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Determinants of Low Birth Weight in West Wollega, Oromia Regional State, Western Ethiopia: Facility Based Case Control Study

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Abstract

Background: It is estimated that 15% to 20% of all births worldwide are LBW, which account more than 20 million births a year, and 95.6% of them in developing countries.

Objective: The aim of the study was to identify determinants of low birth weight in West Wollega, Oromia regional state, and West Ethiopia.

Method: Facility based unmatched case control study design was used among mothers who gave birth to live new born in randomly selected hospitals in West Wollega, Ethiopia. Data was collected using structured interviewer administered questionnaire. Collected data was coded and entered in to EPI info version 7:2:1 and exported to SPSS version 24 for analysis.Adjusted odd ratio was used todetermine determinants of low birth weight at p value less than 0.05.

Result: The study indicated that, odds low birth weight among mothers from food insecure house hold (AOR(95%CI)=2.9(1.05-8)) was 3 times more than that of food secure uneducated mother (AOR(95%CI)=5(1.8-14)), birth interval of <24 months (AOR(95%CI)=4.6(1.2-18)), age at first birth of <18 years (AOR(95%CI)=4(1.1-15)), late initiation of ANC (AOR(95%CI)=4.4(1.3-15.7))), Pregnancy induced hypertension(AOR(95%CI)=3.6(1.03-12.9)) and maternal mid upper arm circumference of <23cm (AOR(95%CI0=11(4-35)) were also determinant factors for low birth weight in the study area.

Conclusion: The study suggested that household food insecurity, maternal educational status, birth interval of <24 months, age at first birth <18 years, late initiation of first ANC services, pregnancy induced Hypertension and maternal mid upper arm circumference of <23cm were other predictor of low birth weight in this study. Early screening for medical and obstetric condition as well as maternal nutritional status is a key action to reduce low birth weight in this study area.

Keywords: Low birth weight, Determinants, New born

Abbreviations: ANC: Antenatal Care; AOR: Adjusted Odd Ratio; CI: Confidence Interval; EDHS: Ethiopian Demographic Health Survey; FANTA: Food and Nutrition Technical Assistant;FAO: Food and Agricultural Organization; HFSAS: House Hold Food Security Access Scale; HFS: House Hold Food Security; IUGR: Intra Uterine Growth Restriction; LBW: Low Birth Weight; MUAC: Mid-Upper Arm Circumference; MDG: Millennium Development Goal; NBW: Normal Birth Weight; USAID: United States Agency for International Development; ZHO: Zonal Health Office.

Introduction

Low birth weight is defined by WHO as birth weight of less than 2500grams,irrespective of gestational age and can be sub divided into very low (less than 1500grams) and extremely low (less than 1000grams),are 20 times more likely to die, or have poor health outcomes than heavier babies [1]. Most low birth weight babies are not premature; they are born at the right time but they are small for their age, they are stunted in uterus, before they are born [2].

Low birth weight is still a public health concern. According to the recent global estimates more than 15% of new born infants weigh less than 2500grams [3].The study conducted in African countries showed that the proportion of low birth weight in Malawi, Burkina Faso and Uganda found to be 15.7%, 13.4% and 10% respectively [4].The distribution of low birth weight in Ethiopia also not uniform across different part of the country. It is as high as 30.7% in northern part and 10% in Addis Ababa [5,6].

The time of intrauterine growth and development is one of the most vulnerable periods in the human life cycle. The weight of the infant at birth is an important predictor of infant growth and survival, and is dependent on maternal health and nutrition during pregnancy [7]. Low birth weight leads to an impaired growth of the infant with its attendant risks of a higher mortality rate, increased morbidity, impaired mental development, and the risk of chronic adult disease[8].Infants who weight less than 2500g at birth have a four-fold higher risk of neonatal death than those who weight greater than 2500g.

Poor maternal nutritional status has been related to adverse birth outcomes; however, the association between maternal nutrition and birth outcome is complex and is influenced bymany biologic, socioeconomic, and demographic factors, which vary widely in different populations. Understanding the relation between maternal nutrition and birth outcomesmay provide a basis for developing interventions that will improve birth outcomes and long-term quality of life and reduce mortality, morbidity, and health-care costs. low birth weight and Intrauterine Growth Restriction (IUGR) represent the leading causes of neonatal death among children born without congenital anomalies and often result in short and long-term health problems/disabilities including a possible predisposition to chronic disease in adult life [9].

