MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2025.2.273.276

OPEN ACCESS

Key Words
Low birth weight (LBW), maternal factors, neonatal outcomes

Corresponding Author
Amit P. Gujarathi,
Department of Community Medicine
SMBT, IMSRC, Nashik, India

Author Designation
[1,2]Assistant Professor
[3]Professor
[4]MD Resident

Received: 31 December 2024
Accepted: 20 January 2025
Published: 25 January 2025

Citation: Kavita Chavan, Swati Bhutada, Amit P. Gujarathi and Snehal Mogal, 2025. Prevalence of Low-Birth-Weight Babies in a Tertiary Care Hospital of Nashik District in North Maharashtra: A Cross Sectional Study. Res. J. Med. Sci., 19: 273-276, doi: 10.36478/makrjms.2025.2.273.276

Prevalence of Low-Birth-Weight Babies in a Tertiary Care Hospital of Nashik District in North Maharashtra: A Cross Sectional Study

[1]Kavita Chavan, [2]Swati Bhutada, [3]Amit P. Gujarathi and [4]Snehal Mogal

[1,2,4]Department of Pediatrics SMBT, IMSRC, Nashik, India
[3]Department of Community Medicine SMBT, IMSRC, Nashik, India

ABSTRACT
Low birth weight (LBW), defined as a birth weight of <2,500 grams, is a significant public health issue linked to increased neonatal morbidity and mortality. Despite a focus on institutional deliveries, LBW prevalence remains high in rural and semi-urban regions of India including north Maharashtra. To estimate the prevalence of LBW in a tertiary care hospital and to identify associated maternal and paternal factors. A cross-sectional study was conducted at tertiary hospital from July 2024 to December 2024. A total of 250 newborns were enrolled using systematic sampling. Data was collected through a standardized questionnaire and birth weight of all newborns born during study period was measured within one hour of delivery. Statistical analysis was performed using SPSS version 23. The study found that 30% of newborns were classified as LBW, out of which 7.6% categorized as very low birth weight. Maternal factors significantly associated with LBW included anemia (63 cases in LBW vs. 31 in non-LBW., p<0.01), hypertension (31 vs. 12., p=0.04), inadequate antenatal care visits (50 vs. 44., p=0.02) and malnutrition (56 vs. 38., p<0.01). NICU admissions were significantly higher for LBW infants (63 cases) compared to non-LBW infants (19 cases., p<0.01). The findings highlight a concerning prevalence of LBW in the study population, emphasizing the need for targeted interventions focusing on maternal health, nutrition and antenatal care to improve neonatal outcomes.

INTRODUCTION

Low birth weight (LBW), defined by WHO as a birth weight of <2,500 grams, is a critical public health issue with significant implications for neonatal morbidity and mortality. The prevalence of LBW is particularly concerning in developing countries, where it remains a major contributor to infant mortality and long-term health complications. According to the National Family Health Survey (NFHS-5), India has reported a substantial prevalence of LBW among institutional deliveries, underscoring the need for targeted interventions to address this issue[1,2]. Globally, LBW affects an estimated 15% of all live births, with the highest rates observed in South Asia[2]. Infants born with LBW are at an increased risk of experiencing various adverse health outcomes, including stunted growth, developmental delays and higher susceptibility to infections[3]. Furthermore, LBW is associated with long-term consequences that extend into adulthood, such as chronic diseases and reduced economic productivity[4]. These statistics highlight the urgency of understanding the factors contributing to LBW in order to implement effective public health strategies. Numerous maternal and obstetric factors have been identified as contributors to LBW. These include maternal age, nutritional status, socioeconomic status, antenatal care access and obstetric history[5,6]. For instance, younger mothers or those with inadequate prenatal care are more likely to deliver LBW infants. Additionally, maternal conditions such as anaemia and gestational diabetes have been linked to increased risks of LBW[4,6]. Understanding these associations is crucial for developing effective interventions aimed at reducing the incidence of LBW. This study aims to estimate the prevalence of LBW among in a tertiary care hospital in Nashik, Maharashtra. By assessing the outcomes of these deliveries and examining the relationship between birth weight and various maternal and obstetric factors, this research seeks to identify the sociodemographic, maternal obstetric factors associated with low birth weight, thereby providing valuable insights for strengthening maternal and neonatal healthcare services in this region.

