

# Low Birthweight and its Associated Factors During the Era of COVID 19 at Assosa General Hospital, Western Ethiopia, 2020

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## Research Article

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# Abstract

**Introduction:** Low birth weight (LBW) is birth weight less than 2.5 kg regardless of gestational age. The prevalence of low birth weight in developing countries is 16.5%. And it will help policy makers, health system planners, health care managers, and clinicians to perform evidence-based work and also help to contribute its own role to the achievement of World Health Organization goals by 2025. This study aims to assess low birth weight and its associated factors during the era of COVID 19 at Assosa General Hospital.

**Method:** A hospital-based cross-sectional study was conducted from December 01, 2020 to February 01, 2021 at Assosa General Hospital. A total of 335 samples were selected. Allocation was performed using the systematic random sampling technique. Data were collected using a structured questionnaire through interview and chart reviewing. It's checked for completeness and consistency. Then entered into Epi-Info and analyzed by using SPSS software version 22. First, descriptive analysis was carried out then, bivariate analysis was used to identify variables with p value of less than 0.25. Variables with p value < 0.25 were entered into multivariate logistic regression analysis was used and confounding effect was controlled. Finally, those variables with p-value < 0.05 were identified as significant determinants of LBW.

**Result:** The response rate of this research was 100%. Based on this study, the prevalence of LBW was 11%. Variables like no antenatal care [(AOR = 9; 95% CI 1.2 – 66)], fear of COVID19 is reason for Missed ANC follow up [(AOR = 9; 95% CI 1.2 – 66)] and type of pregnancy [(AOR = 6.35; 95% CI 1.7 – 23)] were identified as significant factors for this study.

**Conclusion and Recommendations:** The prevalence of LBW in the era of COVID 19 was 11%. The associated factors of low birth weight are no antenatal care visit (ANC) during pregnancy and pregnancy type. So, concerned bodies were recommended to do more and more on ANC follow-up.

## Introduction

Low birth weight (LBW) is a birth weight less than 2.5 kg regardless of gestational age (1). LBW infants are 20 times more at risk to develop complications and die as compared to normal-weight neonates (2). LBW is a key factor that affects about 15.5% of all newborns and that puts them at a higher risk of neonatal illness and death (3).

Globally, around 15–20% of birth are LBW; hence, it is considered as a great public health concern. Greater than twenty million infants, (15%) percent of all births, were born with LBW. The incidence of LBW in developing countries (16.5%) is more than double when compared with that in developed regions (7 percent). In sub-Saharan Africa, its accounts for 15%(4).

Hereafter, the World Health Organization noted a policy that targets to reduce LBW by 30% by the end of 2025.

The magnitude of LBW in third-world countries is 16.5% or twice higher than that in first-world countries (7%) (5).

In Ethiopia, still now LBW is considered as an agenda for the government, because it's a good indicator of the health of infant, and, also a major factor that determines the infant's physical, survival, and mental growth. It is also the main factor of infant and childhood illness, predominantly impairment of neurodevelopment problems such as mental retardation, inhibited growth and cognitive development, and chronic diseases later in life and learning challenges (4, 6).

It also leads to long-term handicap (7). It is associated with long-term morbidity during adulthood (8); weight at birth is a relevant indicator for the quality and development of fetus and a predictor of health throughout its life course (9).

The death of LBW babies is 40 times more than that for normal weight babies(10).

This is based on epidemiological observations that infants weighing less than 2,500 g are approximately 20 times more likely to die than heavier babies (7).

Therefore, the aim of this study is to assess the prevalence and associated factors of LBW at Assosa General Hospital.

This study will help policy makers, health system planners, health care managers, and clinicians to perform evidence-based work and it also helps to contribute its own role to the achievement of World Health Organization goals by 2025.

## **Objectives**

### **General Objective**

To assess to assess the prevalence and associated factors of LBW during the era of COVID 19 at Assosa General Hospital, Western, Ethiopia, 2020

### **Specific Objective**

To assess the prevalence of low birth weight during the era of COVID 19 at Assosa General Hospital, Western Ethiopia, 2020

To determine factors associated with low birth weight during the era of COVID 19 at Assosa General Hospital, Western Ethiopia, 2020

## **Methods And Materials**

### **Study Area**

The study was conducted in Assosa General Hospital, which is the capital city of Benishangul Gumuz regional state. It is located 661 km far from Addis Ababa in the Western part of Ethiopia.

