



## Original Article

# Clinical Profile and Outcome of Neonates Admitted to the Neonatal Care Unit at Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet

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### ABSTRACT

The neonatal mortality rate is still high in Bangladesh. It is crucial to identify areas where health care can be enhanced in order to improve newborn outcomes. The objective of this study was to describe the reasons for admission and the magnitude of neonatal mortality in the neonatal care unit of Jalalabad Ragib-Rabeya Medical College Hospital. This cross-sectional study was conducted between the periods of 1<sup>st</sup> January 2018 and 30<sup>th</sup> June 2018. Data were collected from the inpatient record files at the hospital record section. A total of 854 patients were included in the study. Among them, males were 57.4% and 42.6% were females. Most of the admitted neonates (78.7%) were inborn. Prematurity was present in 23.6% of neonates. The majority of the neonates (76.4%) were admitted within 24 hours of birth. The most common reasons for neonatal admission were low birth weight (44.8%), neonatal sepsis (42.6%), asphyxia (40.6%), neonatal jaundice (24.8%), hypoxic-ischemic encephalopathy (10.7%), congenital anomaly (8.1%), and infants of diabetic mothers (5%). The overall death rate was 11%. Sepsis (60.6%), LBW (59.6%), asphyxia (55.3%), and prematurity (51.1%) were the main contributors to neonatal death. Prematurity, birth weight <1500 grams, outborn baby, vaginal delivery, birth asphyxia, and sepsis were all associated with a higher risk of neonatal mortality ( $p < 0.05$ ). Low birth weight, sepsis, asphyxia and prematurity were the leading causes of neonatal admission and mortality in our study. Preventing asphyxia and sepsis, as well as improving the survival of preterm and low-birth-weight newborns, must be prioritized.

**Keywords:** Neonate, Clinical profile, Outcome.

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### INTRODUCTION

The period from birth to under 4 weeks (28 days or less) of age for an infant who is completing many of the physiological adaptations required for extrauterine existence is known as the neonatal period. Due to a

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variety of illnesses, this is the most critical era of life, and the majority of them can be avoided<sup>1</sup>. Every year, roughly 130 million babies are born around the world, with 4 million dying during the first 28 days of life. Seventy-five percent (75%) of neonatal deaths occur within the first seven days of life, and 50% within the first 24 hours<sup>2</sup>. The causes of infant morbidity and mortality differ across developed and developing

countries. In developed countries, non-preventable causes like congenital anomalies and prematurity are common. However, preventable illnesses such as infections and birth asphyxia are most prevalent in developing countries<sup>2,3</sup>.

Poor maternal health, unfavourable social conditions and inadequate care during pregnancy, delivery, and the immediate postpartum period are known to cause perinatal and newborn fatalities in developing nations<sup>4</sup>. Around 99 percent of all newborn deaths occur in low resource countries. Neonatal mortality accounts for 40-70 percent of all infant deaths. Neonatal death is dropping at a slower rate than infant and under-five mortality, according to mortality trends<sup>4</sup>. Under-5 and infant mortality rates have decreased by 65 percent and 56 percent, respectively, over the last two decades. Neonatal mortality has decreased by 46%, while post-neonatal mortality has decreased by 71%<sup>5</sup>.

The neonatal mortality rate (NMR) in Bangladesh is 28 per 1000 live births. These deaths account for 61% of all deaths among children under the age of five. The rate of neonatal death is roughly three times that of post-neonatal mortality. Birth asphyxia (21%), low birth weight (11%), and severe infection (34%) are the leading causes of neonatal death in Bangladesh<sup>5</sup>.

To improve care for pregnant mothers and children, Bangladesh has developed a nationwide policy of free maternal and child health care. Higher utilization rates of health services for antenatal care and delivery services have been demonstrated from this population, but the impact of this care on perinatal morbidity and mortality has yet to be determined<sup>6</sup>.

The perinatal death rate in Sylhet is 63 per 1000 pregnancies, which is the highest in the country, and neonatal mortality is 3.9%, which is the second worst rate in the country<sup>5</sup>. In order to develop strategies to improve neonatal health care in Sylhet, it is crucial to quantify and monitor the causes of newborn morbidity and mortality. So the aim of this study was to describe the characteristics of the neonates admitted to the neonatal care unit of Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet, as well as to investigate the magnitude of neonatal mortality in the unit.