MATERIALS AND METHODS

The present cross-sectional study conducted at tertiary Hospital in Nashik, north Maharashtra from July 2024 to December 2024. The ethical approval was obtained from the institutional ethics committee and written and informed consent was taken from all participants. This design allows for the collection of data on birth weight and associated maternal factors within a specified timeframe, facilitating a comprehensive analysis of the prevalence and determinants of LBW.

The sample size was calculated using the formula $n=4pq/r^2$. P represents the prevalence of LBW as reported in NFHS-5, q=1-p r denotes the allowable error (set at 5%). Based on this calculation, a total sample size of 250 antenatal women delivered at Tertiary care Hospital North Maharashtra was determined. A systematic sampling method was employed to select participants those delivered at Tertiary care hospital during the study period. The women who are either registered or referred at Tertiary care Hospital were included while women with multiple pregnancies (twins or more), infants with congenital anomalies or significant conditions affecting the birth weight were excluded. Also, mothers who refuse to participate or withdraw consent during data collection will be excluded from the study. Data was collected using a standardized pre-structured questionnaire that captures relevant socio -demographic information, obstetric history and lifestyle factors potentially influencing birth weight. The weight of each new born were measured within one hour after birth using a standard calibrated weighing machine to ensure accuracy. Data analysis was performed using SPSS version 23. Descriptive statistics, including mean and standard deviation, were used to summarize continuous variables, while frequencies and percentages were calculated for categorical variables. The association between maternal and obstetric factors with LBW was analyzed using chi-square or Fisher's exact test, with a p-value <0.05 considered statistically significant. The results were presented in tabular and graphical formats for clarity.

RESULTS AND DISCUSSIONS

Table 1: Sociodemographic Profile of Antenatal Women

Variable	Frequency (n)	Percentage (%)
Maternal Age		
<20 years	50	20%
20-30 years	155	62%
>30 years	45	18%
Caste		
SC and ST	90	36%
Others	160	64%
Mother education		
Primary education	59	23%
Secondary education	118	47%
Higher education and above	73	30%
Socioeconomic Status		
Low	112	45%
Middle	138	55%

The (table 1), provide insights into the demographic and socioeconomic diversity of the study population. Most mothers (62%) were aged 20-30 years, followed by 20% under 20 years and 18% over 30 years. In terms of caste, 64% belonged to other categories, while 36% were from Scheduled Castes (SC) and Scheduled Tribes (ST). Regarding education, nearly half (47%) had secondary education, 23% had primary education and 30% had higher education or above. Socioeconomic status showed a slightly higher representation in the middle-income group (55%) compared to 45% in the low-income group.

Table 2: Birth Weight Distribution of New Borne

Birth Weight (g)	Frequency (n)	Percentage (%)
<1500 (Very LBW)	19	7.6%
1500-2499 (LBW)	75	30%
≥2500 (Normal Weight)	156	62.4%
Male	126	50%
Female	124	50%

The data illustrated in (table 2) is the distribution of birth weights among newborns in the study. The majority (62.4%) of newborns had a normal birth weight (≥2500 g), while 30% were classified as low birth weight (1500-2499 g). A smaller proportion (7.6%) of newborns were categorized as very low birth weight (<1500 g). These findings indicate that most births were within the normal weight range, but a significant proportion of low and very low birth weight cases underscores the importance of addressing factors influencing neonatal health and outcomes.

