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Research Article

Magnitude of Low Birth Weight and Associated Factors among Women who gave Birth in Public Hospitals of Harari Regional State, Eastern Ethiopia

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ABSTRACT

Background: Low birth weight remains a public health challenge in developing worlds. Globally, low birth weight is associated with an increased risk of early neonatal mortality and morbidity. The primary causes of low birth weight are related to maternal risk factors. For instance; maternal under nutrition, maternal anemia, and hypertensive disorders of pregnancy are associated with low birth weight. Although it remains one of the top challenges of adverse birth outcome, predictors of low birth weight are rarely Eastern studied in Ethiopia. To the best knowledge of the researchers, the magnitude of low birth weight is not studied in this study area. Therefore, this study was aimed to assess the magnitude of low birth weight and associated factors among women who gave birth in public Hospitals of Harari Regional state, Eastern Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 403 women who deliverd in public hospitals of Harari Regional State, Eastern Ethiopia from February 10th to March 20th, 2019. A systematic sampling technique was used to select study participants. Data were collected using pretested structured interviews administered questionnaires. The collected data were entered into Epi-data version 3.1, and exported to SPSS (IBM version 22) for statistical analysis. Descriptive statistics were carried out using frequency tables, proportion and summary measures. Multivariable analysis was done to identify the true effects of predictor variables on the outcome variable after controlling for possible confounders. Statistical significance was declared at p-value <0.05.

Result: Overall, the magnitude of low birth weight was 23.3% [(95% CI (19.0, 28.0)]. In final model of multivariable analysis; unplanned pregnancy [AOR=4.7;95%CI (2.4, 8.9)], maternal mid upper arm circumference less than 23cm[AOR=3.5;95%CI (1.8, 6.0)], substance use in current pregnancy[AOR=5.0; 95%CI(2.5, 10.0)], maternal anemia [AOR=2.3; 95%CI (1.2, 4.4)], a history of hyperemesis in current pregnancy[AOR=4.5,95 % CI =2.3, 9.0)] and having no history of antenatal care follow-up in current pregnancy [AOR=5.4; 95 % CI =2.5, 12.9)] were statistically associated with low birth weight.

The conclusion: The magnitude of low birth weight was relatively high in this study area compared to national and global targets. Therefore, efforts should be emphasized on ensuring women's nutritional status during pregnancy, and creating awareness on the potential risks of substance use for unborn fetus. Health information dissemination on the utilization of ANC service is also very crucial to improve the birth weight of newborn babies.

Keywords: Low birth weight, associated factors, predictors, Eastern Ethiopia

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INTRODUCTION

Low birth weight (LBW) remains an important public health problem throughout the world. World Health Organization (WHO) defined LBW as birth weight of less than 2500grams at birth weight measurement within an hour of birth [1,2]. LBW is continued a global public health challenges especially in Sub-Saharan Africa and Asian countries. Worldwide, more than 20 million babies are born with low birth weight, of which 95.6% of them are from developing countries [3].

There is considerable variation in the prevalence of low birth weight across regions within a country. The majority of low births are from low and middle-income countries and it's highly prevalent in South Asia (28%), Sub-Saharan Africa (13%), and Latin America (9%) [4]. Birth weight at birth is a strong indicator of maternal health and nutrition. If undernourished in utero, there is an increase in the risk of death in early childhood. Those who survive tend to have impaired immune function and increased risk of disease, and they are likely to remain undernourished, with reduced muscle strength, cognitive abilities, and Intelligence Quotient (IQ) throughout their lives [1]. As they become adults, they suffer a higher incidence of chronic non-communicable disease such as diabetes and heart disease[2], because of long term effect of low birth weight, World Health Assembly and Global Nutrition have targeted to reduce low birth weight by 30% at the end of 2025 [3].