In 2012, the World Health Assembly endorsed comprehensive implementation plan on maternal, infant and young child nutrition with the goal to achieve a 30% reduction of the number of infants born

with a weight lower than 2500 g by the year 2025. This would translate into a 3.9% relative reduction per year between 2012 and 2025 and a reduction from approximately 20 million to about 14 million infants with low weight at birth [10].But yet low birth weight is persisting as major cause for neonatal mortality in developing country like Ethiopia and the study area in particular.

Therefore the study give a base line on determinant factors of low birth weight in the study areawhich will help in improving care and prevention of new born at risk of being low birth weight that has great contribution for neonatal death in the study area.

Materials and Methods

Study design, area and period

Facility based unmatched case control study was conducted among mothers who gave birth to live new born in selected public hospitals of West Wollega Zone from April 15-July 15, 2019. The Zone is found at a distance of 441km from Addis Ababa located west of the country. West Wollega is divided into 21 districts and 3 town administrations.Based on the 2019 report, total projected population size of the zone is 1,872,601 from these 1,058,019 were males and 814,582 were females among this 345,120 were reproductive age women. The zone possesses Woinadega weather condition. West Wollega has a total of 7 hospitals (5 public and 2 non-governmental). In addition the zone has 67 health centers, 337 private clinics (21 medium and 316 small clinics), 36 rural drug venders and 51 drug stores.

Population

Cases were term babies weigh <2500grams and controls was term babies weigh ≥2500 grams. All live births at hospitals in west Wollega and all term, live births in selected hospitals in west Wollega were source population and study population of the study respectively. All term, live and none twin births were included both for case and controls where pre term new born with congenital abnormality and mother who was seriously ill during interview were excluded from the study.

Sample size determination

Sample size determination was made using double population proportion formula by considering 95% confidence level, 80% power and control to case ratio of 3:1.The sample size determination was made for four predictors of Low Birth Weight separately (Maternal food insecurity status, age of mothers(<20), maternal educational status and place of residence) and the one yielded maximum was taken to calculate the final sample size of the study.Based on this, with additional 10% non response rate the final sample size was calculated to be 292(73 cases and 219 controls) using the following formula.

$$n = \frac{(r+1)}{r} \frac{(\bar{p})(1-\bar{p})(Z_{\beta} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

p= (P1+P2)/2=(0.403+0.217)/2=0.31

n= (3+1)/3(0.31)(1-0.31)(0.84+1.96)²/(0.403-0.217)²

n =4/3(1.68/0.034)=66=(with additional 10%)=73

Therefore n=292(73 cases, 219 controls)

n=Sample size,

r= Ratio of control to case (3:1)

p=Average proportion of p1 and p2,

p1=Proportion among exposed (40.30%),

p2= Proportion among control (21.70%)

Zα/2=Standard level of significance (1.96),

Z□=Desired power (80%).

Sampling procedures

West Wollega has a total of seven hospitals, five governmental and two non- Governmental. From these, four hospitals were selected randomly. Sample size was cascaded to each selected hospitals by considering average institutional delivery in the last two months before actual data collection in each hospitals. Then allocation of the final sample size to each health facility was made using proportion of institutional delivery in the facilities. In the selection of cases and controls delivery registration log book was used as list of new born baby in each facility. In each selected health facility all low birth weight those fulfilled the eligibility criteria during the study period were included and three eligible newborns were selected using simple random sampling technique next to each case as the controls. Neonatal birth weight was made immediately after birth using standard baby weighting scale and data collection and interview was done after delivered mothers become stabled and transferred to post natal room using interviewer administered questionnaire.

Data collection tool and procedure

Data was collected using structured interviewer administered questionnaire that was adopted from reviewed literature. The questionnaire was first prepared in English and translated into Afaan Oromo (the regional language) for data collection. The 6 sections: Socio demographic characteristics, obstetric characteristics, ANC service section and maternal behavior during pregnancy, maternal health condition during pregnancy and nine generic questions to measure food insecurity status. One two nurses and one public health professional supervisors involved in data collection after having training on every aspects of data collection for this study. The new born weight was measured in gram using standard baby weighting scale in the delivery room immediately after birth by trained health professional and the trained data collectors used the measured new born weight for this study. After the mother become stabled maternal MUAC was taken using MUAC tape meter to estimate nutritional status.