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia, The Benishangul-Gumuz Region has a total population of 784,345, of which, 398,655 were men and 385,690 were women. The hospital serves for many other hospitals and kebeles. Obstetrics and gynecology wards have separate labor, delivery, and postnatal care services and have family planning, high-risk maternity, antenatal care (ANC), and gynecological outpatient departments.

## Study Design and study period

Hospital-based cross-sectional study was conducted among mothers who delivered in Assosa General Hospital from December 01, 2020 to February 01, 2021.

## Population

### Source Population

All mothers who gave birth at the Assosa General Hospital.

### Study Population

All mothers who gave birth at the Assosa General Hospital in our study area and study period.

### Sample Size Determination

The required sample size was determined using single population proportion formula by taking 14.9% from similar research performed at two hospitals in the delivery clinics of Northwest part of Ethiopia(11).

By using the 95% CI and 5% marginal error (d)

$$N = \frac{(Z_{\alpha/2})^2 \cdot p(1-p)}{d^2}$$

where n = number of sample size

$(Z_{\alpha/2})$  = the value of a under standard normal table for the given value of confidence level = 1.96

$d^2$  = margin of error

P = prevalence of low birth weight = 14.9%

$$\text{Therefore, } n = \frac{(1.96)^2 \cdot 0.149(1-0.149)}{(0.04)^2} = 304.4$$

by adding 10% of the nonresponse rate. The final total sample size was 335.

## **Sampling Techniques and its Procedure**

Systematic random sampling was used to select the study participants. According to previous delivery reports of the Assosa General Hospital, the delivery rate is 1010 per quarter of a year. Our data collection period was for 2 months. Therefore, during our data collection period, we expected around 674 women for delivery. Therefore, for data collected from 335 women, we have used a k value of 2. The lottery method was used to get the initial study participants. Finally, study participants were enrolled to this study with every two intervals.

## **Inclusion and Exclusion Criteria**

### **Inclusion Criteria**

All mothers who gave live birth during the study period and after birth with no missing information were included in this study.

### **Exclusion Criteria**

Neonates with congenital anomalies and still birth were excluded in this study.

## **Data Collection process**

Newborns whose weight was measured within one hour of delivery were enrolled in this study. Data were collected from the selected mothers through interview and newborn chart review to find variables.

## **Data quality control and data analysis**

Data were checked for completeness and consistency and entered to Epi info, and it was then exported to SPSS version 22 for analysis. First, data management was performed. A descriptive analysis was then performed to determine the prevalence of LBW. Bivariate analysis was used to check whether the independent variables was associated with the dependent variable. Those variables with p-value of  $< 0.25$  in bivariate logistic regression analysis were included in the multivariate logistic regression analysis for controlling the possible effect of confounders. Finally, variables with P-value  $\leq 0.05$  were identified as significantly associated factors.

## **Operational Definitions**

**Birth weight** – is the first weight of the newborn obtained after birth. For live births, birthweight should preferably be measured in the first hour of life.

World Health Organization defines low birth weight (LBW) as birth weight less than 2500 g irrespective of gestational age (1).

## **Study Variables**

## Dependent Variable

Low birth weight (LBW)

## Independent Variables

- **Socio demographic characteristics** such as maternal age, maternal occupation, religion, ethnicity, marital status and residence, educational status of mother and father
- **Maternal lifestyle** (chat chewing, drinking alcohol, cigarette smoking)
- **Maternal medical and obstetrics related characteristics** such as PIH, maternal weight, gravidity, parity, birth interval, history of abortion, renal disease, GA at birth, ANC follow up, fear of COVID19 is reason for Missed ANC follow up, number of ANC follow-up.
- **Nutritional factors** MUAC, BMI, maternal height, maternal weight
- **Neonatal factors** such as gestational age, newborn sex, birth interval, and number of children.

## Results

A total of 335 mothers were eligible to participate in the study, and we had a 100% respondent rate. The associated factors of LBW were no antenatal care visit (ANC) [(AOR = 9; 95% CI 1.2 – 66)] during pregnancy, fear of COVID19 is reason for Missed ANC follow up [(AOR = 9; 95% CI 1.2 – 66)] and type of pregnancy [(AOR = 6.35; 95% CI 1.7–23)].