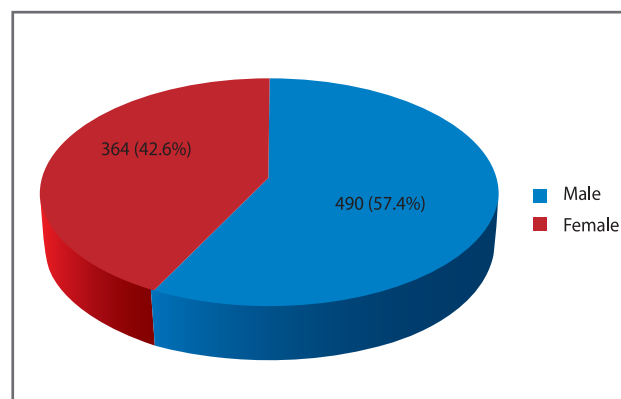
## MATERIALS AND METHODS

This cross-sectional study was conducted at the neonatal care unit in the department of paediatrics at the Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet. This is a private medical college hospital situated in the northeast region of Bangladesh. The

neonatal care unit consisted of a 10 bedded neonatal intensive care unit (NICU) equipped with radiant warmers, incubators, bubble continued positive airway pressure (bCPAP) and mechanical ventilators; a special care baby unit; a low birth weight care unit; and a general neonatal ward. The study was carried out over a period of 6 months, from 1<sup>st</sup> January to 30<sup>th</sup> June 2018. All newborns (Both inborn and outborn) who were admitted during this period were included in the study. A total of 1072 neonates were admitted during this period. Among them, 110 were excluded for unavailability of records or partial information, and 108 newborns were excluded because they were admitted only for observation, and after 24-48 hours of observation, they were discharged without any treatment. Finally, 854 cases were enrolled for analysis. Data were collected from the inpatient record files at the hospital record section. Data on age at admission, gender, gestational age and weight during admission, place of delivery, mode of delivery, initial presenting symptoms at admission, final diagnosis, and outcome in regards to whether the newborn was discharged after completion of treatment, discharged on request (DOR), left against medical advice (LAMA), transferred to another hospital, referred to a specialized centre, or expired and the cause of death were collected. Data were analysed with SPSS Version 21 and presented as frequency, percentage, bar and pie charts. Case fatality and the relative risk of death associated with selective variables were calculated. A p-value of <0.05 was considered significant.

## RESULTS

A total of 854 cases were included in the study. Among them, males made up 57.4% and 42.6% were females (Figure-1). The male-to-female ratio was 1.35:1. The majority of the neonates (76.4%) were admitted within



