

Profile and outcomes of low-birth-weight babies admitted to Neonatal Intensive Care Unit: Experience of a tertiary care hospital

MA Kamal¹

Abstract

Background: Low birth weight (LBW) is an important public health issue in developing countries such as Bangladesh, as it is linked to higher rates of neonatal morbidity and mortality.

Objective: To evaluate the morbidity patterns and outcomes of LBW neonates admitted to a tertiary care Neonatal Intensive Care Unit (NICU) in Bangladesh.

Methods: This cross-sectional observational study was conducted over 12 months in the NICU of Bangladesh Shishu Hospital & Institute, Dhaka. A total of 76 LBW neonates (<2.5 kg) were included. Clinical, demographic, and outcome data were collected and analyzed using SPSS version-25.

Results: Of the 76 neonates, 88.2% were ≤ 3 days, and 55.3% were male. A majority (64.5%) were full-term, with 67.11% weighing between 1500 and 2499 grams. The predominant morbidities were respiratory distress syndrome (32.89%), birth asphyxia (22.37%), and sepsis (18.42%). Mortality was 18.4%, with the highest rate of 33.33% observed in infants weighing less than 1000 gm. The duration of hospital stays was greatest in the group with the lowest birth weight. Other issues diminished as birth weight increased.

Conclusion: Low birth weights (<1000 gm) are associated with an increased risk of newborn morbidity and mortality. Longer hospital stays are related with low birth weight, and the most common morbidity include respiratory distress syndrome, birth asphyxia, and sepsis.

Keyword: LBW, Oxygen saturation, Complications, Outcomes

Introduction

Low birth weight (LBW) of children poses a serious public health problem in low- and middle-income countries.¹ Early childhood is a critical window for children's physical and mental development and LBW contributes as a leading cause of illness and death among children during this period.² The rate of LBW in Bangladesh dropped to 14.5% in 2022.³ Child's birth weight below 2.5 kg regardless of gestational age was considered LBW.⁴ Low birth weight is one of the primary causes of child mortality and several diseases of future life in developing countries, especially in Southern Asia.⁵ Neonates with LBW are significantly more vulnerable to complications such as respiratory distress syndrome, birth asphyxia, sepsis, hypothermia, and hyperbilirubinaemia, all of which contribute to increased morbidity and mortality.⁶

Worldwide, about 130 million infants are born annually, and nearly 4 million dies within the neonatal period. Alarming, 75% of neonatal deaths occur within the first seven days, and 50% within the first 24 hours of birth.^{7,8} The causes of neonatal mortality differ significantly between developed and developing regions. In high-income countries, congenital anomalies and extreme prematurity are more common, whereas in low- and middle-income countries, preventable causes like infections, birth asphyxia, and LBW predominate.⁹ Birth asphyxia (21%), LBW (11%), and severe infection (34%) are leading contributors to neonatal mortality in the country.¹⁰

Although Bangladesh has introduced several policy interventions aimed at improving maternal and neonatal health including free maternal and child healthcare and increased facility-based deliveries the impact on neonatal outcomes, particularly in LBW infants, remains variable and understudied.¹¹ The present study was undertaken to evaluate the morbidity patterns, and outcomes of low birth weight neonates admitted to the Neonatal Intensive Care Unit (NICU) of a tertiary care hospital in Bangladesh.

¹Associate Professor (Current Charge)
Department of Neonatal Medicine
Bangladesh Shishu Hospital & Institute

Correspondence

Dr. MA Kamal
Associate Professor (Current Charge)
Department of Neonatal Medicine
Bangladesh Shishu Hospital & Institute, Sher-E-Bangla Nagar
Dhaka-1207 Bangladesh
e-mail:
makamaldr09@gmailcom

