neonates with their index mother pairs delivered in Attat Hospital.

4.4 Study Population

The study population was all eligible neonates with their index mother pairs delivered in Attat Hospital during data collection time (June 15, 2021 to July 15, 2021).

4.5 Study Unit

All singleton newborn with mothers delivered in Attat hospital during data collection time.

4.6 Inclusion Criteria

All singletons live born in postnatal ward during study period will in include in study.

4.6.Exclusion Criteria

Newborn babies whose mother suffered from severe medical or surgical condition, newborn with congenital abnormalities, and unknown last menstrual period with absent ultrasound evidence were excluded from the study.

4.7 Sample Size Determination and Procedure

4.7.1 Sample size determination

A single population proportion formula was used to identify sample size at 95% confidence level and a margin of error of 5%. The proportion of LBW was taken to be 21.23% from a facility based study in Bahir Dar [58]. The final sample size after adding 10% non-response rate was 283.Simple random sampling technique was used to select the study participants.

$n= (Z)^2(p(1-p))/w^2$ where n - is desired sample size

Z- Is standard distribution

P - Population proportion

W - Marginal errors

$n= (Z\alpha/_2)^2\, p(1-p)/w^2$

$$n = \frac{(1.96)^2(0.2123)(1-0.2123)}{(0.05)^2}$$

n = 256.9

n= 257

Since the non-respondents of 10% were added to calculate sample size

n = 10%×257=25.7

n = 257+25.7

n = 282.7 ≈ n = 283

4.7.2 Sampling Procedure

All mothers delivered singleton baby during the study period were included in the study. A simple random sampling technique was used with in all study until required sample size was obtained and the next participant was used for those selected participants who failed to fulfill the inclusion criteria.

4.8 Study Variables

4.8.1 Dependent Variables

Low birth weight

4.8.2 Independent Variables

Socio-demographic characteristics of mother include maternal age, Family income, maternal educational status, maternal occupation, maternal residence, maternal nutrition, maternal behavior and neonatal factors. The another Maternal and obstetrics characteristics and factor associated with low birth, Parity, Birth interval, History of low birth weight, Number of ANC visit and additional factor that associated with low birth weight are Characteristics of newborn such as sex of newborn, Gestational age ,and birth weight.

4.9 Operational Definition

- Birth Weight: - The first weight of the newborns, which was measured within 24 hours of birth.
- LBW:- Birth weight < 2500 grams[1]
- Gestational Age: - The duration of pregnancy from conception to delivery, which was determined by last menstrual period or ultrasound evidence.
- Pregnancy Complications: - Health problems that occur during pregnancy (antepartum hemorrhage (APH), premature rupture of membrane (PROM), pregnancy-induced hypertension (PIH), etc.).
- Anemia During Pregnancy:- Hemoglobin (Hb) level <11g/dl.[59]

- Dietary Counseling: - Nutrition related advice provided to pregnant mothers by the health professionals.

4.10 Data Collection Instruments and Techniques

4.10.1 Data Collection Instrument

Data was collected by using structured interviewer administered questions. The questions were prepared by English and translate in to Amharic and translated back to English to check consistency. The questionnaire was developed after reviewing different literatures on development of valid instruments for low birth weight and associated factors in facility level [12].

4.10.2 Data Collection Techniques

Data was collected by interviewing mothers by trained data collectors through Amharic language translated structured questionnaire and reviewing neonates' medical records for Birth weight after mothers who give birth.

4.11 Data Quality Control

The quality of data was ensured during collection, coding, entry, and analysis. The discussion was done among the data collector to prevent confusion and misunderstanding about study. Each mother was interviewed and the card was checked for consistency, provision of full information and appropriate documentation. The data collectors were instructed to write the code for the privacy of information on the checklist during data collection, so that any identified errors was traced back by using code. The filled checklist was check for completeness by data collector and supervisor daily. Finally problems encountered were discussed among team and solved immediately.

4.12 Data Processing and Analysis

The collected data were cleared, checked, analyzed and processed by using Statistical Package for Social Sciences (SPSS) Version 21 before reported finally the counted result of analyzed and processed data were presented by using tables, graphs and texts.

4.13. Ethical Considerations

Formal letter of ethical clearance for permission was obtained from the Wolkite University Faculty of Medicine and Health Science department of midwifery and

Research committee to conduct study. Further permission was obtained from Attat hospital. The confidentiality was kept during data collection by data collector. Client's identification was not recorded; in place of name codes were used to maintain confidentiality of clients.