Measurements

In this study, birth weight is defined as; the first weight of new born immediately after birth. Low birth weight is defined as; the first weight of new born less than 2500 grams.House hold food security: In this study, household food security is defined as; physical and economic access to all members at all time to sufficient food for active and healthy life.Food insecurity status was assessed and labeled as secure and insecure. Based on the house Hold Food Insecurity Access Scale (HFIS) of the Food And Nutrition Technical Assistance (FANTA) which was developed by USAID, the house hold food

insecurity status was assessed by questionnaire consists of nine occurrence questions and nine frequency of occurrence that were asked at each occurrence to determine how often the condition occurred. According to this scale, a given house hold is classified as food secure if no to all the nine questions or rarely for only question number one. If yes and the frequency is sometimes or often for question number one or rarely, sometimes, often for question number two or rarely for question number three and four that house hold has mild food insecurity. On the other hand if yes and the frequency is sometimes, often for question number three and four or rarely, sometimes for question number five and six the household has moderate food insecurity. Lastly, if yes and the frequency is often for question number five and six or rarely, sometimes, often for question number seven to nine, the household has severely food insecure. In this study, house hold food insecurity is defined as limited or uncertain access to adequate food and healthy nutrition or uncertain ability to acquire food in a socially acceptable way.MUACisalso defined as a measurement of mid upper arm circumference of pregnant women to check her nutritional status as, normal for ≥ 23cm andnot for <23cm.

Data quality assurance

The questioner was prepared in English and translated into Afan Oromo (the regional language). The pre-test was done to insure clarity, wording, and logical sequence and skip pattern of the tool. Training was given to the data collectors on the objective of the study, technique and procedure that should be followed during interview and anthropometry measurement. Data collectors and supervisors were informed on the steps to be followed during MUAC measurement, the standardization and the importance of measuring the new born baby with light close and re-measure the close to know the exact weight of the baby. Close supervision was done by supervisors. Collected data was checked for completeness every day after data collection.

Data processing and analysis

After collection,data was coded and entered in to EPI info version 7:2:1 and exported to SPSS version 24 for analysis. Descriptive statistics was computed for each study variables and summarized by using frequency and percentage. The outcome variable was labeled as case for birth less than 2500 g and control for birth weight greater or equal to 2500 g. Then cases were coded with number one and controls were coded with zero.

Bivariate analysis was done to compare low birth weight with each independent variable and to identify the candidate variables for the final model. Variables with P-value <0.25 were selected as a candidate for multiple logistic regression model to identify association between dependent and independent variables.Then, adjusted odds ratio with 95% confidence interval was calculated. Finally variables with P-value <0.05 at multivariable model were considered as statistically significant predictors of the outcome variable. The necessary assumption of logistic regression like goodness of fit of the final model was checked using Hosmer Lemeshow test considering good fit at P-value ≥ 0.05 and omnibus likelihood test <0.05, normality by using histogram and presence of Multi collinearity by using variance inflation factor were checked.

Results

Socio-demographic characteristics ofthe study respondents

In this study a total of 292 mothers with new born baby comprising 73 cases and 219 controls were interviewed making response rate of 100%. From the study participants 275(94.2%) of households were headed by their husbands. About 126(43%) of mothers were in the age group of 25-29 years. Among these 31(42.5%) of mothers were in cases and 95(43.4%)were in controls. The mean (±SD) age of the mothers was (24.7(±3.9) years. Majority of the respondents 181(62%) were Protestants. About 222(76%) of mothers were educated from these, majority of them 192(87.7%) were in controls and 30(41.1%) were in cases. One hundred twenty two (41were in cases. One hundred twenty two (41%) of the family income 29(39.7%) in cases and 93(42.5%) in controls was below 2400.00 Ethiopian birr per monthly (Table 1).