## Sociodemographic Characteristics of Mothers

Among 335 mothers, the majority of them were in the age range of 20 to 24 and 25–29 years, respectively. Those mothers who are found to age greater than or equal to 35 account 26(7.8%).

One hundred seventy-nine of them were orthodox in their religion. The marital status of 320 (95.5%) mothers was married. The occupational status of mothers as government employee, private employee, merchant, housewife, student, and others was 225 (67.2%), 46(4.8%), 34(10.1%), 17(5.1%), and 13(3.9%) respectively.

Among all participants, around 239(71.3%) resided in the urban area (Table 1).

Table 1  
Sociodemographic characteristics of the participants at Assosa  
General Hospital, Ethiopia, 2020

<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>%</b>
<b>Age of Mother</b>	< 20	61	18.2
	20–24	122	36.4
	25–29	107	31.9
	30–34	19	5.7
	>/= 35	26	7.8
<b>Respondent Religion</b>	Orthodox	179	48.1
	Muslim	135	36.3
	Protestant	54	14.5
	Other	4	1.1
<b>Mother age</b>	15–19	10	2.7
	20–24	85	22.8
	25–30	126	33.9
	> 30	151	40.6
<b>Mothers' education</b>	Cannot read and write	6	1.8
	Read and write	23	6.9
	Primary	32	9.6
	Secondary and above	53	15.8
	Diploma and above	221	66
<b>Marital status</b>	Married	320	95.5
	Single	3	0.9
	Divorced	6	1.8
	Widowed	6	1.8
<b>Mother Occupation</b>	Government employer	225	67.2
	Merchant	46	4.8
	Housewife	34	10.1
	Student	17	5.1
	Other	13	3.9

<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>%</b>
<b>Ethnicity</b>	Amhara	130	38.8
	Oromo	68	20.3
	Shenasha	56	16.7
	Other	81	24.2
<b>Residence</b>	Rural	96	28.7
	Urban	239	71.3
<b>Monthly income</b>	< 1000	45	13.4
	1001–3000	56	16.7
	3001–5000	56	16.7
	> 5000	178	53.1

## **Lifestyle-related factors**

Based on this study, only 5(1.5%) of mothers had a history of chat chewing during pregnancy and around 143(42.7%) had a history of alcohol use. Types of fuel used were wood, kerosine, and electricity accounts 271(80.9%), 8(2.4%), and 56(16.7%), respectively. Twelve (3.6%) of mothers faced physical violence during pregnancy (Table 2).



Table 2  
Lifestyle- and health-related characteristics of mothers at Assosa General  
Hospital, Ethiopia, 2020

Variable	Category	Frequency	Percentage
History of Chat chewing	Yes	5	1.5
	No	330	98.5
History of Smoking	Yes	0	0
	No	335	100
History of Alcohol Use	Yes	143	42.7
	No	192	57.3
Separate room for kitchen	Yes	291	86.9
	No	44	13.1
Type of fuel used	Wood	271	80.9
	Kerosine	8	2.4
	Electricity	56	16.7
Physical Violence during Pregnancy	Yes	12	3.6
	No	323	96.4

## Obstetrics and medical related factors

The descriptive statistics of obstetrics-related factors are evidenced by different variables. Based on this finding, 141(42.1%) of mothers were Multipara, 13(3.9%) of the mother's pregnancy type were Multiple (twin). Mothers who had an ante nata care visits (ANC) were 316(94.3%) and mothers who did not had an ante nata care visits were 19(5.7%). Mothers who missed ANC due to fear of COVID 19 were 19(5.7%) whereas mothers who didn't fear COVID 19 during ANC visit were 316(94.3%) (Table 3).

Table 3

Obstetric- and medical-related characteristics of mothers at Assosa General Hospital, Ethiopia, 2020

Variable	Category	Frequency	Percentage
Parity	Multipara	141	42.1
	Primipara	194	57.9
Gravidity	Multigravida	145	43.3
	Primigravida	190	56.7
Pregnancy Type	Singleton	322	96.1
	Multiple	13	3.9
Pregnancy	Intended	310	92.5
	Unintended	25	7.5
ANC Visit	Yes	316	94.3
	No	19	5.7
Fear of COVID19 is reason for Missed ANC follow up	Yes	19	5.7
	No	316	94.3
Number of ANC Visit	One	26	7.8
	Two	113	33.7
	Three	89	26.6
	Four	88	26.3
Where did you visit ANC	Hospital	172	51.3
	Private Clinic	37	11
	Health Center	102	30.4
	Health post	5	1.5
Folic Acid Use	Yes	312	93.1
	No	23	6.9
Family Planning Use	Yes	303	90.4
	No	32	9.6
History of Abortion	Yes	27	8.1
	No	308	91.9