5. Result

5.1Socio-demographic Factors of Respondents

A total of 271 newborn/mother pairs were participated in the study, which makes a response rate of 96%. The mean age and standard deviation of the mothers were 28.5 ± 3.2 years, and 89.7% were age groups from 20–34 years. The majority of mothers (47.6%) were Orthodox in religion. Nearly hundred percent of the mothers (98.2%) were married, 52% were rural residents, 41% of the mothers were merchants and 29.5% have family monthly income of 620 ETB. Regarding maternal educational status, 10.3% of the respondents were unable to read and write (**Table 1).**

Table1.Socio-Demographic, Factors of Mothers in Attat Hospital, Ethiopia, June15-July 15, 2021 (N=271)

Variables	Frequency	Percentage (%)
Age of the mother		
<20	3	1.1
20–34	243	89.7
35–49	25	9.2
Marital status		
Single	5	1.8
Married	261	98.2
Maternal educational status		
Not read and write	28	10.3
Read and write	88	32.5
Primary education	75	27.7
Secondary & above	80	29.5
Mothers occupation		
Merchant	111	41
Government employed	46	17
House wife	86	31.7
Farmer	28	10.3

Religion		
Orthodox	111	41
Protestant	51	18.8
Muslim	107	39.5
Other*	2	0.7
Family income per month		
≤620ETB	80	29.5
621-1500ETB	64	23.6
1501-3000ETB	59	21.8
≥3001TB	68	25.1
Residence		
Urban	130	48
Rural	141	52

Others*(traditional)

5.2 Maternal Medical and Reproductive Characteristics

Ninety nine (36.5% respondents were primiparous, and the majority (61.3%) of mothers had a birth interval of ≥ 24 months. Two hundred twenty-seven (83.8%) of the pregnancies were wanted and planned, and 38 (14%) had current pregnancy complications with majority of 20(54.1%) presented with premature-rupture of membrane (PROM). Thirty (11.1%) of respondents had a history of LBW, 249 (91.9%) had ANC follow up, and 241 (88.9%) had taken iron and folic acid (IFA) supplementation during pregnancy. Additionally, 4.4%, 6.6%, and 6.3% of mothers had anemia, malaria, and sexually transmitted infections during pregnancy, respectively **(Table 2).**

Table 2 Maternal Medical and Reproductive Characteristics in Attat Hospital, Ethiopia, June15-July 15, 2021 (N=271)

Variable	Frequency	Percentage (%)
Parity		
1-2	99	36.5
3-5	153	56.5
≥6	19	7
Birth interval (in months)		
≤ 24	46	17.3
> 24	167	61.3
Desirability of pregnancy		
Yes	227	83.8
No	44	16.2
Current pregnancy complication		
Yes	38	14
No	233	86
Types of pregnancy complication		
APH	8	21.6
PROM	20	54.1
PIH	10	26.3
History of LBW		
Yes	30	11.1
No	241	88.9
Chronic medical illness		
Yes	7	2.6
No	264	97.4
Types of chronic medical illness		
TB	4	57
HIV	1	14.3
DM	2	28.7
Malaria during pregnancy		
Yes	18	6.6
No	253	93.4
STI during pregnancy		
Yes	17	6.3
No	254	93.7
Anemia during pregnancy		
Yes	12	4.4
No	259	95.6

ANC follow-up		
Yes	249	91.9
No	22	8.1
Number of ANC follow-up		
1-3	63	23.2
Four and above	186	68.6
IFA supplementation		
Yes	241	88.9
No	30	11.1
Number of IFA tablets		
< 60	59	21.8
60–90	182	67.2

5.3 Nutritional Status and Behavioral Factors

Two hundred twenty-two (81.9%) mothers were counseled about dietary intake, and 163 (60.1%) of them took extra meals during pregnancy. 10 (3.7%) had drunk alcohol, and only 5 (1.8%) had chewed khat during pregnancy **(Table 3).**

Table 3 Nutritional and Behavioral Factors of Mothers in Attat Hospital, Ethiopia, June15-July 15, 2021 (N=271)

Variables	Frequency	Percentage (%)
Dietary counseling		
Yes	222	81.9
No	49	18.1
Additional nutrition during pregnancy		
Yes	163	60.1
No	108	39.9
Alcohol drinking		
Yes	10	3.7
No	261	96.3
Khat chewing		
Yes	5	1.8
No	266	98.2