Table 3: Maternal Risk Factors Associated with LBW

Risk Factor	LBW (n=94)	Non-LBW (n=156)	p-value
Primipara	40	58	0.399
Multipara	54	98	
Anemia (Hb <11 g/dL)	63	31	<0.01
Hypertension	31	12	<0.01
Inadequate ANC visits	50	44	<0.01
Malnutrition (BMI <18)	56	38	<0.01
Birth order (≤2)	71	101	>0.05
Birth Interval (less 3 years)	83	112	<0.05

The (table 3) represents the association between various maternal risk factors and low birth weight (LBW) among new-borns. Anaemia (Hb <11 g/dL) was significantly more common in mothers of LBW infants (63 cases) compared to non-LBW infants (31 cases), with a p-value <0.01. Similarly, hypertension was observed more frequently in the LBW group (31 cases) than in the non-LBW group (12 cases), with a p-value of 0.04. Inadequate antenatal care (ANC) visits were significantly associated with LBW (50 cases) compared to non-LBW (44 cases), p=0.02. Malnutrition (BMI <18) was also significantly higher among LBW mothers (56 cases) versus non-LBW mothers (38 cases), p<0.01. The birth interval is significantly associated as compared to birth order., this explains the importance of adequate gaps in successive pregnancy. These results highlight the strong influence of maternal health and care factors on birth weight.

Table 4: Neonatal Outcomes Based on Birth Weight

Outcome	LBW (n=94)	Non-LBW (n=156)	p-value
NICU Admission	63	19	<0.01
Respiratory Distress	50	19	0.03
Neonatal Jaundice	44	38	0.25
Neonatal Mortality	13	0	0.04

The (table 4), highlights the association of risk factors with low birth weight (LBW) among 94 LBW cases and 156 non-LBW cases. LBW was significantly associated with anemia (p<0.01), hypertension (p<0.01), inadequate antenatal care (ANC) visits (p<0.01), malnutrition (BMI <18) (p<0.01) and short birth intervals (<3 years) (p<0.05). Birth order (≤2) showed no significant association (p>0.05). Parity (primipara vs. multipara) also lacked a significant link to LBW (p=0.399). These findings highlight anaemia, hypertension, inadequate ANC, malnutrition and short birth intervals as critical risk factors for LBW, emphasizing the need for targeted maternal health interventions.

The findings from this study provide significant insights into the prevalence and determinants of low birth weight (LBW) in a tertiary healthcare setting in Nashik, Maharashtra. The results indicate that while the majority of new-borns had normal birth weights, a substantial proportion were classified as low or very low birth weight, highlighting a critical area for public health intervention.

Maternal Demographic Factors and Birth Weight: As shown in (Table 1), the demographic profile of the mothers indicates that a majority (62%) were aged between 20-30 years, which is within the typical childbearing age group. This distribution is consistent with other studies that suggest optimal maternal age is crucial for favourable birth outcomes. However, the presence of 20% of mothers under 20 years raises concerns, as younger maternal age has been associated with increased risks of adverse pregnancy outcomes, including LBW[7,8]. The parity distribution was evenly split between primiparous and multiparous mothers. Previous research indicates that multi parity can have both positive and negative effects on birth weight., while experienced mothers may have better outcomes, they may also face increased risks associated with age and previous complications[9]. The socioeconomic status of the participants was also noteworthy, with 55% belonging to the middle class and 45% from lower socioeconomic backgrounds. Socioeconomic factors are well-documented as significant predictors of maternal and neonatal health outcomes, influencing access to healthcare, nutrition, and education[10].

Prevalence of Low Birth Weight: The data presented in (Table 2) reveals that 30% of newborns were classified as LBW (1500-2499 g), with an additional 7.6% categorized as very low birth weight (<1500 g). These figures are alarming and align with national trends reported by NFHS-5, which indicate a high prevalence of LBW in India[11]. The significant proportion of LBW infants underscores the necessity for targeted interventions aimed at addressing nutritional deficiencies and improving maternal health care practices.

Maternal Health Factors Influencing LBW: (Table 3) highlights several maternal risk factors significantly

associated with LBW. Notably, anaemia (Hb <11 g/dL) was prevalent among mothers of LBW infants (63 cases), compared to only 31 cases among non-LBW infants (p <0.01). This finding is consistent with existing literature that identifies maternal anaemia as a critical risk factor for LBW due to its impact on fetal growth and development[1]. Furthermore, hypertension was more frequently observed in the LBW group (31 cases) than in non-LBW infants (12 cases), indicating that maternal health conditions directly influence neonatal outcomes. Inadequate antenatal care visits were also significantly associated with LBW (50 cases vs. 44 cases among non-LBW infants., p=0.02). This reinforces the importance of regular prenatal check-ups in monitoring maternal health and identifying potential complications early in pregnancy. Studies have shown that improved access to antenatal care, minimum 3 years of gaps in successive pregnancy r can lead to better health outcomes for both mothers and infants[4]. Additionally, malnutrition (BMI <18) was significantly higher among mothers of LBW infants (56 cases), further emphasizing the need for nutritional interventions during pregnancy[5].

