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# Clinical Profile and Outcomes of Term and Preterm Newborns Admitted to the NICU at a Tertiary Care Hospital

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ABSTRACT

**Background:** The neonatal period remains the most vulnerable window for child survival, accounting for a disproportionate share of under-five mortality, with many deaths occurring in the first week of life. Preterm birth and its complications contribute substantially to neonatal morbidity and mortality, particularly in South Asia. In tertiary NICUs, term and preterm newborns often present with different illness patterns and care needs. The study aimed to describe and compare the clinical profiles and in-hospital outcomes of term and preterm newborns admitted to the NICU of a tertiary care hospital. **Methods & Materials:** This retrospective observational study was conducted in the neonatal intensive care unit (NICU) of a tertiary hospital in Bangladesh, over 12 months, from January 2023 to December 2023. All consecutive NICU admissions aged 0 to 28 days were screened, and 148 neonates with sufficient documentation were included. Maternal and perinatal details were extracted using a structured data sheet when available. The primary outcomes were discharge status and length of stay. Secondary outcomes included discharge weight and major morbidities, such as sepsis, respiratory disorders, hypoglycaemia, and jaundice requiring phototherapy. Data were analyzed using SPSS version 26 with descriptive statistics, and statistical significance was set at $p<0.05$. **Results:** Of 148 NICU admissions, 79 were preterm and 69 term. Preterm newborns had lower gestational age and birth weight (34.4 vs 37.0 weeks, 2189 vs 2751 g; both $p<0.001$), more grunting (48.1% vs 20.3%, $p=0.001$), and higher rates of prematurity or low birth weight and RDS (54.4% and 20.3% vs 7.2% and 0.0%; both $p<0.001$). Term newborns had more meconium aspiration or MAS (13.0% vs 1.3%, $p=0.006$; 17.4% vs 3.8%, $p=0.012$). Jaundice and sepsis were common in both groups, with high antibiotic and phototherapy use, while preterm newborns had longer hospital stay (4 vs 3 days, $p=0.007$) and lower discharge weight (2088 vs 2775 g, $p<0.001$). **Conclusion:** Preterm NICU admissions had lower gestational age and birth weight, greater respiratory morbidity, and longer hospital stay than term newborns, while term newborns had more meconium-related illness. High burdens of jaundice, suspected infection, and antibiotic use in both groups underscore the need for targeted prematurity prevention, standardized respiratory and jaundice protocols, and stronger infection diagnostics with antimicrobial stewardship in tertiary NICUs.

***Keywords:*** *Neonatal intensive care unit, Preterm newborn, Term newborn, Respiratory distress syndrome, Neonatal sepsis*

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## INTRODUCTION

The neonatal period represents the most critical phase for child survival, contributing disproportionately to global under-five mortality [1]. Despite significant progress through expanded immunization, safer deliveries, and improved management of childhood infections, reductions in neonatal mortality have lagged behind, with a substantial number of deaths occurring within the first week of life. Preterm birth and its associated complications account for a significant proportion of neonatal morbidity and mortality. Global data indicate that preterm birth is prevalent, particularly in South Asia and sub-Saharan Africa, and its impact extends beyond mortality to include prolonged morbidity and neurodevelopmental impairments among survivors [2,3]. Although neonatal mortality has declined globally since 1990, progress is uneven across regions, and many countries are unlikely to achieve 2030 targets if current trends persist [4]. The causes of death among preterm neonates are multifactorial, including respiratory complications, intrapartum-related events, and infections. Prospective studies from South Asia emphasize the role of preventable, care-sensitive conditions in preterm neonatal deaths [5]. Sepsis continues to be a leading and complex contributor to neonatal morbidity and mortality, with systematic reviews highlighting a high global burden, inconsistent case definitions, and persistently elevated fatality rates in resource-limited settings where culture confirmation and intensive monitoring are often lacking [6,7].