Variables		Birth Weight			
		Low		Normal	
		No:	%	No:	%
Head of house hold	Male	70	95.9	205	93.6
	Female	3	4.1	14	6.4
Age of mothers	15-19	5	6.8	8	3.7
	20-24	28	38.4	87	39.7
	25-29	31	42.5	95	43.4
	≥30	9	12.3	29	13.2
Religion	Orthodox	19	26	59	27
	Protestant	47	64.4	134	61.2
	Muslim	6	8.2	21	9.6
	Other	1	1.4	5	2.3

Educational status of mothers	Educated	30	41.1	192	87.7
	Un educated	43	58.9	27	12.3
Educational level of mothers	Primary	12	40	93	48.4
	Secondary	10	33.3	50	26
	Higher	8	26.7	49	25.5
Occupation of mothers	Government employer	4	5.5	24	11
	Private employer	3	4.1	23	10.5
	Farmer	27	37	59	27
	Merchant	5	6.8	21	9.6
	House wife	33	45.2	89	40.6
	Other	1	1.4	3	1.4
Residence	Urban	36	49.3	105	47.9
	Rural	37	50.7	114	52.1
Educational status of husband	Educated	68	93.2	202	92.2
	Un educated	5	6.8	17	7.8
Educational level of husbands	Primary	25	36.8	68	33.7
	Secondary	21	30.9	66	32.7
	Higher	22	32.3	68	33.7
Occupation of husband	Government employer	15	20.5	56	25.6
	Private employer	10	13.7	24	10.9
	Farmer	36	49.3	99	45.2
	Merchant	9	12.3	35	16
	Other	3	4.1	5	2.3
No of people living in the house	1-3	29	39.7	74	33.8
	≥4	44	60.3	145	66.2
Monthly income	<2400	29	39.7	93	42.5
	2400-9300	44	60.3	126	57.5
Floor of the house	Earth	53	72.6	126	57.5
	Cement	15	20.5	76	34.7
	Wooden	5	6.8	17	7.8
Roof of the house	Grass	17	23.3	42	19.2
	Corrugated	56	76.7	177	80.8
Wall of the house	Mud and wood	49	67.1	154	70.3
	Cement block	11	15.1	35	16
	Sand and stone	13	17.8	30	13.7

Table1: Socio-demographic characteristics of mothers and their respective new born birth weight among selected hospitals in West Wollega, September, 2019.

Obstetric characteristics of the study respondents

From the total study participants, 155(53%) of the new born baby were female, 39(53.4%) in cases and 116(53%) controls. About 50(68.5%) of mothers of cases and 156(71.2%) of mothers of controls were gravida two and above. Nearly 111(54%) of mothers were told the birth weight of the new born baby in the previous birth, 27(54%) cases and84(53.8%) controls where 2(7.4%) of cases and7(8.3%) of controls reported that they had history of low birth weight. Majority 174(84%) of mothers who had gave birth to two and above 35(70%) in cases and 139(89.1%) in controls had birth interval of greater than 24 months between current and last delivery. About42(14%) of mothers 24(32.9%) in cases and 18(8.2%) in controls reported that they gave first birth at the age of below 18 years. About one third76(26%) of maternal mid upper arm circumference 40(54.8) in cases and 36(16.4%) in controls were less than 23cm.

The study depicted that all most all 277(95%) of mothers attended antenatal care during the current pregnancy of which 244(88%) of them 51(74%) cases and193(92.8%) controls attended four times and above. Among those attended ante natal care, only 43(62.3%) of cases and 186(89.4%) of controls started the first antenatal visit as early as possible during the first trimester. Majority 246(84%) of pregnant mothers 64(87.7%) cases and 182(83.1%) controls received iron folate where 53(72.6%) of cases and 163(74.4%) of controls received nutritional counseling during the current pregnancy (Table 2 andTable 3).

Variables		Birth Weight			
		Low		Normal	
		No:	%	No:	%
Sex of new born	Male	34	46.6	103	47
	Female	39	53.4	116	53
Gravidity	1	23	31.5	63	28.8
	≥ 2	50	68.5	156	71.2
Previous live birth	No	1	2	0	0
	Yes	49	98	156	100
Previous still birth	No	44	88	137	87.8
	Yes	6	12	19	12.2
Know previous birth weight	No	23	46	72	46.2
	Yes	27	54	84	53.8
previous birth weight	Small	2	7.4	7	8.3
	Normal	25	92.6	77	97.7
Birth interval in months	<24	15	30	17	10.9
	≥24	35	70	139	89.1
Age at first birth	<18	24	32.9	18	8.2
	≥18	49	67.1	201	91.8
Current pregnancy planned	No	3	4.1	10	4.6
	Yes	70	95.9	209	95.4
MUAC of mothers	<23cm	40	54.8	36	16.4
	≥ 23cm	33	45.2	183	83.6

Table2: Obstetric characteristics of mothers and their respective new born birth weight among selected hospitals in West Wollega, September, 2019.