DOI:
<https://doi.org/10.3329/dshj.v41i1.93354>

Received : 2 March 2025

Revised : 22 March 2025

Accepted : 27 March 2025

Materials and Methods

This cross-sectional observational study was conducted in the Department of Neonatal Intensive Care Unit (NICU) at Bangladesh Shishu Hospital & Institute (BSH&I), Dhaka, over a 12-month period from January 1 to December 30, 2024. All neonates admitted to the NICU during study period were included in this study. Among 916 total admissions, 76 neonates with a birth weight below 2.5 kg according to inclusion and exclusion criteria were selected for detailed evaluation. Neonates weighing more than 2.5 kg having major congenital anomalies were excluded. Data collected included demographic details, clinical parameters (gestational age, birth weight, presenting symptoms, diagnoses), and treatment outcomes. Gestational age and birth weight were obtained from maternal antenatal records when available. For neonates born in the hospital, weight was measured using a digital scale. Each neonate underwent a thorough clinical examination. Morbidity, mortality, and treatment outcomes were systematically documented. All data were entered and analyzed using SPSS software version 25. Descriptive statistics were applied, and results were presented as frequencies and percentages.

Results

A majority of the neonates (88.2%) were 3 days old or younger, and over half of them (55.3%), were male. In terms of gestational age, 64.5% were term (≥ 37 weeks), 23.7% were late preterm (34–36 weeks), and 11.8% were early preterm (< 34 weeks) (Table I).

Table I: Demographic characteristics of the study subjects (N=76)

Demographic characteristics	No.	%
Age (days)		
≤ 3	67	88.2
4-6	6	7.9
> 6	3	3.9
Sex		
Male	42	55.3
Female	34	44.7
Gestational age (weeks)		
< 34	9	11.8
34-36	18	23.7
≥ 37	49	64.5

The majority (67.11%) weighed between 1500-2499 gm, 25% weighed 1000-1499 gm, and only 7.89% had an extremely low birth weight of < 1000 gm (Table II).

Table II: Percentage of LBW babies according to birth weight

Birth weight (gm)	No.	%
< 1000	06	7.89
1000-1499	19	25.00
1500-2499	51	67.11
Total	76	100.00

The most prevalent condition was respiratory distress syndrome (32.89%), with birth asphyxia (22.37%) and sepsis (18.42%) following closely behind. Other noteworthy morbidities included jaundice (14.47%), hypothermia (6.58%), and hypoglycaemia (3.95%). Meconium aspiration syndrome (17.11%) was also present. Some neonates presented with multiple morbidities during their hospital stay (Table III).

Table III: Morbidity profile of the study participant

Morbidity profile	No.	%
Respiratory distress syndrome	25	32.89
Birth asphyxia	17	22.37
Sepsis	14	18.42
Meconium aspiration syndrome	13	17.11
Jaundice	11	14.47
Hypothermia	5	6.58
Hypoglycaemia	3	3.95

Out of all the study neonates, 18.4% died and 81.6% lived. Most of them (51.3%) were in the hospital for 8–14 days, then 42.1% for less than 7 days, and only 6.6% for more than 14 days (Table IV).

Table IV: Outcome of the study participant (N=76)

Outcome	No.	%
Death		
Yes	14	18.4
No	62	81.6
Duration of hospital stay (days)		
≤ 7	32	42.1
8-14	39	51.3
> 14	5	6.6

Respiratory distress syndrome (RDS) was the most prevalent morbidity in all categories, followed by sepsis and birth asphyxia (Table V).

Table V: Relation of morbidity profile by birth weight (N=76)

	Birth weight (gm)			Total
	< 1000 n=6 (%)	1000-1499 n=19 (%)	1500-2499 n=51 (%)	
Respiratory distress syndrome	2 (33.33)	7 (36.84)	16 (31.37)	25
Birth asphyxia	1 (16.67)	4 (21.05)	12 (23.53)	17
Sepsis	1 (16.67)	3 (15.79)	11 (21.57)	15
Meconium aspiration syndrome	1 (16.67)	2 (10.53)	10 (19.51)	13
Jaundice	1 (16.67)	2 (10.53)	8 (15.69)	11
Hypothermia	1 (16.67)	1 (5.26)	3 (5.88)	5
Hypoglycaemia	1 (16.67)	1 (5.26)	1 (1.96)	3

The mortality rate was highest among neonates with a birth weight of less than 1000 gm (33.33%) and lowest among those weighing 1500-2499 gm (15.69%). The majority of neonates were hospitalized for 8-14 days, with the lowest birth weight group experiencing more prolonged hospitalizations (> 14 days) (Table VI).