These epidemiological patterns result in a diverse and complex patient population within neonatal intensive care units (NICUs). While both term and preterm newborns may require NICU admission, their underlying conditions and clinical courses frequently differ. Preterm infants are more likely to experience respiratory distress syndrome, apnea, temperature instability, feeding intolerance, and complications associated with low birth weight. In contrast, term newborns are often admitted for perinatal asphyxia, sepsis evaluation, severe jaundice requiring phototherapy, congenital anomalies, and metabolic disturbances. Clinical outcomes are influenced by illness severity at presentation, timeliness of referral, adherence to standardized protocols, and the availability of respiratory support and infection control measures. Given the resource-intensive nature of NICU care, facility-specific data on admission diagnoses, complication profiles, and outcomes are critical for optimizing staffing, antibiotic stewardship, respiratory equipment allocation, and quality improvement initiatives [8,4].

In South Asia, research consistently demonstrates that neonatal survival is shaped by both community-level practices and the quality of facility-based care. Studies from Bangladesh, India, and Nepal indicate that essential newborn care interventions, such as hygienic cord care and thermal protection, are linked to

improved survival, highlighting the continuum between household practices and facility outcomes [9]. In Bangladesh, cohort studies conducted in urban slum environments reveal that preterm birth accounts for a significant proportion of neonatal deaths, with mortality risk concentrated in the initial days of life. This finding emphasizes the critical importance of immediate postnatal stabilization and prompt management of complications [10]. Facility-based research from Bangladesh further demonstrates that neonatal survival is influenced by clinical acuity, prematurity, and health system factors, including discharge against medical advice, referral delays, and limited capacity in special care newborn units [11]. Recent studies from southern Bangladesh have identified prematurity, low birth weight, sepsis, perinatal asphyxia, and respiratory distress syndrome as leading causes of NICU admissions and in-hospital mortality. This pattern aligns with broader regional findings and underscores the necessity for unit-specific risk profiling [12]. Previous analyses of NICU admission patterns in Dhaka also reveal that morbidity profiles are heterogeneous and context dependent, reinforcing the need for regular facility-level audits of clinical profiles and outcomes to inform service planning and benchmarking [13].

Despite the expanding evidence base, a practical gap persists in many tertiary care settings: term and preterm newborns are frequently reported together, which limits the ability to tailor clinical protocols, anticipate complication patterns, and allocate resources according to risk. Comparative, facility-level analyses that distinctly profile term and preterm admissions and quantify outcomes such as survival, major complications, length of stay, and discharge status can yield actionable insights for clinicians and administrators. Accordingly, this study was designed to describe and compare the clinical profiles and in-hospital outcomes of term and preterm newborns admitted to the NICU of a tertiary care hospital.

## METHODS & MATERIALS

This hospital-based retrospective observational study was conducted in the Neonatal Intensive Care Unit (NICU) of a territory hospital in Bangladesh during over 12 months study period from January 2023 to December 2023, using routinely maintained NICU admission and discharge records. A total of 148 consecutively admitted newborns within the study period were screened. Among them, 69 were confirmed term babies and 79 were preterm babies; eligible participants were neonates aged 0–28 days at admission with a documented gestational age or sufficient obstetric or neonatal assessment data to classify gestation, while records with major missing core variables, such as gestational age and outcome, or admissions for non-clinical administrative reasons were excluded.

Newborns were categorized as term, gestational age ≥37 completed weeks, or preterm, gestational age <37 completed weeks; birth weight categories were defined as ELBW <1000 g, VLBW 1000–1499 g, LBW 1500–2499 g, and ≥2500 g. Data were extracted to a structured data collection sheet covering maternal and perinatal factors, including age, antenatal care indicators, obstetric complications where available, place and mode of delivery, and immediate postnatal variables; neonatal clinical profile variables included sex, gestational age, birth weight, Apgar scores, resuscitation at birth, age at admission, presenting complaints and signs, final diagnoses, key investigations as documented, treatments and supportive interventions, and in hospital complications. The primary outcomes were discharging status, discharged, died, referred, left against medical advice, and length of hospital stay; secondary outcomes included discharge weight and clinically important complications, such as sepsis, respiratory morbidities, hypoglycaemia, jaundice requiring phototherapy, and other diagnoses recorded by the treating team.