Variables		Birth Weight			
		Low		Normal	
		No:	%	No:	%
Attended ANC	No	4	5.5	11	5
	Yes	69	94.5	208	95
No: ANC Visit	<4	18	26	15	7.2
	≥ 4	51	74	193	92.8
Months at ANC started	≥ 4	26	37.7	22	10.6
	<4	43	62.3	186	89.4
Dewormed	No	67	91.8	190	86.8
	Yes	6	8.2	29	13.2
Iron folate received	No	9	12.3	37	16.9
	Yes	64	87.7	182	83.1
Duration iron folate received	<3months	33	51.6	108	59.3
	≥3months	31	48.4	74	40.7
Nutritional counseling in pregnancy	No	20	27.4	56	25.6
	Yes	53	72.6	163	74.4
Counseling on toxic substance in pregnancy	No	27	37	88	40.2
	Yes	46	63	131	59.8

Table3: ANC Service utilization of mothers and their respective new born birth weight among selected hospitals in West Wollega, September, 2019.

Health condition and food insecurity status of respondents

In thisstudy, 31(10.6%) of mothers 17(23.3%) of cases and 14(6.4%) of controls had history of Pregnancy induced hypertension and 44(15%) (34.2% of cases and 8.7% of controls) and only 8(3%) had history of malaria during the current pregnancy (Table4).

Variables		Birth Weight			
		Low		Normal	
		No:	%	No:	%
Drink alcohol	No	73	100	211	96.3
	Yes	1	1.4	8	3.7
Chew chat	No	71	97.3	216	98.6
	Yes	2	2.7	3	1.4
Smoke	No	73	100	217	99.1
	Yes	1	1.4	2	0.9
Any smoker in the house	No	70	95.9	205	93.6
	Yes	3	4.1	14	6.4

Any food discouraged due to cultural reason	No	63	86.3	195	89
	Yes	10	13.7	24	11
Hypertension	No	56	76.7	205	93.6
	Yes	17	23.3	14	6.4
Anemia	No	48	65.8	200	91.3
	Yes	25	34.2	19	8.7
Malaria	No	72	98.6	212	96.8
	Yes	1	1.4	7	3.2
Known chronic disease	No	73	100	213	97.3
	Yes	2	2.7	6	2.7

Table4: Maternal exposure to addictive substance, health condition and their respective new born birth weight among selected hospitals in West Wollega, September, 2019.

Based on the house Hold Food Insecurity Access Scale (HFIS) all mothers who participated in this study were assessed about their household food insecurity status.Majority of mothers reported that their house hold had no enough food 26(35.6%) in cases and 38(17.4%) in controls followed by house hold member eat limited variety of food 21(28.8%) in cases and 26(11.9%) in controls due to lack of resources in the last six months before the study. But, no mother reportedto stay day and night without eating anything because of not having enough food. Based on this, 95(32.5%) were food insecure, 39(53.4%) in cases and 56(25.6%) in controls. More than half, 55(57.9%) were mild 19(48.7%) in cases and 36(64.3%) in controls), 32(33.7%)were moderate 13(33.3%) in cases and 19(34%) in controls and 8(8.4%) (18% in cases and 1.8% in controls) were severe food insecure (Table 5).

Variables		**Birth Weight**			
		Low		**Normal**	
		No:	**%**	**No:**	**%**
Worry about meal	No	47	64.4	181	82.6
	Yes	26	35.6	38	17.4
No eat kind of food preferred	No	53	72.6	198	90.4
	Yes	20	27.4	21	9.6
Eat limited variety of food	No	52	71.2	193	88.1
	Yes	21	28.8	26	11.9
Eat food not want to eat	No	60	82.2	211	96.3
	Yes	13	17.8	8	3.7
Eat smaller meal	No	58	79.5	207	94.5
	Yes	15	20.5	12	5.5
Eat fewer meal in a day	No	64	87.7	217	99.1
	Yes	9	12.3	2	0.9
Ever no food to eat of any kind	No	70	95.9	219	100
	Yes	3	4.1	0	0
Sleep hungry at night	No	68	93.2	218	99.5