Variable	Category	Frequency	Percentage
History of APH	Yes	10	3
	No	325	97
History of PIH	Yes	18	5.4
	No	317	94.6
History of Anemia	Yes	39	11.6
	No	296	88.4
History of malaria during Pregnancy	Yes	40	11.9
	No	295	88.1
HIV Status	Non-Reactive	305	91
	Reactive	30	9

## Nutrition-related factors

Regarding nutritional factors, mothers who took additional diet during pregnancy were 317(94.6%) but who did not take additional diet were 18(5.4). During their pregnancy time MUAC measurement result of mothers was greater than or  $\geq$  22 centimeter. A total of 303 (99.4%) of them were weighing greater than or equal to 50 kg (Table 4).

Table 4  
Nutrition-related characteristics of mothers at Assosa General Hospital, Ethiopia, 2020

Variable	Category	Frequency	Percentage
Additional diet intake	Yes	317	94.6
	No	18	5.4
Maternal MUAC	< 22 cm	16	4.8
	$\geq$ 22 cm	319	95.2
Maternal Hight	< 150 cm	16	4.8
	$\geq$ 150 cm	319	95.2
Maternal Weight	< 50 KG	2	0.6
	$\geq$ 50 KG	333	99.4

## Newborn related factors

Those newborns with gestational age of < 37 weeks and  $\geq$ 37 weeks accounted for 34(10.1%) and 303(89.9%), respectively. The proportion of both sexes of newborns was approximately 50%. Forty six percent of these newborns were born with a birth interval of two to three years. From all study participants, households who had three to five children were 122(36.4%) (Table 5).

Table 5  
Newborn-related characteristics at Assosa General Hospital,  
Ethiopia, 2020

Variable	Category	Frequency	Percentage
Gestational Age	< 37 week	34	10.1
	$\geq$ 37 week	303	89.9
Sex	Male	161	48.1
	Female	174	51.9
Birth Weight	< 2.5 kg	36	10.7
	$\geq$ 2.5kg	299	89.3
Birth Interval	< 2	132	39.4
	2–3	154	46
	> 3	49	14.6
Number of Children	$\leq$ 2	97	29
	3–5	122	36.4
	$\geq$ 5	116	34.6

## Prevalence of LBW

Among 335 study participants, the prevalence of LBW is 11% (**Figure-1**).

## Factors Associated with LBW

Based on the study conducted, child age, no ANC follow-up, COVID19 is reason for Missed ANC and type of pregnancy were identified as significant factors for full vaccination (Table 6).

Table 6  
Bivariable and multivariable logistic regression analysis with p value less than 0.25

Variables	Category	Low birth weight		Crude OR (95% CI)	Adjusted OR (95% CI)	P Value
		Yes	No			
ANC follow-up	Yes	29(9.2)	287(90.8)	1	1	1
	No	7(36.8)	12(70.6)	5.7(2,15.8)	9(1.2,66)	<b>0.03</b>
Fear of COVID19 is reason for Missed ANC follow up	Yes	7(36.8)	12(70.6) 287(90.8)	5.7(2,15.8)	9(1.2,66)	<b>0.03</b>
	No	29(9.2)		1	1	1
Family Planning use	Yes	29(9.6)	274(90.4)	1	1	1
	No	7(21.9)	25(78.1)	0.4(0.15,0.95)	1,4(0.4,4.9)	0.57
Folic Acid Use	Yes	31(9.9)	281(90.1)	1	1	1
	No	5(21.7)	18(78.3)	2.5(0.9,7)	0.55(0.1,3.8)	0.55
Hx of Anemia	Yes	12(29.3)	29(70.3)	1	1	1
	No	24(8.2)	270(91.8)	0.2(0.09,0.47)	0.37(0.12,1.2)	0.084
Hx of Malaria	Yes	12(28.6)	30(71.4)	1	1	1
	No	24(8.2)	269(91.8)	0.23(0.1,0.45)	0.33(0.1,1)	0.56
Gestational Age	< 37	8(23.5)	26(26.5)	0.33(0.13,0.81)	1	0.13
	> 37	28(9.3)	273(90.7)	1	0.06(0.34,1)	
Pregnancy Type	Singleton	31(9.1)	291(63.2)	1	1	1
	Multiple	5(38.5)	8(61.5)	5.87(1.8,19)	6.35(1.7,23)	<b>0.006</b>
COR = Crude odds ratio; AOR = adjusted odds ratio; CI = confidence interval						