Furthermore, in Africa, the magnitude of LBW is unacceptably high compared to developed regions. The findings of previous studies reported a range of LBW in Africa as 27.5% in Libya [5], 25.5% in Uganda [6], and in 38.3% Sudan [7]. In Ethiopia, different studies conducted in some parts of the contry have shown magnitude of LBW as 11.2% in Gondar, Norther-West Ethiopia[8] , 6% in Woliata Sodo, Southern Ethiopia [9] , 12.8% in Wollo, North-East [10] , 9.8% in Hosanna[11] , and 8.8% in Addis Ababa, central Ethiopia [12]. Although data on LBW is available in Ethiopia, almost all previous studies were conducted in central, Northern, Southern and Western [13-15], and rarely studied in Eastern part of Ethiopia [16].

Furthermore; researchers have identified LBW has numerous negative consequences on the health of newborn. For instance; a study conducted in Soddo referral hospital indicated that the likelihood of perinatal death is eight times higher among low birth weight than their counterpart. This shows that the burden of low birth weight is still under question in Ethiopia [3]. Socio-demographic characteristics, maternal reproductive characteristics, no prenatal care during pregnancy, maternal literacy level, and maternal medical history were all factors associated with low birth weight [3]. In Ethiopia, although some studies have been conducted with different study type, still there is scarcity of locally generated evidence regarding magnitude of low birth in Eastern Ethiopia. Therefore, this study aimed to assess the magnitude of low birth weights and its associated factors among women attending delivery services in selected public hospitals in Harari town, Eastern Ethiopia.

METHODS

Study area, period and design

A facility-based cross-sectional study was conducted in Hiwot Fana specialized University Hospital and Jugal Regional Hospital found in Harari Regional State, Eastern Ethiopia from February 10 to March 20, 2019. Harar town is the capital city of Harari Regional States. The town is located in the Eastern part of Ethiopia at a distance of 526km away from Addis Ababa, the capital city of Ethiopia. According to the 2007 census report of the Central Statistical Agency, the total population of the region is estimated to be 183, 415, of which 92,316 are males and 91, 099 females [17]. In the town, there are 45 health facilities (34 health posts, 8 health centers, and 5 hospitals). Among the 5 hospitals found in the town, only two of them are giving service as public hospitals. This study was conducted in two public hospitals, where different and multidimensional health care services are being provided to the patient.

Study population, eligibility criteria and sample calculation

All mothers who gave birth in the selected public hospitals (Hiwot Final Specilalized University hospital and Jugal Regional Hospital) of Harari Regional state, Eastern Ethiopia were considered as source population. All mothers with singleton deliveries (in order to eliminate any confounding caused by multiple pregnancy) and delivery outcomes after 28 complete weeks of gestation were enrolled to the study. Women who gave multiple births and women who were unable to respond at the time of enrollment were excluded from the study. The minimum required sample size of this study was determined by using Statistical Software Epi-info (version 7) by considering the following assumptions. Proportion of LBW (P=10%) taken from a previous study conducted in Adwa General Hospital, Northern Ethiopia [18], Precision or margin of error 3%, 95% confidence level and by adding 5% contingency for non-response rate, the final sample size was 403.

Sampling Technique and procedures

Initially, the Harari regional state was purposely selected from other parts of Eastern Ethiopia. In the region, there are only two public hospitals namely: Jugal Regional Hospital (JRH) and Hiwot Fana Specialized University Hospital (HFSUH). HFSUH is the only referral Hospital hosted by Haramaya University, Eastern Ethiopia. Currently, both hospitals are providing different health services including labor and delivery services to the laboring mothers and newborns in maternity wards. According to the health management and information system (HMIS), the total numbers of deliveries in quarterly (3 months) report were 1152 in Jugal Regional Hospital (JRH) and 1578 in Hiwot Fana Specialized University hospital (HFSUH). When these quarterly report number deliveries reduced to monthly report, the total number of delivery in in JRH and HFSUH would be 384 and 526 respectively. Based on the above information, we used a simple systematic sampling technique to select study participants using a list frame of admitted laboring mother to the obstetric ward. Accordingly, we estimated the Kth interval by dividing total population (N=910) to calculated sample size (n=403). Thus, (K= 910/403= 2). Then, the total sample size (n=403) was proportionally allocated to both hospitals. Accordingly, 170 samples were allocated to Jugal Regional Hospital and 233 allocated for Hiwot Fana Specialized University hospital. Finally, the data were collected from the participants until the required sample size was achieved (Figure 1).