	Yes	5	6.8	1	0.5
Go a whole day and night without eating	No	73	100	219	100
	Yes	0	0	0	0
Food insecure	No	34	46.6	163	74.4
	Yes	39	53.4	56	25.6
Level of food insecurity	Mild	19	48.7	36	64.3
	Moderate	13	33.3	19	34
	Severe	7	18	1	1.8

Table 5: Food insecurity status of mothers and their respective new born birth weight among selected hospitals in West Wollega, September, 2019.

Determinants of low birth weight among live births in the study area

Bivariate logistic regression was done between each independent variables and low birth weight to select candidate variables for the final model. Candidate variables werefurther analyzed using multiple logistic regressions to see their independent effect on the low birth weight. The result of multiple logistic regression showed that Educational status of mothers was associated with low birth weight. The odds of low birth weight was 5 times (AOR(95%CI)=5(1.8-14)) higher among uneducated mothers compared to their counterparts. The odds of low birth weight was four times more (AOR(95%CI)=4(1.1-15)) among women who gave the first birth at age youngerthan 18 years than those who gave birth at the age ≥ 18 years. Similarly, the odds of low birth weight was 4.6 times more (AOR (95%CI)=4.6 (1.2-18))for those <24 months birth interval compared to their counterparts.

Late antenatal visit initiationafter first trimester was positively associated with low birth weight compared to those started first ANC visit earlier during first trimester of gestational age (AOR(95%CI)=4.4(1.3-15.7))whereas pregnancy related hypertension was also associated with low birth weight (AOR(95%CI)=3.6(1.03-12.9)).Odds of low birth weight was about three times (AOR(95%CI)=2.9(1.05-8)) more among new born baby born to mothers of food insecure households compared to mother from food secure households.Maternal mid upper arm circumference of less than 23cm was alsopositively associated with low birth weight (AOR(95%CI)=11(4-35)) (Table 6).

Variables		**Birth Weight**	**COR With 95% CI**	**AOR With 95% CI**			
		Low/Case			**Normal/Control**		
		No:			**%**	**No:**	**%**
Educational status of mothers	Educated	30	41.1	192	87.7	1	1
	Un educated	43	58.9	27	12.3	10.2(5.5-18.9)	5(1.8-14)
Birth interval in months	<24	15	30	17	10.9	3.5(1.6-7.7)	4.6(1.2-18)
	≥ 24	35	70	139	89.1	1	1
Age at first birth	<18	24	32.9	18	8.2	5.5(2.8-10.9)	4(1.1-15)
	≥ 18	49	67.1	201	91.8	1	1
No. ANC Visit	<4	18	26	15	7.2	4.5(2.1-9.6)	2.9(0.75-11)
	≥ 4	51	74	193	92.8	1	1
Months at ANC started	≥ 4	26	37.7	22	10.6	5.1(2.6-9.7)	4.4(1.3-15.7)
	<4	43	62.3	186	89.4	1	1
Hypertension	No	56	76.7	205	93.6	1	1
	Yes	17	23.3	14	6.4	4.4(2-9.5)	3.6(1.03-12.9)
Anemia	No	48	65.8	200	91.3	1	1
	Yes	25	34.2	19	8.7	5.5(2.8-10.8)	2(0.57-7.3)
MUAC of mothers	<23cm	40	54.8	36	16.4	6.16(3.4-11)	11(4-35)
	≥ 23cm	33	45.2	183	83.6	1	1

Food insecure	No	34	46.6	163	74.4	1	1
	Yes	39	53.4	56	25.6	3.34(1.9-5.8)	2.9(1.05-8)

Table 6: Multiple logistic regressions result of determinant factors associated with low birth weight among new born baby in West Wollega, Ethiopia, 2019.

