

Research Article

# Proportion of Low Birth Weight (LBW) Among Newborn Babies Delivered at Dhaka Medical College Hospital

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## Abstract

**Background:** Low birth weight (LBW) remains a major public health problem especially in developing countries like Bangladesh. We assessed the proportion of LBW of the newborn babies delivered at DMCH and its associated maternal factors. **Methodology:** This cross-sectional descriptive study was conducted among 57 mother and newborn pairs delivered at Postnatal obstetrics wards of Dhaka Medical College Hospital (DMCH), Dhaka. Data was collected from each participants by face to-face interview using a semi-structured pre-tested questionnaire which included socio-demographic information and information about birth weight and its associated maternal factors. **Result:** This study involved 257 participants with a mean age of 25 years ( $\pm 4.26$ ), primarily aged 21 to 30 (64.97%). Approximately 38.13% had a monthly family income below 15,000 taka, and 10.98% of mothers were illiterate. One-third received 2 to 4 antenatal visits, with 8.56% having none. Delivery methods were nearly equal, with 49.02% vaginal and 50.97% cesarean. Common complications included PROM (14.39%), pre-term labor (11.67%), and GDM (10.89%). Term pregnancies accounted for 70%, while among preterm births, 20.23% were low birth weight (LBW) and 4.67% very low birth weight (VLBW), surpassing general population rates. **Conclusion:** Lack of regular antenatal care (ANC) visits and poor maternal diet significantly impact newborn birth weight. To reduce low birth weight (LBW), it is essential to monitor maternal diets and ensure at least four ANC visits for all mothers. LBW infants are at higher risk of mortality and chronic diseases, making its reduction vital for achieving Sustainable Development Goals (SDGs) on infant mortality. Further multi-center studies are needed to accurately assess LBW prevalence in Bangladesh.

## Keywords

LBW, Very LBW, Proportions, Bangladesh

## 1. Background

Low birth weight (LBW) remains a leading public health problem especially in developing countries like Bangladesh. It has been defined by the World Health Organization (WHO)

as weight of baby within one hour of birth to be less than 2,500 grams, based on epidemiological observations that newborns weighing less than 2,500 g are about 20 times more

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likely to die than heavier babies [1-3]. Low birth weight (LBW) is a significant factor contributing to increased risks of infant mortality, severe childhood illnesses, malnutrition, and impaired cognitive development. Approximately 20 million babies (15.5%) are born with LBW each year, with about 96% of these in low- and middle-income countries (LMICs) like Bangladesh. South Asia has the highest LBW prevalence globally at 28%, followed by sub-Saharan Africa (13%) and the Caribbean and Latin America (9%). In Bangladesh, LBW prevalence declined from 36% in 2004 to 22.6% in 2015, indicating progress [4-6]. LBW accounts for 60%–80% of neonatal deaths worldwide. Key risk factors include a history of premature delivery, maternal age extremes (under 18 or over 34), inadequate prenatal care, underweight mothers, short birth intervals, heavy physical work, poor nutrition during pregnancy, as well as conditions like anemia and hypertension [7-10]. Additionally, sociodemographic factors such as rural residence, illiteracy, low economic status, and experiences of intimate partner violence are also associated with an increased risk of LBW [11, 12].

As Dhaka Medical College is a tertiary care hospital that receives most complicated cases, it is essential to understand the proportion of low birth weight (LBW) infants delivered here, along with the socio-demographic and obstetric profiles of the mothers. Therefore, this study aimed to examine the proportion of LBW deliveries and the maternal characteristics associated with them at Dhaka Medical College Hospital.

## 2. Methodology

This cross-sectional descriptive study was conducted at the Obstetrics and Gynecology Department of Dhaka Medical College Hospital (DMCH) over six months, from July 2022 to December 2022. The study population included all live newborns delivered at DMCH during the study period and their mothers, excluding newborns with congenital anomalies and stillbirths. The sample size was calculated using the formula for proportion, assuming an estimated LBW proportion of 15% and a 5% margin of error. Data were collected using a structured questionnaire administered to mothers post-delivery and through medical records review. The questionnaire gathered information on socio-demographic characteristics, maternal medical and obstetric history, nutritional status, and antenatal care. Newborn birth weights were recorded within one hour of delivery.