Data collectors, data collection tools and procedures

The data were collected using structured interviews administered questionnaires, which were developed from the Ethiopian Demographic and Health Survey (EDHS) data collection tools [19], and other relevant related kinds of literatures [13,16] Initially,

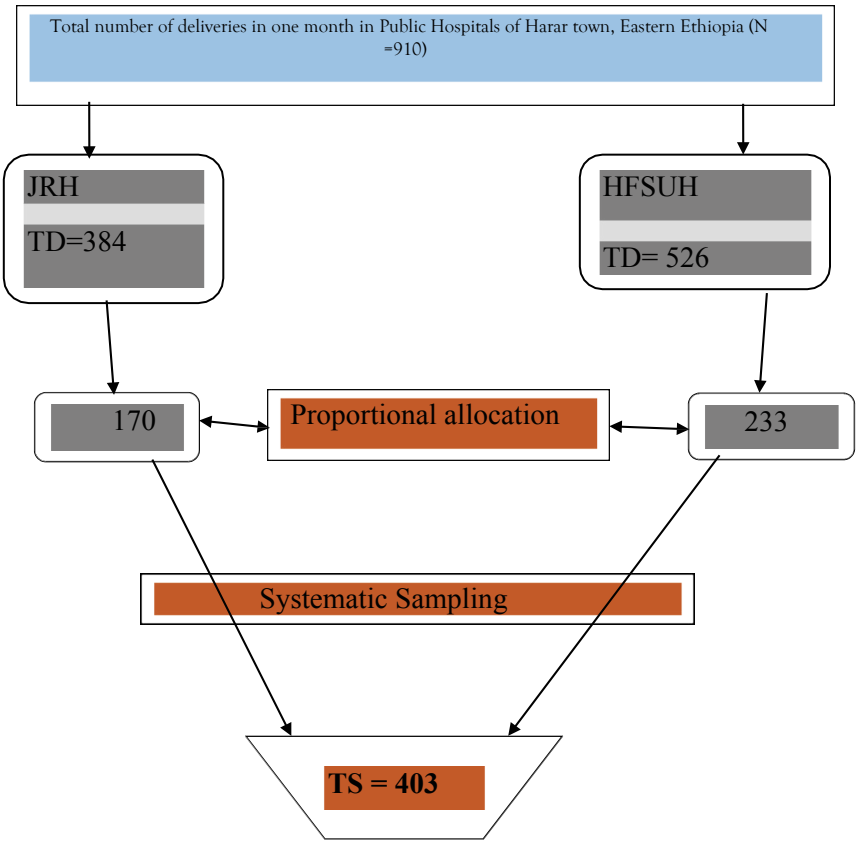

Figure 1: Schematic presentation of sampling procedure among mothers who delivered in Public hospitals of Harar town, Eastern Ethiopia, 2019.

the questionnaire was prepared in English language, translated into local languages (Afan Oromo and Amharic) by local language experts, and translated back into English version to check for its consistency. The questionnaire had open and close-ended questions containing socio-demographic characteristics, maternal obstetrics and gynecological history, maternal dietary habits, behavioral factors, relevant environmental factors, and newborn anthropometric measurement. The questionnaire was reviewed by several independent reviewers and the maternal dietary diversity score was calculated according to the currently updated women dietary diversity guide [20]. Data were collected over period of one month by four (4) diploma Midwives and Laboratory technologist. Two Bachelor of Science (BSc) Nurses were recruited to supervise the data collected in each hospital. The data collectors interviewed the participants after they fully decided to enroll in the study. The interview was conducted in a separate area in the postnatal recovery room to assure the privacy of the participants. Newborn weight was obtained during weighing of newborn at the time birth in collaboration with duty midwives. The measurement was executed by lying down in only a weight pan with only a light cloth to prevent measuring error and measured to the nearest 0.1 kg [21]. Low birth weight neonates were taken to neonatal intensive care unit and managed accordingly. Routine Hemoglobin is performed for every clients admitted to the labor ward before delivery. In the instance where hemoglobin was not performed at admission, the data collector obtained a sample by using portable hemoglobin measurement (Hemacue ltd angel holm) using sterile finger stick method to determine hemoglobin concentration level [1]. Women with a hemoglobin concentration of <11.0 g/dl were labeled as anemic. Accordingly; we categorized status of anemia based on hemoglobin result as: mild anemia (hgb level=10–10.9 g/dl), moderate anemia (hgb level= 7–9.9 g/dl) and severe anemia (hgb level< 7.0 g/dl). Maternal Mid Upper Arm Circumference [22] measurement was taken after the client was stable and transferred to the maternity ward. MUAC was measured in the appropriate position with a nonstretchable measuring tape to the nearest 0.1cm [21]. Maternal MUAC under 23cm was considered as under nutrition [1]. Anemic clients were linked to MCH for standard Iron therapy while nutritional related education was provided for those whom MUAC indicated under-nutrition.