5.4 Newborn Factors

The majority (58.7%) of newborns were females and 257 (94.8%) were gestational age ≥ 37 weeks (**Table 4).** The prevalence of LBW among newborn babies in Attat Hospital was 18.1% (95% CI: 12.3%−19.8%) (Figure 2)

Table 4 Newborn Factors of LBW in Attat Hospital, Ethiopia, June15-July 15, 2021 (N=271)

Variables	Frequency	Percentage (%)
Sex		
Male	112	41.3
Female	159	58.7
Gestational age		
< 37 weeks	14	5.2
≥37weeks	257	94.8

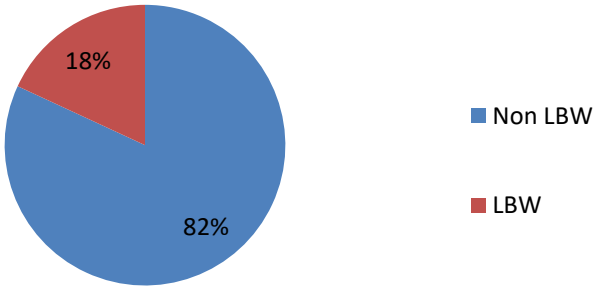


Figure2. The prevalence of LBW among newborn babies in Attat Hospital, Ethiopia, June15-July 15, 2021 (N=271)

5.5 Factors Associated with LBW

In the bivariate analysis, the age of the mother, residence, marital status, birth interval, desirability of pregnancy, anemia, having ANC follow-up, Iron and folate provision, gestational age, dietary counseling during , mothers with previous history of LBW, ANC visit, and khat chewing had a p-value < 0.2. These variables were further analyzed using multivariate logistic regression, and the result showed that the age of the mother, residence, gestational age, and having ANC follow-up of the newborns were significantly associated with LBW.

Mothers aged < 20 years old were 3.78 times more likely to deliver LBW newborns than 20–34 years old mothers (AOR: 3.78, 95% CI, 1.02–13.97), and mothers lived in a rural area were 3.49 times more likely to deliver LBW babies compared with mothers who had living in the urban area (AOR: 3.49, 95% CI, 1.48–8.24). Similarly, mothers who had no ANC follow-up during pregnancy were 3.79 times more likely to deliver LBW babies compared to mothers who had ANC follow-up (AOR: 3.79 95% CI, 1.08–13.23). Newborn babies who were delivered before the gestational age of 37 weeks were 3.82 times more likely to be LBW compared to babies born in the gestational age of ≥ 37 weeks (AOR: 3.82, 95% CI, 1.- 55–9.42) Finally, mothers with previous history of LBW were 3.37 times more likely to be LBW than with non LBW history mothers(AOR: 3.37, 95% CI, 1.17–9.72) (Table 5).

Table 5 Binary and Multivariate Analysis of Factors Associated with LBW in Attat Hospital, Ethiopia, June15-July 15, 2021 (N=271)

Variables	LBW		COR [95% CI]	AOR [95% CI]	P-value
	Yes %	No %			
Age of the mother					
<20	9(16.1)	39(12.9)	1.44(1.6–3.22)	3.78(1.02–13.97)*	0.047
20–34	35(62.5)	218(72.2)	1	1	
35–49	12.1(21.4)	45(14.9)	1.66(0.80–3.45)	1.15(0.40–3.33)	0.12
Residence					
Rural	20(35.7)	56(18.5)	2.44(1.30–4.50)	3.49(1.48–8.24)*	0.04
Urban	36(64.3)	246(81.5)	1	1	
Marital status					
Single	17(30.4)	54(17.9)	2.00(1.05–3.80)	1.10(0.40–3.08)	0.961
	39(69.6)	248(82.1)	1	1	
Married					
Birth					
interval(months)	22(57.9)	80(37.2)	2.32(1.15–4.68)	2.18(0.92–5.19)	0.09
≤24	16(42.1)	135(62.8)	1	1	
> 24					
Desirability of					
pregnancy			1	1	
Yes	36(64.3)	248(82.1)	2.55(1.37–4.75)	1.49(0.57–3.91)	0.585
No	20(35.7)	54(17.9)			
Anemia during					
pregnancy			3.19(1.28–7.93)	0.87(0.17–4.56)	0.80
Yes	14(60.9)	9(39.1)	1	1	
No	79(23.6)	9(39.1)			
ANC follow-up					
Yes	9(39.1)	270(89.4)	1	1	
No	17(30.4)	32(10.6)	2.55(1.24–5.24)	3.79(1.08–13.23)*	0.048
IFA provision					
Yes	40(71.4)	261(86.4)	1	1	
No	16(28.6)	41(13.6)	2.55(1.31–4.96)	0.66(0.19–2.31)	0.53
Gestational age					
< 37 weeks	24(42.9)	52(17.2)	3.29(1.78–6.10)	3.82(1.55–9.42)*	0.001
≥37weeks	32(57.1)	250(82.8)	1	1	
History of LBW					
Yes			2.12(1.09–4.11)	3.37(1.17–9.72)*	0.018
No	43(76.8)	184(60.9)	1	1	
	13(23.2)	118(39.1)			