Table VI: Relation of outcome by birth weight (N=76)

	Birth weight (gm)			Total
	< 1000 n=6 (%)	1000-1499 n=19 (%)	1500-2499 n=51 (%)	
Death	2 (33.33)	4 (21.05)	8 (15.69)	14
Duration of hospital stay (days)				
≤7	1(16.67)	6 (31.58)	25 (49.02)	32
8-14	3 (50.0)	12 (63.16)	24 (47.06)	39
>14	2(33.33)	1 (5.26)	2 (3.92)	5

Discussion

In the current study, the majority of neonates (88.2%) were ≤3 days old at the time of admission, with a marginally greater percentage of males (55.3%). The majority (64.5%) were term (≥37 weeks), 23.7% were late preterm (34-36 weeks), and 11.8% were early preterm (<34 weeks). Chauhan et al¹² documented a comparable male preponderance (59.39%) with a sex ratio of 1.46:1, although a greater incidence of preterm births (<34 weeks, 56.40%) in contrast to our study (11.8%).¹² Faucher et al¹³ reported a 19.6% incidence of preterm births, whereas Nejad et al¹⁴ identified that low birth weight neonates were categorized as 26.1% early preterm, 31.7% late preterm, and 42.1% term. Pathak et al¹⁵ documented a male predominance of 54%, with 61% classified as appropriate for gestational age (AGA) and 39% as small for gestational age (SGA), including 26.8% term SGA and 11.8% preterm SGA. Rahman et al. observed that 43% of low birth weight neonates were delivered between 34 and 37 weeks gestation.¹⁶

In this study, the majority of neonates (67.11%) had weights ranging from 1500 to 2499 g, with 25% falling into the 1000 to 1499 g category, and just 7.89% classified as extremely low birth weight (under 1000 g). Chauhan et al¹² discovered a similar trend, with 72.47% in the 1500-2499 g group. Pathak et al¹⁵ shared some interesting findings on the distribution of neonates: they found that 10% weighed less than 1 kg, 18% were in the 1-1.499 kg range, 25% fell between 1.5-1.999 kg, and a notable 47% were in the 2-2.499 kg category. Meanwhile, Saini et al. reported different figures, with 2% in the <1 kg group, 24% in the 1-1.5 kg group, and a significant 74% in the 1.5–2.5 kg range.¹⁷

In terms of morbidity, the most prevalent disease was respiratory distress syndrome (RDS) (32.89%), followed by birth asphyxia (22.37%) and sepsis (18.42%). Other morbidities included meconium aspiration syndrome (17.11%), jaundice (14.47%), congenital abnormalities (9.21%), hypothermia (6.58%), and hypoglycaemia (3.95%). Pathak et al¹⁵ reported 35% RDS, 23% sepsis, and 10% birth asphyxia, as well as 14% hyperbilirubinaemia, 5% hypoglycaemia, and 7.5% congenital abnormalities. Gupta et al¹⁸ discovered hyperbilirubinaemia

in 30%, respiratory distress in 28.5%, and sepsis in 23.5% of LBW neonates, whereas Naikey et al¹⁹ observed sepsis, birth asphyxia, respiratory distress, or hyperbilirubinaemia in 67% of LBW neonates.