Variables and Measurements

In this study, the dependent variable was Low Birth Weight (LBW). This outcome variable was dichotomized as binary outcome ("low birth weight" and "normal birth weight".) During the software analysis, this binary outcome was recorded as 0 and 1. Thus, if the weight of newborn was < 2500grams it recoded as "1" and if the weight of newborn was > 2500grams it recorded as "0". Newborn weight less than 2500grm were considered as low birth weight and newborn weight was taken within one hour of delivery [1]. Twenty-four-hour maternal dietary diversity score was assessed according to the currently updated category of women's minimum dietary diversity guideline. Among ten total food groups if the mother consumed at least>=5 food groups the dietary diversity score was considered as minimum whereas consuming at least <5 food groups is considered low dietary diversity score [20].

Data quality control

Before the actual data was collected, a pretest was done on 5% of the total sample size in Haramaya hospital to verify the clarity of instruments and to help familiarize data collectors with the instruments, and to make necessary corrections as necessary. The final version of the questionnaire which is prepared in English was translated into the local language and back to English. Before data collection a three days intensive training was given to data collectors and supervisors on the instruments, method of data

collection, how to take anthropometric measurements, ethical issues, and the purpose of the study. Daily data crosschecking and double data entry were performed by a separate data clerk to cross-check entered data and solve problems if there was entered data mismatch.

Data processing and analysis

The collected data were first coded, entered into Epi data version 3.1, and exported to SPSS statistical software (MBI version 22) for analysis. Descriptive analysis was done using frequency distribution and percentage for categorical variables, and summary measures to present the continuous variables. A bivariable analysis was done to select candidate variables for multivariable analysis and those variables with a p-value less than 0.25 were considered for the multivariable analysis model. The model adequacy was checked using Hosmer and Lemeshow goodness of fitness tests (p-value=0.882), which indicates how well the model fits the data. Multi-collinearity was checked using the variance inflation factor (VIF) and Tolerance. All covariates having p-value < 0.25 in bivariable analysis were entered into multivariate analysis to control possible confounders and to detect true determinant factors of low birth weight. Odds ratio along with 95% CI, were estimated to measure the strength of association between dependent and independent variables, and finally, variables with p-value less than or equal to 0.05 in multivariate analysis were declared as statistically significant.

Ethical considerations

Ethical clearance was obtained from Institutional Health Research Ethical Review Committee (IHRERC) of College of Health and Medical Sciences, Haramaya University. The official letter of permission was written from the College of Health and Medical Science to selected public hospitals in where the study was actual conducted. Informed, voluntary, written and signed consent was also obtained from each study participant after explaining the purpose of the study. The study participants were informed about their full right to skip any question or withdraw at any time. They were also assured that there will be no harm or direct benefit of being participating in this study. All the information from the respondents was kept confidential.

RESULTS

Socio-demographic characteristics of the respondents

A total of 403 study participants were enrolled in this study with a response rate of 99%. About 289(72.3%) were between 20-34 years with a mean (± SD) age of 26.49 (± 5.37) years. Most of the respondents 295(73.8%) were Muslims, Oromo in ethnicity 304 (76.0%) and about 239 (59.8%) were rural residents. More than half, 211 (52.8%) of respondents had no formal education. About 257 (64.3%) of respondents were housewives (Table 1).