The dependent variable was birth weight, categorized as LBW (<2500 grams) and normal birth weight ( $\geq$ 2500 grams). Independent variables included sociodemographic characteristics (maternal age, family income, parents' education and occupation, religion, age of marriage), maternal medical and obstetric characteristics (parity, abortion history, pregnancy interval, antenatal visits, pregnancy complications), nutritional status (additional diet, iron and folic acid supplementation), and newborn characteristics (sex, gestational age, birth order). Data analysis was performed using SPSS version

25, with descriptive statistics summarizing the data. Ethical approval was obtained from the Ethical Review Committee of DMCH, and informed consent was secured from all participants. Confidentiality was maintained, and quality control measures included training data collectors, pretesting the questionnaire, and supervising data collection. This methodology aimed to comprehensively assess the proportion of LBW and associated maternal factors among newborns at DMCH.

## 3. Result

A total of 257 participants were enrolled in this study. The mean age of the participants was 25 years ( $\pm$ 4.26 years), with the majority (64.97%) falling within the 21 to 30 age group. Only 7.39% of the mothers were above 36 years of age. More than one-third of the participants (38.13%) reported a monthly family income of less than 15,000 taka, while only 10.5% had a monthly income exceeding 50,000 taka. Additionally, 10.98% of the mothers were illiterate, and nearly one-third (33.8%) had completed secondary education. In terms of paternal education, only one-fourth (24.9%) had attained education beyond the higher secondary level. A significant proportion of fathers were employed as day laborers (38.13%), while 26.84% were in service-related jobs [Table 1].

Regarding obstetric history, one-third of the mothers had received between 2 to 4 antenatal visits, and 31.12% had more than 4 visits. It is concerning that 8.56% of the mothers had no antenatal visits, and 16.73% had only one check-up throughout the entire pregnancy. Conversely, it is encouraging that the majority of participants received supplementation for iron (77.04%), calcium (63.03%), and multivitamins (70.03%). The rates of vaginal delivery and cesarean section were nearly equal, at 49.02% and 50.97%, respectively [Table 2].

This study also examined associated maternal comorbidities during pregnancy. Premature Rupture of Membranes (PROM) was the most prevalent complication among mothers who delivered low birth weight (LBW) babies, occurring in 14.39% of cases, followed by pre-term labor (11.67%) and Gestational Diabetes Mellitus (GDM) (10.89%). The proportions of pre-eclampsia and eclampsia were concerning at 9.72% and 5.83%, respectively, while 8.5% of mothers experienced gestational hypertension. Only four mothers had heart disease during pregnancy, and 7.78% had post-dated pregnancies [Table 3].

The study found that 70% of the mothers who delivered during the study period had term pregnancies (defined as 37 completed weeks) [Figure 1], while 30% of births were pre-term. Among the preterm births, 20.23% were classified as LBW, and 4.67% as very low birth weight (VLBW), proportions that are significantly higher than those observed in the general population [Figure 2].

**Table 1.** Socio-demographic profile of participants (n=257).

Characteristics	Frequency (%)
Age (years)	
16-20	33 [12.84]
21-25	95 [36.96]
26-30	72 [28.01]
31-35	38 [14.78]
36-40	19 [7.39]
Mean age ( $\pm$ SD)	25 $\pm$ 4.26
Monthly income	
<15000	98 [38.13]
15000-30000	77 [29.96]
30000-50000	55 [21.40]
>50000	27 [10.50]
Educational Qualification of mother	
Illiterate	28 [10.98]
Primary	80 [31.12]
Secondary	87 [33.85]
Higher secondary and above	62 [24.12]
Educational Qualification of father	
Illiterate	31 [12.06]
Primary	73 [28.40]
Secondary	91 [35.40]
Higher secondary and above	64 [24.90]
Occupation of father	
Service Holder	69 [26.84]
Businessman	80 [31.12]
Day-labourer	98 [38.13]
Unemployed	9 [3.50]

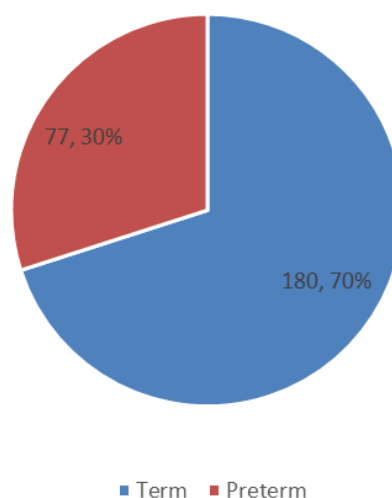
**Table 2.** Obstetrics History of the participants.