Discussion

The study depicted that determinants of that low birth weight among live new born in West Wollega hospitals were: House hold food insecurity, maternal MUAC, Late initiation of ANC visit, birth interval of less than 24 months between current and last birth and age at first delivery. Theodds of low birth weight were about three times higher in mothers found in household food insecurity than those in food secure.This finding was in line with the study conducted in Pakistan which stated that, food insecure women had about 5 times increased risk of delivering a low birth weight neonate and concluded that food insecurity in pregnancy along with socio economic statuses are associated with low birth weight in neonates.The finding was also consistent with the study conducted in Ethiopia, Addis Ababa which showed that mothers in food insecure household were more likely to deliver low birth weight baby.This might be due to the fact that, during pregnancy there is an increased demand of nutrition, as a result pregnant women must have adequate quality and quantity of food. But food insecure mothers had limited or uncertain availability of nutritionally adequate food which prevents them from meeting guide line for healthy eating during pregnancy and leads to have low birth weight.

Maternal Mid Upper Arm Circumference (MUAC) was the other factor determinant of low birth weight in the study area where odds of low birth weight were more among mothers with MUAC measurement of less than 23cm compared to those with greater than 23cm. this finding is in line with the study conducted in Addis Ababa which pointed out that MUAC is an indicator of maternal nutritional status and birth outcome depend on maternal condition.This study revealed that, birth interval of less than 24 months between the current and last delivery was a risk factor for low birth weight. According to this finding; Neonates born at less than 24 months interval had 4.6 times increased risk of low birth weight.The finding was similar with the study conducted in Bale Zone and North-west Ethiopia which indicated that short inter pregnancy interval of less than 24 months was associated with low birth weight.This might be because of close interval of pregnancy and period of lactation worsen the mothers nutritional status and there is no adequate time for the mother to recover psychological stress of the last pregnancy.

Giving birth early before the age of 18 years increased risk of having low birth weight neonate as compared to their counterparts. The study was consistent with the study conducted in India.This might be due to the fact that the body of adolescent was not well developed to nourish and accommodate the fetus. In this study area, odds of giving low birth weight baby were more among uneducated mothers compared to those educated mothers. This is in line with finding from Ethiopian demographic and health survey 2016and North Shoa which showed that births to mothers with no education are more likely to have low birth weight compared with births to women with education. This might be because, educated women can get access to job opportunity which enable them find better medical services like early prenatal care and get treatment for other medical problems. Educated women are also take better care of them and make more informed decisions on the care of unborn fetus.

Hypertension was maternal medical problem associated with low birth weight. Mothers who had history of hypertension during pregnancy had about 3.6 times increased risk of having low birth weight compared with those without hypertension during pregnancy and this concurrent with a review of low birth weight in Ethiopia. Early initiation of Antenatal care visit is one of the most important means of maintaining fetal and maternal well being. The study depicted that, late initiation of prenatal care afterfirst trimester increaserisk of low birth weight compared with the counterpart. This is due to the fact that pregnant women who did not start antenatal care services as early as possible might have missed full package of prenatal care services. Screening of medical problem, counseling on eating balanced diet and additional feeding during pregnancy as well as discouraging harm full addiction like smoking and alcohol consumption had better if done at early stage of pregnancy. Despite this the study had limitations. First the source of case and controls were hospitals, and home delivery was not considered neither as case nor controls. Secondly this study design cannot calculate absolute risk. Thirdly, there might be recall bias for some variables and social desirability bias for variables like house hold food security.

Conclusion

The study showed that household food insecurity was a determinant factor of low birth weight. Maternal education, Birth interval of <24 months, age at first birth of<18 years, late initiation of first ANC services, pregnancy induced Hypertension and maternal mid upper arm circumference of <23cm were also determinant of low birth weight in the study area.The government and local stake holders should emphasize and give aid for pregnant mothers in households with food insecurity. In addition to this community, health care provider and health system should promote pregnant mothersfor early screening/detection/of medical and obstetric problem as well as maternal nutritional status. Further prospective cohort study should indicate the clear association between maternal nutrition or household food security and pregnancy out come in this study area.

Declaration

Ethical consideration

Ethical clearance was obtained from Wollega University, School of graduate studies Ethical Review committee. Permission for conducting the study was secured from each Hospital administration. Written consent was obtained from all the study participants at each hospital after they had briefed about the objectives and the aim of the research.

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Authors Contribution

BT is the principal investigator involved in the proposal development, analysis of the data, interpretation of the data, report writing, and manuscript preparation. HB and MD involved in the preparation of the manuscript and reviewing the paper. All authors have reviewed and approved the submission of the manuscript.

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