Table 1: Socio-demographic characteristics of the women who delivered in selected public Hospitals in Harari Regional State, Eastern Ethiopia, 2019.

VARIABLES	CATEGORIES	FREQUENCY(N)	PERCENTAGE (%)
Age (years)	<20	72	18.0
	20-24	74	18.5
	25-29	125	31.3
	30-34	90	22.5
	≥ 35	39	9.8
Marital status	Married	393	98.3
	Divorced & Widowed	7	1.75
Religion	Muslim	295	73.8
	Orthodox	81	20.3
	Protestant	24	6.0
Ethnicity	Oromo	304	76.0
	Amhara	58	14.5
	Harari	20	5.0
	Others *	18	4.6
Residency	Rural	239	59.8
	Urban	161	40.2
Education of mothers	No formal education	211	52.8
	Primary education	122	30.5
	Secondary and above	67	16.8
Maternal Occupation	Government employ	36	9.0
	Private employ	83	20.8
	Housewife	257	64.3
	Others **	24	6.0
Family size	≤5	289	72.3
	>5	111	27.7
Family wealth index	Poor	133	33.3
	Medium	133	33.3
	Rich	134	33.4

Key:*Gurage, Tigray, **Daily laborer, farmer, students

Maternal obstetrics related characteristics

About 160 (40 %) of the respondents replied that their pregnancy was unplanned. The majority, 288 (72%) of respondents were multigravida and more than half, 225(56.3%) of them attended ANC follow-up. Nearly two-thirds 257(64) of the participants were delivered through SVD. More than half, 255(56.2%) of the respondents had history Iron supplementation (Table 2).

Medical and behavioral related characteristics

Of 400 study participants, only 20(5%) had a chronic medical disease, of which the majority 15(75%) of them were a hypertensive disease. About 187(46.8%) of participants reported a history of substance use, of which more than two-thirds 129(69.4%) were continued using substances during current pregnancy (Table 3).

Maternal dietary-related characteristics

The majority, 390(97.5%) of the respondents had low dietary diversity scores and nearly half of the study participants 197 (49.3%) had received additional food during the current pregnancy, of which 120 (60.6%) of them received more than two additional meals per day. Similarly, more than half of respondents 225(56.3%) received prenatal nutritional education during their follow-up.

Concerning maternal anthropometry and hemoglobin level measurement, 160 (40%) of respondents had MUAC measurement less than 23cm and 161(39.2%) of them with hemoglobin measures

Table 2: Obstetrics related characteristics of the women who delivered in selected public Hospitals in Harari Regional State, Eastern Ethiopia, 2019.

VARIABLE	CATEGORIES	FREQUENCY (N)	PERCENTAGE (%)
Gravidity	Primi gravida	112	28.0
	Multi gravida	288	72.0
Birth interval(n=288)	≤2 years	235	82.2
	>2 years	53	17.8
Condition of pregnancy	Planned	240	60.0
	Unplanned	160	40.0
ANC follow up	Yes	225	56.3
	No	175	43.7
Number of ANC visit(n=225)	≤2 visit	70	31.1
	>2 visit	155	68.9
Trimester on first ANC visit(n=225)	1st trimester	85	37.8
	2nd trimester	116	51.6
	3rd trimester	24	10.6
IFA supplementation	Yes	225	56.2
	No	175	43.8
Hyperemesis gravidrum	Yes	136	34.0
	No	264	66.0
Mode of delivery	SVD	257	64.3
	Operative delivery	143	35.8

Key: *ANC: Antenatal Care, SVD: Spontaneous Vaginal Delivery*

Table 3: Medical and behavioral characteristics of the women who delivered in selected public Hospitals in Harari Regional State, Eastern Ethiopia, 2019.