Notes: *Statistically significant at p value < 0.05 with 95% CI.

6. Discussion

The finding of this study showed that magnitude of low birth weight 18.1%. This finding is consistent with studies conducted in Health institutions in Dessie (15.6%) ,Gondar referral hospital (17.1%), Tigray (14.6%), a systematic review and meta-analysis in Ethiopia (17.3%), Kenya (12.3%), and the estimated global (17.5%) and sub-Saharan African countries LBW prevalence (16.4%).(2,10,14,25) The reported value is higher than the study findings of Tigray (6.3% and 9.9%), Nigeria (6.3%), Iran (6.3%), China (2.8%), and the regional estimates of Central Asia (6%), Eastern Asia (6%), Western Asia (10.9%), and Latin America and Caribbean (8.8%).(2,11,14,17,24) However, the prevalence of LBW was lower than studies conducted in Bahir Dar (21.2%), Uganda (25.5%), India (28.61%), and the regional estimates of LBW in Southern Asia (32.3%)(2,59). This difference might be due to the socioeconomic, seasonal, and geographical variation, which might result in discrepancies in health service utilization and the nutritional status of mothers. Mothers aged < 20 years old were 3.78 times more likely to deliver LBW newborns than 20–34 years old. Likewise, studies conducted in Hosanna town, Gondar, Mekelle, and a systematic review and meta-analysis in Ethiopia showed similar findings. (9, 59) These might be because having a birth at an early age had a higher risk of delivering a baby with LBW (28). Pregnant teens are more likely to develop pregnancy-related high blood pressure and anemia, which will lead to preterm labor and delivery. Additionally, young women had less awareness of pregnancy-related problems and less likely to seek medical care as early as possible.

Mothers who reside in rural areas had 3.49 higher odds of delivering LBW babies compared to urban residents. Studies conducted in Bahir Dar, Tigray, and Ghana reported similar findings.(3,7,10) The possible reason might be the greater hardship due to poor infrastructures, hard physical work, and less access to basic health services in rural areas. Additionally, there will be lower accessibility for health information, health services utilization, and nutritional awareness in rural areas.(30, 31)The odds of LBW were 3.79

times higher in mothers who had no ANC follow-up compared to mothers who had ANC follow-up. This result is comparable with studies conducted in Bale zone hospitals, the University of Gondar, Hosanna town, and Mekelle.(7,25) There will be a chance for monitoring of fetal wellbeing and timely intervention of feto-maternal problems when there is an ANC visit. Additionally, there will be routine nutritional and medical advice, as well as the provision of supplementations during ANC visits. Newborns delivered in < 37 weeks of gestation were 3.82 times more likely to be LBW than those who were delivered in ≥ 37 weeks. Similar findings were reported from studies conducted in Dangla Ethiopia, a systematic review and meta-analysis in Ethiopia, Kenya, Uganda, Nepal, and India.(14,9,59) Gestational age plays a significant role in determining infants' birth weight. Prematurely (< 37 weeks) delivered newborns are at a higher risk of LBW.(15,28,35)Finally, mothers with previous history of low birth were 3.37 times more likely to be LBW compared to non LBW mothers. This study is comparable with studies done in Kenya and India. (14)

7. Limitations of the study

Factors like intrauterine infection during pregnancy; placental abnormalities, pre-pregnancy weight, indoor environmental factors, outdoor air pollution, climatic factors, and seasonal variation were not addressed, since the study design was Cross-sectional. We recommend other researchers to do follow up study to come up with finds shown that what effects each covariates have by controlling all potential confounders.