## Discussion

The prevalence of LBW at Assosa General hospital was 11%. Most of the studies conducted in Ethiopia agree with this study. In contrary to that, there are studies which showed high prevalence of LBW. Studies from different areas revealed that the prevalence of LBW at Adwa General Hospital, Northern Ethiopia was 10%(5), 9.4% at Southeast of Iran(12), 14.9% in Northwest part of Ethiopia(13), 15.8% at Wolaita Sodo University Teaching and Referral Hospital, Southern Ethiopia(14), 18% at Kambata-Tembaro zone, southern Ethiopia(15), 20.73% in Central region of India(16), 21% at Dire Dawa City, Eastern Ethiopia(17), and 24% at public hospital in North Wollo Zone, Amhara region Ethiopia(25). The variation in prevalence rate of low birth weight might be due to the variation in study area, study time, study sample size, infrastructure for health care, awareness, accessibility of health institution, and so on.

Based on our study, the identified associated factors of LBW were absence of antenatal care visit (ANC) and type of pregnancy.

Regarding antenatal care visit (ANC), mothers with no antenatal care visit (ACV) were 9 times more likely to have LBW infants than those who had antenatal care visits (ANC) (AOR = 9; 95% CI 1.2 – 66). This study is in line with a study conducted in Dessie, Amhara, Ethiopia (18), West Bengal, India (19), Ataye Primary Hospital, North Shoa, Ethiopia(20), Kambata-Tembaro zone, southern Ethiopia(15), Debreberhan Referral Hospital(21) Amhara Regional State Referral Hospitals of Ethiopia(22), Jimma Medical Center (JMC)(23), Northwest part of Ethiopia (22) and Northwest part of Ethiopia (13) In fact, this might be because in those mothers who had no ANC follow-up, there were difficulties in knowing health problems timely, like danger sign of pregnancy, and social misconducts that can affect the birth outcome of the neonate and if they did not have ANC visit at all, they may not receive iron supplementation and advise about lifestyle and nutrition.(24).

The other factor associated with low birth weight was fear of COVID19 is reason for Missed ANC follow up. Mothers who were missed ANC visit due to fear of COVID 19 were 9 times high likely to get LBW infants than those mothers who didn't have fear (AOR = 9; 95% CI 1.2 – 66). The reason for this might be, due to inaccessibility of personal protective equipment, lack of awareness or misunderstanding, increment of COVID 19 mortality and morbidity, poor screening and management of COVID and negligence of covid 19 prevention strategy.

The final factor associated with LBW is the type of pregnancy. Mothers who had a twin pregnancy were six times more likely to have LBW infants than who had a singleton pregnancy (AOR = 6.35; 95% CI 1.7– 23). This might be due to nutritional sharing of fetus from mother during pregnancy.

## Conclusions And Recommendations

The prevalence of LBW in the era of COVID 19 was 11%. The associated factors of low birth weight are no antenatal care visit (ANC) during pregnancy, fear of COVID19 is a reason for Missed ANC follow up and pregnancy type. So, concerned bodies were recommended to do more on ANC follow-up and misunderstanding of mothers COVID 19 and ANC.

## Abbreviations

**ANC** Antenatal Care

**APH** Ante Partum Hemorrhage

**AOR** Adjusted Odds Ratio

**BMI** Body Mass Index

**CI** Confident Interval

**COR** Crude Odds Ratio

**EDHS** Ethiopia Demographic and Health Survey

**FMOH** Federal Ministry of Health

**HIV** Human Immune Deficiency Virus

**IUGR** Intra Uterine Growth Restriction

**LBW** Low Birth Weight

**MUAC** Mid Upper Arm Circumference

**PIH** Pregnancy Induced Hypertension

**SGA** Small for Gestational Age

**SPSS** Statistical Package Social Science

**UNICEF** United Nations Children's Fund

**WHO** World Health Organization

## **Declarations**

### **Ethics approval and consent to participate**

Ethical approval was obtained from the ethical review committee of Assosa University, College of Health Sciences on behalf of the nursing department. It was conducted in accordance with the Declaration of Helsinki. Also, participants under 18 years of age were approved by the ethics committee to provide informed consent on their own behalf. A permission letter was written for Regional health bureau. Then, Regional health bureau wrote to Assosa General Hospital manager. Finally, Assosa General Hospital manager wrote a letter for maternity and neonatal unit. Then written informed consent was obtained from each study participant.