VARIABLES	CATEGORIES	FREQUENCY(N)	PERCENTAGE (%)
Chronic disease(n=400)	Yes	20	5.0
	No	380	95.0
Type of chronic diseases(n=20)	Hypertension	15	75.0
	Diabetic Mellitus	5	25.0
History of substance use(n=400)	Yes	187	46.8
	No	213	53.3
Do you continue substance use during current pregnancy(n=187)	Yes	129	68.9
	No	58	31.1
Type of substance used(n=129)	Khat chewing	90	69.7
	Others**	39	30.3
How often you use substances	Always	13	10.0
	Usually	25	19.3
	Sometimes	91	70.7

**:- Alcohol, shisha smoker

less than eleven (g/dl). Of those anemic mothers, about 32(19.8%) were severe anemia (<7g/dl) (Table 4)

Magnitude of Low birth weights

A total of 400 of the mothers' newborns, about 23.3% [(95% CI (19.0, 28.0)] of them had a birth weight below 2500grams at birth (Figure 2).

Factors associated with low birth weights

In bivariable logistic regression analysis (rural residence, history of hyperemesis during the current pregnancy, unplanned pregnancy, no prenatal care, prenatal nutrition education, maternal mid-upper arm circumference measurement less than 23cm, no iron and folic acid supplement intake (IFA), history of substance abuse and maternal anemia) were all significantly associated with low birth weight and included in the model. Prenatal nutritional education and Iron and folic acid (IFA) supplementation were excluded from the final model due to their collinearity effect (high standard error).

In the final model of multivariable logistic regression analysis variable such as history of hyperemesis gravidrum, unplanned pregnancy, maternal anemia, maternal MUAC less than 23cm, history of substance and no ANC follow-up were remained significantly associated with LBW. Accordingly, the odds of delivering a low birth weight baby was four times higher among mothers who had

Table 4: Dietary characteristics and maternal anthropometric measurement of study participants in selected public health Hospitals in Harari Regional State, Eastern Ethiopia, 2019.

VARIABLE	CATEGORIES	FREQUENCY(N)	PERCENTAGE(%)
Maternal dietary diversity score(24-hrs)	Low	390	97.5
	High	10	2.5
Additional food during current pregnancy	Yes	197	49.3
	No	203	50.7
Frequency of additional food/day	1-2 times	78	39.4
	>2 times	120	60.6
Food skipping pattern during current pregnancy	Yes	22	5.5
	No	378	94.5
Reason for skipping (n=22)	Tiredness	8	36.4
	Being busy at work	9	40.9
	Not to gain weight	5	22.7
Prenatal nutritional education	Yes	225	56.3
	No	175	43.7
MUAC Measurement	≥23cm	240	60
	<23cm	160	40
Hemoglobin level	≥11g/dl	239	59.8
	<11g/dl	161	39.2
Classification of Anemia(n=161)	Severe anemia (<7g/dl)	32	19.8
	Moderate anemia (7-8.9g/dl)	42	26.2
	Mild anemia (9-10.9 g/dl)	87	54

Key: *MUAC- Mid Upper Arm Circumference*

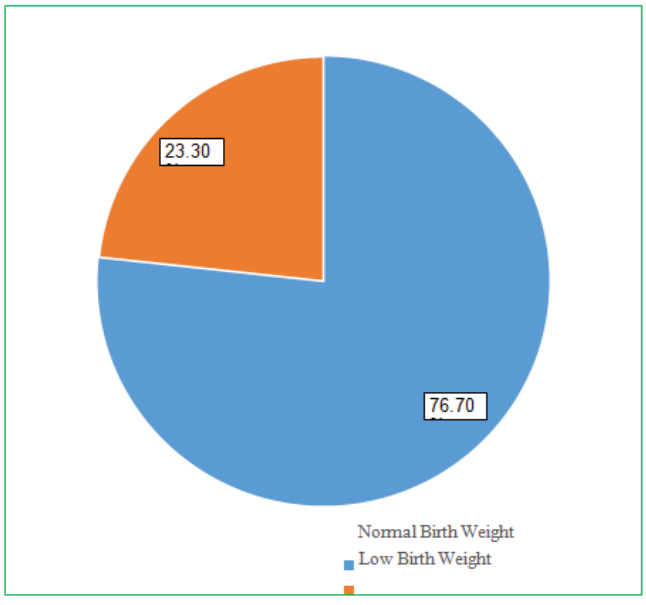

Figure 2: Magnitude of low birth weight among women who gave birth in public Hospitals in Harari Regional State, Eastern Ethiopia, 2019.