All the data were analyzed using SPSS (V-26.0). Data were checked for completeness and internal consistency prior to analysis; continuous variables were summarized as mean ± SD or median with IQR depending on distribution, and categorical variables as frequency and percentage. Term and preterm groups were compared using an independent samples t-test or Mann–Whitney U test for continuous variables, and a chi-square or Fisher's exact test for categorical variables; statistical significance was set at $p < 0.05$.

## RESULTS

Among 148 NICU admissions, preterm newborns (n=79) had a significantly lower mean gestational age than term newborns (34.41 ± 1.73 vs 37.00 ± 1.01 weeks, p<0.001) and a lower mean birth weight (2189.61 ± 594.73 vs 2750.86 ± 709.11 g, p<0.001). Sex distribution was comparable (male: 62.0% preterm vs 59.4% term, p=0.49), as were LUCS rates (82.3% vs 73.9%, p=0.302), admission age (median 6 days in both groups, p=0.61), Apgar scores at 1 and 5 minutes (p=0.933 and p=0.207), and resuscitation requirement (10.1% vs 8.7%, p=0.419). Birth weight categories differed markedly (overall p=0.006), with nearly half of preterm newborns in the 1500–2499 g group (48.1%) compared with only 2.9% of term newborns, while ≥2500 g was far more common among term newborns (82.6% vs 36.7%, p<0.001) *Table I.*

**Table I**

Baseline maternal–neonatal and perinatal characteristics of term versus preterm newborns admitted to the NICU (n=148).

| Variable | Category | Term (n=69) | Preterm (n=79) | p value |
|---|---|---|---|---|
| | | n (%) | n (%) | |
| Gestational age (weeks) | Mean ± SD | 37.00 ± 1.01 | 34.41 ± 1.73 | 0 |
| Birth weight (g) | Mean ± SD | 2750.86 ± 709.11 | 2189.61 ± 594.73 | 0 |
| Sex | Male | 41 (59.4) | 49 (62.0) | 0.49 |
| | Female | 28 (40.58) | 30 (37.97) | |
| Mode of delivery (LUCS) | | 51 (73.9) | 65 (82.3) | 0.302 |
| Age at admission (days) | Median (IQR) | 6.0 (4.0–8.0) | 6.0 (4.5–8.0) | 0.61 |
| Apgar score, median (IQR) | at 1 min | 8.0 (7.0–8.0) | 7.5 (7.0–8.0) | 0.933 |
| | at 5 min | 9.0 (8.0–9.0) | 9.0 (8.0–9.0) | 0.207 |
| Resuscitation performed | | 6 (8.7) | 8 (10.1) | 0.419 |
| Birth weight | <1000 g | 0 (0.0) | 1 (1.3) | 1 |
| | 1000–1499 g | 10 (14.5) | 11 (13.9) | 0.006 |
| | 1500–2499 g | 2 (2.9) | 38 (48.1) | 0 |
| | ≥2500 | 57 (82.6) | 29 (36.7) | 0 |

Respiratory distress was the most frequent presenting complaint in both groups (46.4% term vs 51.9% preterm, p=0.613). However, grunting was significantly more common among preterm newborns (48.1% vs 20.3%, p=0.001). Meconium aspiration at presentation was significantly higher in term newborns (13.0% vs 1.3%, p=0.006). Other complaints, including chest

indrawing, cyanosis, hypoglycaemia, fever, jaundice, and presumed sepsis, did not differ significantly between groups (all p>0.05) *Table II*.