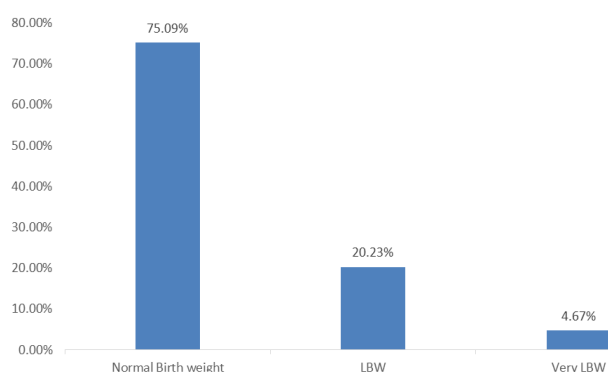
Variables	Frequency
Antenatal visit during pregnancy	
At least 1 visit	43 [16.73]
2-4 visits	87 [33.85]
> 4 visits	80 [31.12]
No visit	22 [8.56]
Supplements during pregnancy	

Variables	Frequency
Iron supplement	198 [77.04]
Calcium Supplement	162 [63.03]
Multivitamin	180 [70.03]
Mode of delivery	
Vaginal delivery	126 [49.02]
Cesarean Section	131 [50.97]

**Table 3.** Complication during Pregnancy.

Variables	Frequency (%)
Gestational HTN	22 [8.5]
Pre-Eclampsia	25 [9.72]
Preterm Labour	30 [11.67]
PROM	37 [14.39]
Anaemia in pregnancy	20 [7.78]
APH	11 [4.28]
DM	26 [10.11]
GDM	28 [10.89]
Hypothyroidism	10 [3.89]
Eclampsia	15 [5.83]
Multiple pregnancy	9 [3.50]
Post dated pregnancy	20 [7.78]
Heart disease in pregnancy	4 [1.55]

**Figure 1.** Gestational age at delivery.



**Figure 2.** Birthweight pattern of newborn.

## 4. Discussion

The study participants had a mean age of  $25 \pm 4.26$  years, with the majority (64.97%) aged between 21 and 30 years. Financial constraints were apparent, with over one-third of participants earning below 15,000 Taka monthly and only 10% exceeding 50,000 Taka. This economic limitation underscores the need for promoting the use of low-cost antenatal care services available at government hospitals in Bangladesh. Adequate financial resources are essential for maintaining proper nutrition and mental well-being during pregnancy.

Comparable data from a study in Nepal, which reported a mean age of  $25.7 \pm 4.8$  years, aligns with our findings [1]. Educational attainment among participants was relatively low, with only about 25% having completed education beyond the secondary level. The majority of fathers were employed as day laborers or businessmen, with only 3.5% unemployed. This highlights the need for improved parental education to enhance pregnancy outcomes and reduce the incidence of low birth weight (LBW). Further, research in Bangladesh has identified poverty and lack of education as significant risk factors for LBW [1]. Studies in other developing countries, including India and Bangladesh, have also demonstrated a link between socioeconomic status and LBW, indicating that both wealth and education levels influence birth outcomes [2-5].

Regarding antenatal care, nearly two-thirds of mothers attended more than four visits, and 33.85% attended 2-4 visits. Remarkably, only 8.56% of mothers had no antenatal visits, although achieving universal antenatal care attendance remains an important goal. Research indicates that attending antenatal care (ANC) four or more times is associated with a reduced incidence of low birth weight (LBW) [6, 7]. The current study's finding that mothers who attended fewer than four ANC visits had a higher likelihood of delivering LBW infants is consistent with these findings [6-7]. Generally, ANC is essential for providing the necessary care to address maternal health complications and ensure the well-being of both mother and newborn [3, 7].

A significant proportion of mothers received iron, calcium, and multivitamin supplementation, with rates of 77.04%, 63.03%, and 70.03%, respectively. The rates of vaginal de-

livery and cesarean section were nearly equal, at 49.02% and 50.97%, respectively. Another study in Bangladesh reported that 14.8% of low birth weight (LBW) infants were delivered by cesarean section (CS). This study highlighted that factors such as region, education, wealth index, maternal weight, height, multiple births, and delivery method (CS) were statistically significantly associated with LBW [1]. Our findings also show a higher LBW rate associated with CS deliveries, consistent with previous research. However, the specific reasons for these CS deliveries were not documented and remain unclear. Notably, unnecessary CS deliveries, sometimes motivated by financial gain, have become increasingly common in Bangladesh, contributing to rising institutional CS rates. Previous studies have suggested that elective CS may be linked to LBW in full-term infants [8-10].