Table 5: Bivariable and Multivariable analysis of factors associated with low birth weight among mothers who gave birth in public hospitals in Harar town, Eastern Ethiopia, 2019.

VARIABLES	CATEGORIES	LOW BIRTH WEIGHT		COR(95%C)	AOR(95%CI)
		Yes (%)	No (%)		
Residency	Rural	64(26.8)	175(73.2)	1.6(1.0-2.7)*	0.8(0.4-1.6)
	Urban	29(18.0)	132(82.0)	1	1
Hyperemesis during current pregnancy	yes	48(35.3)	88(64.7)	2.6(1.6-4.2)**	4.5(2.3-9.0)***
	No	45(17.0)	219(83.0)	1	1
Type of pregnancy	Unplanned	69(43.1)	91(56.9)	6.8(4.0-11.5)**	4.7(2.4-8.9)***
	Planned	24(10)	216(90)	1	1
ANC follow up	No	68(38.9)	107(61.1)	5.0(3.0-8.5)**	5.4(2.5-12.9)**
	Yes	25(11.1)	200(88.9)	1	
Prenatal nutrition education	No	58(33.1)	117(66.9)	2.6(1.6-4.3)**	
	Yes	35(15.6)	190(84.4)	1	1
MUAC measurement	<23	54(33.8)	106(66.2)	2.6(1.6-4.2)**	3.5(1.8-6.05***
	≥23	39(16.2)	201(83.8)	1	1
IFA supplementation	No	64(36.6)	111(63.4)	3.8(2.3-6.4)**	
	Yes	29(12.9)	196(87.1)	1	
Hemoglobin	<11	59(36.6)	102(63.4)	3.4(2.1-5.6)**	2.3(1.2-4.4)**
	≥11	34(14.2)	205(85.8)	1	1
Substance use during current pregnancy	Yes	73(39)	114(61)	6.1(3.5-10.6)	5.0(2.5-10.0)**
	No	20(9.4)	193(90.6)	1	1

Key: **= p-value<0.25 in bivariable analysis; **= p-value < 0.05 in bivariable and multivariable analysis; ***=p-value <0.001 in final model of multivariable analysis.*

hyperemesis gravidarum during the current pregnancy [(AOR=4.5, 95%CI (2.3, 9.0)]. The odds of low birth weight was four times higher among mothers with unplanned pregnancy compared to their counterpart [(AOR=4.7, 95%CI (2.4, 8.9)]. Similarly, the likelihood of delivering low birth weight was two times higher among anemic mothers compared to non-anemic (AOR=2.3, 95% CI (1.2, 4.4). The odds of delivering low birth weight was three times higher among undernourished mothers (MUAC less than 23cm) compared to those whose MUAC >23cm (AOR=3.5, 95% CI (1.8, 6.05). Women who had history of substance use during current pregnancy were five times more likely deliver to deliver LBW baby compared to their counterpart(AOR=5.0, 95% CI (2.5, 10.0). In addition, the likelihood giving LBW was five times higher among those women who had not history of ANC follow-up (AOR=5.4, 95% CI (2.5, 12.9) (Table 5).

DISCUSSION

In the study area, the magnitude of low birth weights was 23.3%. Substance use during the current pregnancy, maternal under-nutrition, maternal anemia, having no history of ANC follow-up, unplanned pregnancy, and having history hyperemesis during current pregnancy were significantly associated with LBW. This findings is similar to previous studies done in Uganda (25.5%) [6], Libya (27.5%) [5], and Bahirdar (21.3%) [23]. However, it was much lower than studies conducted in different countries like in India (63.3%) [24], Sudan (38.3%) [7]. In contrary, it is considerably higher than study conducted in Dire Dawa (13.2%) [16], Wollaita (6%) [9], Gondar (11.2%)[8], Wollo (12.8%) [10], Hosanna (9.8%) [11], Addis Ababa (8.8%) [12], Adawa (10%) [18] and Axum (9.9%) [14]. This wider discrepancy may be due to differences in socio-economic and demographic factors, sample size difference, health care services utilization, and current governmental and non-governmental intervention on maternal health services including nutrition and women's economic empowerment.