**Table II**
Presenting complaints at NICU admission among term and preterm newborns (*n*=148).

| Presenting complaint | Term (n=69) | Preterm (n=79) | p value |
|---|---|---|---|
| Respiratory distress | 32 (46.4) | 41 (51.9) | 0.613 |
| Grunting | 14 (20.3) | 38 (48.1) | 0.001 |
| Chest indrawing | 9 (13.0) | 20 (25.3) | 0.095 |
| Cyanosis | 9 (13.0) | 18 (22.8) | 0.188 |
| Hypoglycaemia | 8 (11.6) | 5 (6.3) | 0.402 |
| Fever | 2 (2.9) | 0 (0.0) | 0.216 |
| Meconium aspiration | 9 (13.0) | 1 (1.3) | 0.006 |
| Neonatal jaundice | 0 (0.0) | 2 (2.5) | 0.499 |
| Presumed sepsis | 0 (0.0) | 2 (2.5) | 0.499 |

The diagnostic profile showed clear group differences for prematurity or low birth weight (54.4% preterm vs 7.2% term, p<0.001) and respiratory distress syndrome, which occurred only in preterm newborns (20.3% vs 0.0%, p<0.001). Meconium aspiration syndrome was significantly more common in term newborns (17.4% vs 3.8%, p=0.012). Neonatal jaundice was highly prevalent in both groups (65.2% term vs 54.4% preterm, p=0.244), and sepsis diagnoses were also frequent without significant difference (36.2% vs 29.1%, p=0.455), including EONS and LONS subcategories (p=0.392 and p=0.504). TTN, pneumonia, IDM, congenital heart disease, hypoglycaemia, birth asphyxia or HIE, and PDA were broadly comparable between term and preterm admissions (all p>0.05) *Table III*.

**Table III**
Distribution of final diagnoses among term and preterm NICU admissions, diagnoses not mutually exclusive (n=148).

| Final diagnosis (not mutually exclusive) | Term (n=69) | Preterm (n=79) | p value |
|---|---|---|---|
| Low birth weight or prematurity | 5 (7.2) | 43 (54.4) | 0 |
| Transient tachypnoea of newborn (TTN) | 14 (20.3) | 20 (25.3) | 0.597 |
| Respiratory distress syndrome (RDS) | 0 (0.0) | 16 (20.3) | 0 |
| Pneumonia (PNA or congenital pneumonia) | 16 (23.2) | 9 (11.4) | 0.091 |
| Meconium aspiration syndrome (MAS) | 12 (17.4) | 3 (3.8) | 0.012 |
| Sepsis (EONS or LONS or sepsis) | 25 (36.2) | 23 (29.1) | 0.455 |
| Early onset neonatal sepsis (EONS) | 20 (29.0) | 17 (21.5) | 0.392 |
| Late onset neonatal sepsis (LONS) | 3 (4.3) | 6 (7.6) | 0.504 |
| Neonatal jaundice | 45 (65.2) | 43 (54.4) | 0.244 |
| Birth asphyxia or HIE | 8 (11.6) | 3 (3.8) | 0.114 |
| Hypoglycaemia | 8 (11.6) | 7 (8.9) | 0.782 |
| Infant of diabetic mother (IDM) | 17 (24.6) | 26 (32.9) | 0.355 |
| Congenital heart disease (any) | 22 (31.9) | 27 (34.2) | 0.904 |
| Patent ductus arteriosus (PDA) | 4 (5.8) | 4 (5.1) | 1 |

Oxygen therapy was commonly used and tended to be higher in preterm newborns (62.0% vs 46.4%), though this difference was not statistically significant (p=0.081). Phototherapy use was similarly high in both groups (63.3% preterm vs 66.7% term, p=0.798), and mechanical ventilation was infrequent (5.1% vs 1.4%, p=0.372). Antibiotic exposure was very high in both groups (86.1% preterm vs 82.6% term, p=0.724), with cefotaxime being the most used agent (75.9% vs 65.2%, p=0.21); use of meropenem, vancomycin, and amikacin did not significantly differ between groups (all p>0.05) *Table IV*.