Consent for publication: Not applicable

Availability of data and material: All required data are available

### **Competing interests**

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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# Authors' Contributions

**MS, FA, ES, DM, HB, WA, DK:** All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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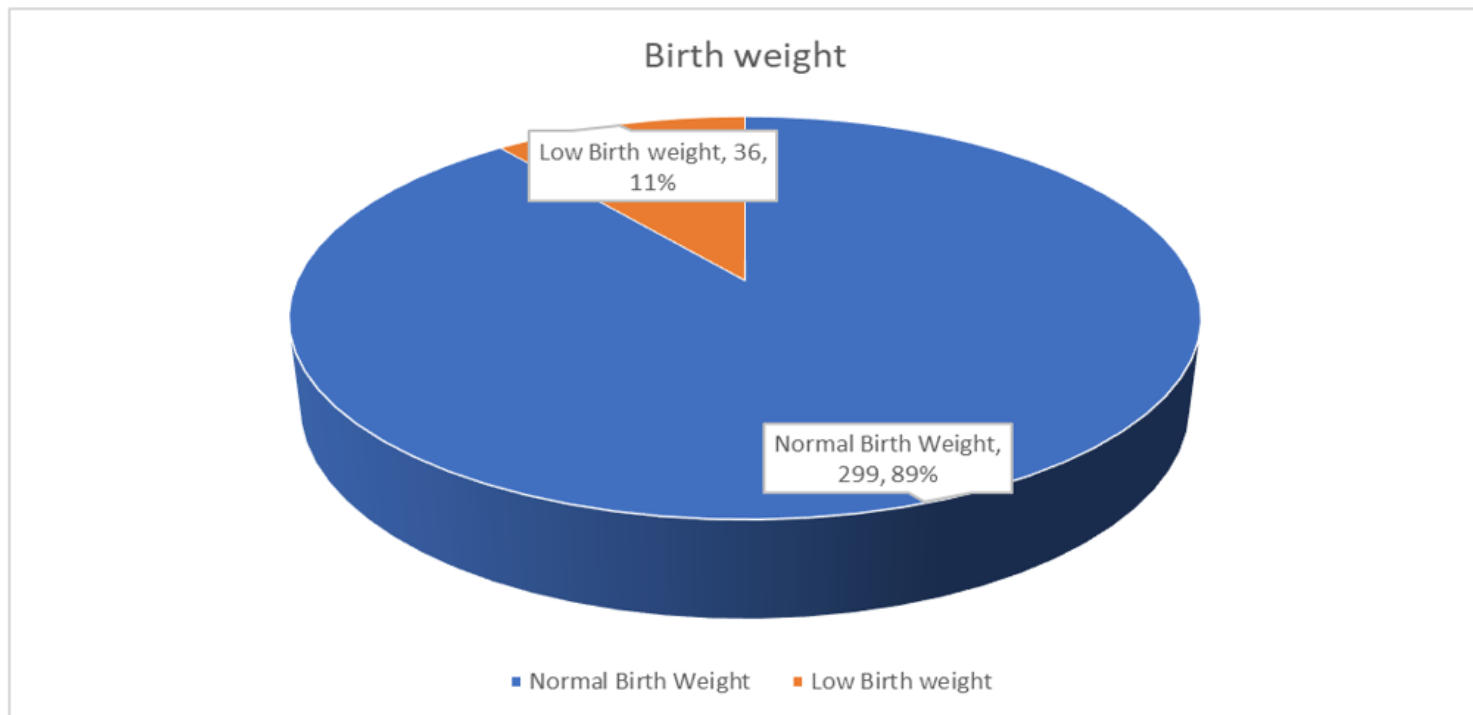
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## Figures



**Figure 1**

Pie chart of low birth weight during the era of COVID 19 at Assosa General Hospital, Ethiopia, 2020