In this study, the odds of delivering a low birth weight newborn are higher among women with hemoglobin less than 11g/dl. This is similar to studies done in Adawa [18] and Nigeria [25]. These may be due to the effect of anemia on the oxygen-bearing capacity and its transportation tendency at the placental site, which leads to poor fetal growth and potential preterm delivery which is a major cause of LBW. The findings of this study also revealed that LBW is associated with having no history of ANC follow-up. This is also supported by previous a study conducted in Wollo [10], Gondar [15], and Dessie [26]. These could be due to the fact that provision of Iron and folate supplementation, nutritional counseling and medical education during routine prenatal visit appear to play a crucial role for fetal development.

Moreover, Furthermore, this study indicated that unplanned pregnancy was found to be a significant predictor of LBW. This finding is supported by studies conducted in Addis Ababa [12] and Axum [14]. This might be due to those unintended pregnancies may end up with termination rather than a continuation, if it continued they may result in poorer outcomes for the mothers and newborn. Similarly, the odds of delivering a LBW infant are higher among undernourished women and this is consistent with previous studies conducted in Dessie [26], India [22] and Bangladesh [27]. This is due to fact that the fetus is completely dependent on the mother's nutrition status for all nutrition taking in utero.

Further, substance utilization during the current pregnancy was another factor independently associated with LBW. This is consistent with studies conducted in Wollo [10],Dessie[26] and Gondar [28]. These might be due fact that maternal substance use may interfere with fetal intrauterine growth and development, and cause low birth weight.

In addition, this study showed that LBW was significantly associated with hyperemesis gravidrum during current pregnancy. The odds of LBW was high among mother with hyperemesis

during the current pregnancy.This is consistent with a systematic review conducted in the Netherlands[29], United Kingdom, and Cambridge University [30]. These could be due to the fact excessive vomiting during pregnancy often leads to low maternal weight gain, poor food intake due to prolonged nausea throughout pregnancy, and overall lower nutritional intake during the pregnancy which can lead to low birth weight.

Strengths and limitations

Strengths included the use of maternal hemoglobin concentration and maternal anthropometry measurements to see further predictors LBW. Limitation includes potential risk factors such as placental factors, congenital syndromes, and intrauterine infections, and any other obstetrical and fetal related complications were not explored. Since the study was a facility-based the participants were from a different place of residency making it difficult to adjust hemoglobin for altitude. Recall as some mothers were not able to remember the exact date of last menstrual period, so mothers who didn't know either last menstrual period nor had ultrasound investigation were excluded from analysis due to many missing values.

CONCLUSION

The magnitude of low birth weight in the study setting was high. Maternal under-nutrition, maternal anemia, substance use, no history of prenatal care, unplanned pregnancy, and history of hyperemesis were significantly associated factors with low birth weight. Therefore, strengthening existed strategies on maternal and neonatal health care, providing adequate education on nutrition, creating awareness the importance of focused ANC follow up and health education dissemination about the consequence of substance use during pregnancy may help to improve the public health issues of low birth weight. Since the cause of low birth weight is multidimensional, further studies are needed using longitudinal design.

Abbreviations

ANC: Antenatal care; HFSUH: Hiwot Fana Specialized University; IFA: Iron and Folic Acid; LBW: Low Birth Weight; MUAC: Mid Upper Arm Circumference; JRH: Jugal Regional Hospital

Ethical Approval and Consent to participate

Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee (IHRERC) of the College of Health and Medical Sciences, Haramaya University. A support letter was written to both public hospitals where the study was conducted. Confidentiality of information was respected. This study was conducted following the Declaration of Helsinki.

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Competing interests

Authors declared that they have no competing of interests in this work.

Authors' contribution

All authors have made a significant contribution to the conception, study design, data collection, data analysis, and interpretation of the findings. The authors also took part in writing the manuscript, reviewed the draft, and finally agreed on the journal to which the article has to be published. All authors read and approved the final draft of the manuscript and also agreed to be accountable for all contents of the manuscript under and circumstances.

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