8. Conclusion and Recommendations

The reported proportion of LBW in this study is comparable with the estimated global prevalence. Age of the mother < 20 years, rural residence, absence of ANC follow-up, gestational age < 37 weeks, and previous history of low birth significantly associated variables with LBW. Therefore, the Zonal health bureau and health care providers should have special attention to ANC services and preventive strategies for preterm delivery giving due attention to rural residing mothers

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Annex

Information sheet

Greetings!!

My name is_____

This is to give you information regarding a study designed to assess Magnitude and associated factors of Low Birth Weight in Attat Hospital. The aim of the study is to generate evidence on Magnitude and associated factors of Low Birth Weight. The study will have a benefit in the effort to improve the quality service by the stakeholders and can influence decision makers.

Study participants have the right for partial or non-participation for the data collection. There is no risk for participating in the data collection and confidentially of the respondent will be maintained as the name is not required on the questionnaire.

Informed Consent

This is to respectful requesting you to participate on this study. You can have full control to take time to understand and decide whether or not to take part on the study. You are also not obliged to answer a question you don't want to and you may end the interview at any time you want to. However, your cooperation and genuine response for the study is highly appreciated. The interview may take up to 30 minute to complete the questionnaire.

Contact detail of the Investigator

If you want to know more about the study you can contact the principal investigator of the study **Tsion Dawit** through her mobile phone numbers +251-972663181,

Do you have any question that you want to ask us about the study?

Consent Form Interviewer: Please provide a paper copy of the Consent form to the respondent and explain it. With due understanding of the aforementioned information, I

am willing to participate in the study? (Yes) Check box: ☐ => Proceed (No) Check box: ☐ => Stop

Part-I Socio-demographic characteristics of mother (respondent)

1. Mothers age_____

2. Marital status A. single B. Married C. Windowed D. Divorced.

3. Maternal educational A. Not read and write B. Read and write C. Primary education D. Secondary & above

4. Maternal occupation A. Merchant B. Government employed C. House wife D. Farmer E. Other

5. Maternal religion A. Orthodox B. Protestant C. Muslim D. Other

6. Family income per month A. ≤620ETB B. 621-1500ETB C.1501-3000ETB D. ≥3001TB

7. Residence A. Urban B. Rural

Part-II Maternal Medical and Reproductive Characteristics

1. How many times you become pregnant? A. 1-2 B. 3-5 C. ≥6

2. Birth interval(in month) A. ≤24 B.>24

3. Does the pregnancy wanted and planned? A. Yes B. No

4. Is there any current pregnancy related complication? A. Yes B. No

5. If yes to Q.4 A. APH B. PIH C. PROM D. Others(_____)

6. Did you have History of Low Birth Weight? A. Yes B. No

7. Did you have History of chronic medical illness? A. Yes B. No

8. If **yes** to **Q#7** what types of chronic medical illness do you have A. TB B. HIV C. DM D. **Others**(_____)

9. Did you have History of Malaria infection during pregnancy? A. Yes B. No

10. Did you have History of Sexually Transmitted Infection (STI) during pregnancy? A. Yes B. No

11. Did you have History of Anemia during this pregnancy? A. Yes B. No

12. Did you have ANC follow up for this pregnancy? A. Yes B. No

13. Number of ANC follow-up during this pregnancy A. 1-3 B. Four and above

14. Did you have iron and folic acid (IFA) supplementation during pregnancy? A. Yes B. No

15. If **yes** to **Q#14,** how much iron and folic acid (IFA tablets you took? A. < 60 tablets B. 60–90 tablets

Part-III Nutritional Status and Behavioral Factors

1. Did you counseled about dietary intake during pregnancy? A. Yes B. No

2. Did you take extra meals during pregnancy? A. Yes B. No

3. Did you smoke cigarettes during this pregnancy? A. Yes B. No

4. If **yes** to **Q#3,** how much pack you smoke per day? _____

5. Did you drink alcohol during this pregnancy? A. Yes B. No

6. Did you chew khat during pregnancy? A. Yes B. No

Part-IV Newborn Factors

1. Birth Weight of the newborn_____

2. Sex of newborn baby? A. Male. B. Female

3. Gestational age of this newborn (in weeks)? A. <37 week B. ≥37weeks