**Table IV**
NICU interventions and antimicrobial use among term and preterm newborns (*n*=148).

| Intervention | Term (n=69) | Preterm (n=79) | p value |
|---|---|---|---|
| Oxygen inhalation | 32 (46.4) | 49 (62.0) | 0.081 |
| Phototherapy | 46 (66.7) | 50 (63.3) | 0.798 |
| Mechanical ventilation | 1 (1.4) | 4 (5.1) | 0.372 |
| Any antibiotic administered | 57 (82.6) | 68 (86.1) | 0.724 |
| Cefotaxime | 45 (65.2) | 60 (75.9) | 0.21 |
| Meropenem | 20 (29.0) | 18 (22.8) | 0.501 |
| Vancomycin | 10 (14.5) | 6 (7.6) | 0.279 |
| Amikacin | 5 (7.2) | 13 (16.5) | 0.145 |

Preterm newborns had a significantly longer hospital stay than term newborns (median 4.0 [IQR 3.0–6.0] vs 3.0 [IQR 2.0–4.8] days, p=0.007). Discharge weight remained significantly lower among preterm newborns (2088.32 ± 553.64 vs 2775.37 ± 550.60 g, p<0.001). Mean weight change during hospitalization was negative in both groups and did not differ significantly (−90.64 ± 158.43 g preterm vs −140.53 ± 234.41 g term, p=0.080). A “normal” condition at discharge was more frequent among term newborns (81.2% vs 65.8%), showing a borderline difference (p=0.056) *Table V*.

**Table V**
In hospital outcomes of term versus preterm newborns admitted to the NICU (*n*=148).

| Outcome measure | Term (n=69) | Preterm (n=79) | p value |
|---|---|---|---|
| Length of hospital stay (days), median (IQR) | 3.0 (2.0–4.8) | 4.0 (3.0–6.0) | 0.007 |
| Discharge weight (g), mean ± SD | 2775.37 ± 550.60 | 2088.32 ± 553.64 | 0 |
| Weight change during stay (g), mean ± SD | -140.53 ± 234.41 | -90.64 ± 158.43 | 0.080 |
| Condition at discharge: Normal, n (%) | 56 (81.2) | 52 (65.8) | 0.056 |

## DISCUSSION

This study offers a pragmatic comparison of clinical profiles and short-term in-hospital outcomes between term and preterm newborns admitted to a tertiary neonatal intensive care unit (NICU). As anticipated, preterm infants demonstrated significantly lower gestational age and birth weight compared to term infants, a trend consistent with global prematurity epidemiology and neonatal unit case-mix reports from South Asia, where prematurity and low birth weight are major contributors to admissions and resource utilization [14-16]. The median age at admission was 6 days in both groups, indicating that a substantial proportion were admitted for evolving postnatal complications rather than immediate delivery-room compromise. This finding contextualizes the high frequencies of jaundice, presumed infection, and respiratory symptoms presenting beyond the first day of life, a pattern also observed in referral-heavy NICU cohorts [15,16].

Respiratory morbidity was a prominent presenting feature, with respiratory distress affecting approximately half of both term and preterm admissions. However, clinical severity indicators varied; grunting was significantly more common among preterm newborns (48.1% vs 20.3%), reflecting the greater prevalence of surfactant-deficient lung disease and early respiratory transition challenges in this group [17,18]. Respiratory distress syndrome was observed exclusively in preterm infants (20.3%), consistent with their known biological vulnerability and the established pattern of RDS clustering in preterm admissions within facility-based newborn care programs [16-18]. The high caesarean section rate in both groups, particularly among preterm newborns (82.3%), may have contributed to transient respiratory morbidity due to delayed lung fluid clearance. Systematic reviews and cohort studies consistently link elective or early-term caesarean delivery with increased risk of neonatal respiratory disorders such as transient tachypnea of the newborn (TTN) and related non-infectious distress syndromes [19,20]. Although TTN rates did not differ significantly between groups in this cohort, the overall frequency (20%–25%) is clinically significant and highlights the need for careful consideration of caesarean delivery timing and indications, as well as preparedness for early respiratory support when caesarean delivery is necessary [19,20].