Mortality in this study was 18.4%, with most neonates (51.3%) hospitalized for 8-14 days. Pathak et al¹⁵ reported higher mortality and a hospital stay distribution of 1-3 days in 13%, 4-6 days in 30%, 7-10 days in 37%, 11-14 days in 12%, and >14 days in 21%. Arefin et al²⁰ and Begum et al²¹ found mortality rates of 40% and 34%, respectively.

The present study demonstrated a considerable variation in leading morbidities, mortality, and clinical outcomes among the three birth weight categories: 1000-1499 gm, 1500-2499 gm, and <1000 gm. Respiratory distress syndrome (RDS) was the most prevalent morbidity in all categories, followed by sepsis and birth asphyxia. Other conditions, including jaundice, hypothermia, hypoglycaemia, and meconium aspiration syndrome, were less prevalent and exhibited a decreasing trend as born weight increased. Chauhan et al¹² reported that RDS/hyaline membrane disease (HMD) affected 55.55%, jaundice 32.82%, sepsis 22.72%, congenital anomalies 5.55%, hypothermia 12.62%, and hypoglycaemia 5.05% in neonates weighed <1 kg. These findings are consistent with these findings. In the 1-1.499 kg group, RDS/HMD was observed in 52.12% of cases, birth asphyxia in 22.36%, jaundice in 15.43%, sepsis in 17%, congenital anomalies in 6.45%, meconium aspiration syndrome in 5.98%, hypothermia in 3.3%, and hypoglycaemia in 1.1%. The morbidities reported in neonates weighing 1.5-2.499 kg included RDS/HMD in 25.95%, birth asphyxia in 26.37%, meconium aspiration syndrome in 16.01%, sepsis in 15.90%, bilirubin in 9.37%, congenital anomalies in 5.69%, hypothermia in 4.35%, and hypoglycaemia in 0.93%.

Based on birth weight, the babies that died weighed less than 1000 grams (33.33%) and those that weighed 1500 to 2499 grams (15.69%) the least. The group with the lowest birth weight also had longer hospital stays (more than 14 days). Chauhan et al¹² found that even more babies under 1 kg died (84.43%), then babies between 1 and 1.499 kg (69%) and babies between 1.5 and 2.499 kg (51.36%). The main reason for death in the smallest weight groups was being born too early. Similarly, Pathak et al¹⁵ found mortality rates of 80%, 55%, and 35% in <1 kg, 1-1.5 kg, and 1.5-2.5 kg neonates, respectively, a trend consistent with Arefin et al²⁰ and Begum et al²¹ where decreasing birth weight was associated with higher mortality.

Overall, major morbidities, mortality, and outcomes in this study varied by birth weight category. RDS remained the most frequent morbidity across all groups, followed by birth asphyxia and sepsis, while other conditions showed a decreasing trend with increasing birth weight. These findings

are in line with previous studies, underscoring the need for targeted preventive and early management strategies in extremely and very low birth weight infants to improve survival outcomes.

Conclusion

This study discovered that perinatal morbidity and mortality exhibit substantial fluctuations in relation to birth weight. Respiratory distress syndrome was the most prevalent condition, followed by birth asphyxia and sepsis. Compared to infants weighing 1500-2499 g, those weighing less than 1000 g had prolonged hospital stays and a higher mortality rate. As the birth weight increased, other complications decreased.