The study identified several pregnancy complications: Premature Rupture of Membranes (PROM) (14.39%), Preterm Labour (11.67%), Gestational Diabetes Mellitus (GDM) (10.88%), and Diabetes Mellitus (DM) (10.11%) were the most prevalent. The findings suggest a need for obstetricians to address the underlying causes and contributing factors of PROM and preterm labour, as early intervention could prevent preterm births and subsequent LBW outcomes. The results of the previous study are similar to those reported in the previous literature. It was further shown that neonates born before 37 weeks of gestational age were more likely to develop LBW than neonates born at term. Furthermore, the present findings are consistent with another previously conducted study that indicated that gestational age was independently associated with the incidence of LBW: neonates born at 37 weeks of gestation or older were protective against LBW [11, 12]. Additionally, the incidence of Gestational Hypertension (17.77%), Pre-Eclampsia (17.77%), and Eclampsia (6%) remains concerning, potentially linked to inadequate antenatal care and poor maternal awareness of these conditions. Antepartum Hemorrhage (APH), hypothyroidism, multiple pregnancies, and heart disease were present in less than 5% of cases.

Despite 70% of participants delivering at term, the prevalence of low birth weight (LBW) remains notably high at 24.9%, indicating potential deficiencies in maternal care. Although very low birth weight (VLWB) rates were not excessively high, they still warrant concern, emphasizing the need for improved maternal health care to ensure that all infants are delivered at a minimum weight of 2.5 kg and at term.

Comparative data from other studies highlight similar issues. A study in Nepal reported an LBW prevalence of 15.3% [13]. Globally, LBW affects an estimated 15% to 20% of all births, equating to over 20 million infants annually [14]. In Iran, a meta-analysis of 93,924 infants found an LBW prevalence of 8.5%. The World Health Organization (WHO) reports varied LBW rates: 15% in sub-Saharan Africa, 11% in the Middle East and Northern Africa, 10% in East Asia, 33% in South Asia, 9% in Latin America, 6% in developed countries, and 17% globally [15]. Specifically, in Bangladesh, the

Multiple Indicator Cluster Survey (MICS) 2012–13 reported an LBW rate of about 20%, while another study found an average of 16.2%. A nationwide population-based study in Bangladesh reported a prevalence of approximately 19.9% (199 per 1,000 live births), with the highest rates observed in the Sylhet region (26.2%), rural areas (20.8%), and among illiterate mothers (26.6%) [16–18].

## 5. Conclusion

In conclusion, low birth weight (LBW) remains a significant challenge in Dhaka Medical College Hospital, with a prevalence of 24.9%, despite 70% of deliveries occurring at term. Key factors contributing to LBW include inadequate antenatal care, poor maternal nutrition, and socio-economic constraints. Addressing these issues through improved maternal health services and education is crucial for enhancing pregnancy outcomes and reducing the incidence of LBW in Bangladesh.

## 6. Limitations of the Study

This study has several limitations. Firstly, its observational design may limit the ability to establish causal relationships between factors and low birth weight (LBW). Additionally, the sample was drawn from a single tertiary care hospital, which may not be representative of the broader population in Bangladesh. Furthermore, self-reported data on maternal diet and antenatal care may be subject to recall bias, potentially affecting the accuracy of the findings. Lastly, the study did not explore the long-term outcomes of LBW infants, which could provide further insights into the implications of low birth weight on child development.

## Abbreviations

LBW	Low Birth Weight
ANC	Ante-Natal Check Up
PE	Pre-Eclampsia
HTN	Hypertension
PROM	Premature Rupture of Membrane
APH	Ante-Partum Haemorrhage
GDM	Gestational Diabetes Mellitus
DM	Diabetes Mellitus

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## Author Contributions

**Rukshana Jalil:** Conceptualization, Data curation, Methodology, Supervision, Visualization, Writing – review & ed-

iting

**Sirajam Munira:** Conceptualization, Data curation, Formal Analysis, Methodology, Project administration, Software, Supervision, Visualization, Writing – original draft, Writing – review & editing

**Sharmeen Sultana:** Conceptualization, Visualization, Writing – review & editing

**Beethi Sarker:** Conceptualization, Data curation, Supervision, Visualization, Writing – review & editing

## Data Availability Statement

All relevant data will be made available upon request to the principal investigator.

## Conflicts of Interest

The authors declare no conflicts of interest.

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## Research Fields

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