A key difference between groups was the higher incidence of meconium-related pathology among term newborns. Meconium aspiration as a presenting complaint (13.0% vs 1.3%) and meconium aspiration syndrome as a final diagnosis (17.4% vs 3.8%) were significantly more common in term infants, consistent with the epidemiology of meconium-stained amniotic fluid and aspiration-related disease, which primarily affects term and post-term deliveries [21,22]. Recent studies demonstrate that outcomes in meconium-exposed neonates are improved by timely supportive ventilation rather than routine invasive suctioning. Meta-analyses show no clear benefit of endotracheal suctioning in non-vigorous infants, supporting a shift toward evidence-based resuscitation and early respiratory stabilization in NICU protocols [23].

Neonatal jaundice was highly prevalent in both term and preterm admissions (65.2% vs 54.4%). Comparable rates of hyperbilirubinemia among NICU admissions have been documented in multiple regional datasets, particularly where outborn referrals and delayed postnatal presentations are common [15,16,24]. Globally, systematic reviews emphasize that severe neonatal jaundice remains a significant and preventable cause of morbidity in low-resource settings, often due to deficiencies in early detection, post-discharge follow-up, and timely access to phototherapy [25,26]. The high rate of phototherapy use in both groups (approximately two-thirds) is appropriate; however, the continued high admission burden indicates a need for structured bilirubin screening, risk stratification, and early outpatient follow-up, particularly for late-preterm infants who are physiologically vulnerable and may be discharged early from delivery facilities [25,26].

Suspected or confirmed infection was a major diagnostic category, with sepsis documented in approximately one-third of both term and preterm newborns. This proportion is similar to reports from other NICUs and special newborn care units in South Asia, where clinical sepsis definitions are frequently used due to limited rapid diagnostics, and where neonatal sepsis remains a significant contributor to mortality and prolonged hospitalization [15,16,27]. Antibiotic exposure was also extremely high (82.6% in term, 86.1% in preterm), surpassing rates reported in multicountry point-prevalence surveys of neonatal antimicrobial use, but consistent with patterns observed in tertiary hospitals in low- and middle-income countries where empiric treatment and early broad-spectrum escalation are common [28,29]. Given the substantial burden of antimicrobial resistance among neonatal pathogens in the region, this level of antibiotic use underscores the need for stewardship interventions, including local antibiogram-guided empiric protocols, prompt culture acquisition when feasible, and structured antibiotic reviews at 36–48 hours to de-escalate or discontinue therapy when infection is unlikely [30,31]. Systematic reviews demonstrate that antimicrobial stewardship programs can safely reduce antibiotic initiation, duration, and broad-spectrum use in neonatology without adverse outcomes, supporting stewardship as a key quality improvement priority for NICUs with high empiric use [31].

Preterm newborns experienced significantly longer hospital stays (median 4 vs 3 days) and lower discharge weights, reflecting slower physiological stabilization and feeding maturation. Similar findings have been consistently reported in studies showing longer lengths of stay and greater resource requirements among preterm admissions [15,16]. Although the proportion of preterm newborns discharged in "normal" condition was lower (65.8% vs 81.2%), the borderline p value indicates limited statistical power to confirm this difference. Nevertheless, the observed trend is clinically plausible and underscores the need for comprehensive discharge readiness assessments and robust post-discharge support for even moderately preterm infants.

## LIMITATIONS

The single-center design, limiting generalizability; a relatively small sample size that may reduce power for some outcomes, for example discharge status; reliance on routine clinical records and non-standardized diagnostic definitions, with overlap of non-mutually exclusive diagnoses; and the absence of longer-term follow-up, microbiology confirmation, and adjustment for potential confounders such as outborn status, antenatal steroid exposure, and severity of illness.

## CONCLUSION

Preterm newborns admitted to the NICU had substantially lower gestational age and birth weight, higher markers of respiratory compromise, and longer hospital stay than term newborns, while term newborns showed a higher burden of meconium-related illness. Jaundice, suspected infection, and antibiotic exposure were common in both groups, highlighting the need for strengthened prevention of prematurity, standardized respiratory and jaundice care pathways, and improved infection diagnostics plus antimicrobial stewardship to optimize NICU outcomes in tertiary settings.

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## CONFLICT OF INTEREST

None declared

## ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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