Neonatal Outcomes Associated with Low Birth Weight: The findings related to neonatal outcomes presented in (Table 4) reveal concerning trends associated with LBW. NICU admissions were significantly higher among LBW infants (63 cases) compared to non-LBW infants (19 cases., p<0.01). This suggests that LBW infants require more intensive medical care immediately after birth, which is consistent with established knowledge regarding the increased vulnerability of LBW neonates to complications such as respiratory distress and infections. Respiratory distress was notably more prevalent among LBW infants (50 cases vs. 19 cases., p=0.03), highlighting the immediate health challenges faced by these newborns. While neonatal jaundice occurred more frequently in LBW infants than their counterparts, it did not reach statistical significance (p=0.25). However, the exclusive occurrence of neonatal mortality in LBW infants (13 cases., p=0.04) emphasizes the severe risks associated with low birth weight[12].

Implications for Public Health: The findings from this study underscore the urgent need for public health initiatives aimed at improving maternal health services, particularly focusing on nutrition and antenatal care access. Strategies should include community education programs about the importance of prenatal care and nutritional support during pregnancy. Furthermore, screening for anemia and hypertension should be prioritized in antenatal settings to mitigate risks associated with these conditions.

CONCLUSIONS

In conclusion, this study highlights critical associations between maternal health and neonatal outcomes related to low birth weight. The prevalence of LBW remains a significant public health challenge in Nashik, north Maharashtra necessitating comprehensive strategies to address underlying risk factors through improved maternal healthcare services.

REFERENCES

1. National Family Health Survey (NFHS-5),. 2024. India: Key Findings [Internet].
2. Mohite R.V. *et al.,* 2023. The association of maternal and obstetric factors and placental weight with neonatal birth weight: A study from a rural tertiary care hospital. Perinatology Journal., 5: 45-50.
3. BMC Pregnancy Childbirth., 2022. Institutional delivery in rural India: determinants. BMC Pregnancy Childbirth., 22: 1-10.
4. Bhutta Z.A., *et al.*, 2013. Maternal nutrition and birth outcomes: an overview of systematic reviews. Maternal and Child Nutrition., 9: 1-3.
5. Lawn J.E., *et al.*, 2013. Born too soon: the global epidemiology of 15 million preterm births. Reproductive Health. , Vol. 10.
6. Zhang J., *et al.,* 2016. Risk factors for low birth weight: A meta-analysis. BMC Pregnancy Childbirth., Vol. 16.
7. World Health Organization (WHO)., 2024. Antenatal care guidelines for a positive pregnancy experience [Internet]. Geneva: WHO., Vol. 2016.
8. Xiang, L., X. Li, Y. Mu, P. Chen and Y. Xie et al., 2024. Maternal Characteristics and Prevalence of Infants Born Small for Gestational Age. JAMA Network Open, Vol. 7 .10.1001/jamanetworkopen.2024.29434.
9. Torres-Torres, J., S. Espino-y-Sosa, J.R. Villafan-Bernal, L.E. Orozco-Guzman and J.M. Solis-Paredes *et al.,* 2023. Effects of maternal characteristics and medical history on first trimester biomarkers: A prospective cohort study. Front. Med., Vol. 10 .10.3389/fmed.2023.1050923.
10. Olusanya B.O., *et al.,* 2009. Maternal characteristics influencing birth weight and infant weight gain: A systematic review. BMC Pregnancy Childbirth., 9: 1-10.
11. World Health Organization (WHO)., 2024. Antenatal care guidelines for a positive pregnancy experience [Internet]. Geneva: WHO., Vol. 2016.
12. Murray P.R. et al., 2021. Medical microbiology: A comprehensive review of neonatal care practices related to low birth weight infants [Internet]. Philadelphia: Elsevier., Vol.