Reference

1. Ngo N, Bhowmik J, Biswas RK. Factors Associated with Low Birth weight in low-and-Middle Income Countries in South Asia. *Int J Environ Res Public Health* 2022;19(21):14139.
2. Khan JR, Islam MM, Awan N, Muurlink O. Analysis of low birth weight and its co-variants in Bangladesh based on a sub-sample from nationally representative survey. *BMC Pediatr* 2018;18(1):1-9.
3. Ahmed MS. Mapping the prevalence and socioeconomic predictors of low birth weight among Bangladeshi newborns: evidence from the 2019 multiple Indicator Cluster Survey. *Int Health* 2022;14(5):485-91.
4. NIPORT ICF. USAID: Bangladesh demographic and health survey 2017-18. *Natl Inst Popul Res Train* 2020:1-511.
5. Islam Pollob SMA, Abedin MM, Islam MT, Islam MM, Maniruzzaman M. Predicting risks of low birth weight in Bangladesh with machine learning. *PLoS One*. 2022 May 26;17(5):e0267190 (<https://doi.org/10.1371/journal.pone.0267190>)
6. UNICEF and WHO. Low birth weight estimates: levels and trends 2000-2015. Geneva: World Health Organization; 2019 (<https://iris.who.int/bitstreams/e2b54439-2579-48b0-a108-c8f392bae7f9/download>)
7. Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: When? Where? Why? *Lancet*. 2005;365:891-900.
8. Jehan I, Harris H, Salat S, Zeb A, Moben N, Pasha O, et al. Neonatal mortality: risk factors and causes: a prospective population-based cohort study in Pakistan. *Bull World Health Organ*. 2009;87:130-8.
9. Roma KM, Pyakurel M, Gupta V, Kanodia P. Clinical profile and outcome of neonates admitted to neonatal intensive care unit of NGMC. *JNGMC*. 2017;15(1):20-2.
10. National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International. Bangladesh Demographic and Health Survey 2014. Dhaka, Bangladesh, and Rockville, Maryland, USA: NIPORT, Mitra and Associates, and ICF International; 2016.
11. Shahidullah M, Hasan MZ, Jahan I, Ahmed F, Dey AC, Dey SK, et al. Perinatal characteristics and outcome of neonates at NICU of a tertiary level hospital in Bangladesh. *Bangladesh J Child Health*. 2017;41(1):34-9.
12. Chauhan AV, Gosai D, Patel U. Morbidity profile and outcome of low-birth-weight neonates in NICU of a tertiary care hospital. *Int J Contemp Pediatr* 2023;10:63-7.
13. Faucher MA, Barger MK. Gestational weight gain in obese women by class of obesity and select maternal/newborn outcomes: a systematic review. *Women Birth*. 2015;28(3):e70-9 (<https://doi.org/10.1016/j.wombi.2015.03.006>)
14. Nejad NH, Pejhan A, Rakhshani MH. The incidence of low birth weight (LBW) and small-for-gestational age (SGA) and its related factors in neonates, Sabzevar, Iran. *Int J Paediatr*. 2014;2(4.2):73-8.
15. Pathak GH, Chauhan AV, Gosai DK, Patel MKR. Clinical profile of low-birth-weight neonates admitted in NICU: a tertiary care hospital-based study. *Int J Contemp Pediatr* 2023;10:199-203.
16. Rahman K, Bhuuyan AR, Ullah MA. Incidence and clinical profile of low-birth-weight babies: a rural tertiary care hospital based study. *New Indian J Obgyn*. 2015;2(1):43-5.
17. Saini A, Gaur BK, Bhalla AS, Antil PK, Maini B, Bharadwaj AK. Clinical profile of low-birth-weight neonates admitted in NICU: A hospital-based study. *J Med Sci Clin Res*. 2019;7(1):381-8.
18. Gupta MK, Kakkar M, Sethi C, Malhotra AK. Pattern of morbidity and mortality in LBW neonates: a study from Jaipur. *J Evol Med Dent Sci*. 2014 Feb 10;3(6):1339-45.
19. Naikey M, Jayashree N, Santosh R. Clinico epidemiological profile of low-birth-weight babies. *Nat J Med Dental Res*. 2015;3(2):89-92.
20. Arefin MS, Martin MA, Chowdhury MAK, Ali ML, Ahmad SS, Bhuyan AH, et al. A comparative study between the outcome of very low birth weight and low birth weight hospitalized babies. *Orion Med J*. 2008; 31:579-82.
21. Begum HA, Islam Y, Ali SA, Nahar N. Outcome of LBW infants. *Bangladesh J Child Health*. 1996;20(2): 42-6.