**Figure-1:** Distribution of the study newborns according to gender; N=854

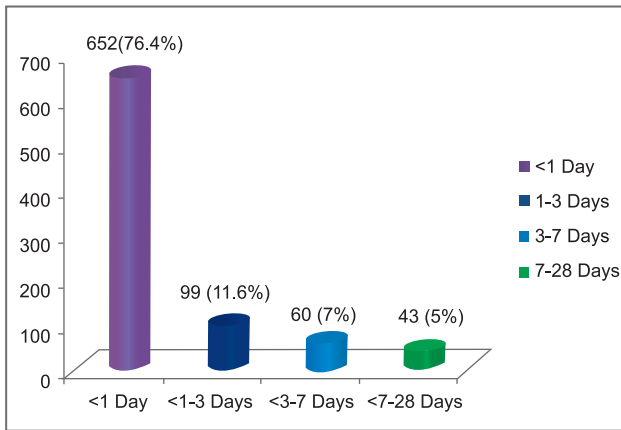


Figure-2: Age at admission of the newborns, N=854

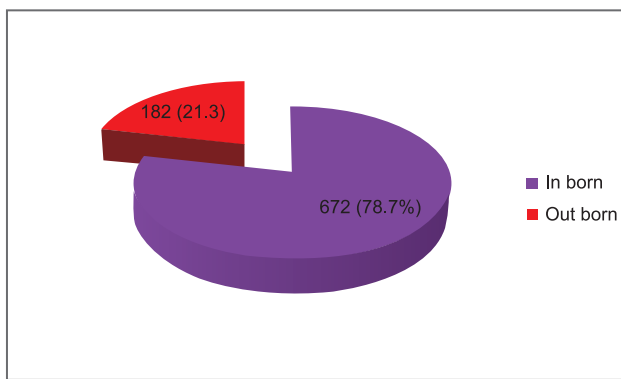


Figure-3: Place of delivery of the study neonates, N=854

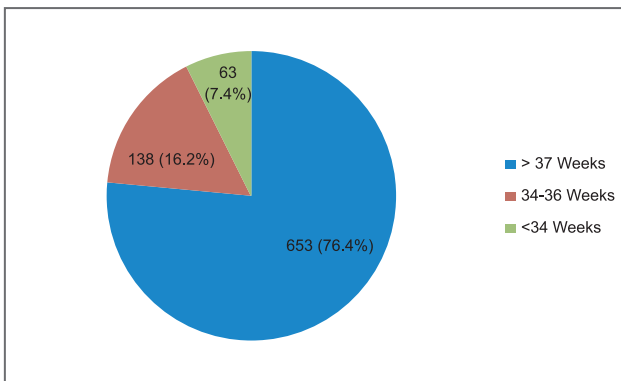


Figure-4: Distribution of newborn according to gestational age, N=854

24 hours of birth and 78.7% were inborn (Figure-2,3). The majority of the neonates (76.4%) were delivered at term, with preterm deliveries accounted for 23.6% (Figure-4). Regarding birth weight, birth weight was normal in 53.4% neonates, and low birth weight and macrosomia were in 44.8% and 1.8% neonates, respectively (Figure-5). The mean birth weight was 2506±664 grams.

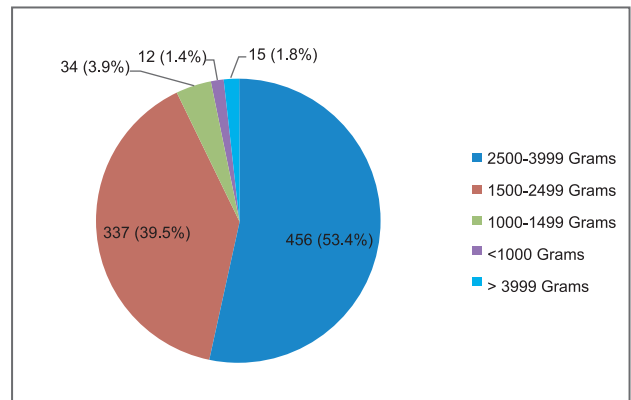


Figure-5: Distribution of the newborn according to birth weight, N=854

In both term and preterm infants, 52.2% and 69.1%, respectively, had characteristics appropriate for gestational age. Preterm neonates had a rate of 45.3% and 2.5%, whereas term neonates had a rate of 28.6% and 2.3%, respectively, of small and large for gestational age (Figure-6). The majority of the neonates (67.7%) were delivered by lower segment caesarean section (LSCS) (Figure-7).

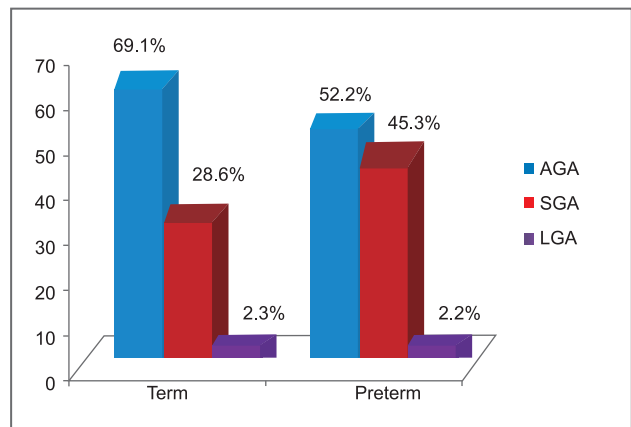
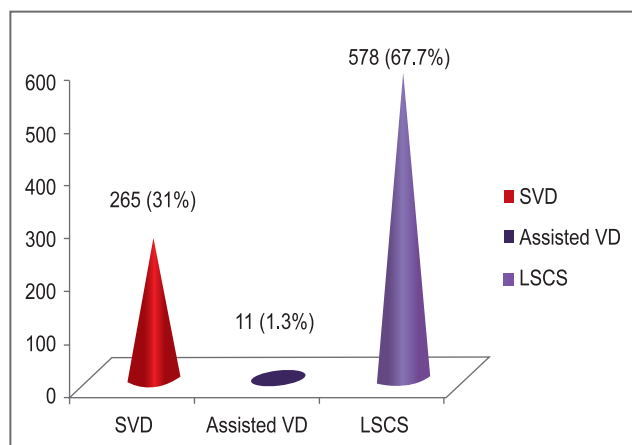


Figure-6: Distribution of the newborn according to gestational age and birth weight, N=854

\*AGA: appropriate for gestational age, SGA: small for gestational age, LGA: large for gestational age

Common causes of neonatal admission were low birth weight (44.8%), neonatal sepsis (42.6%), birth asphyxia (40.6%), neonatal jaundice (24.8%), prematurity (23.6%), congenital anomaly (8.1%), Infants of diabetic mothers (5%), birth injury (3.2%), respiratory distress syndrome (1.3%), transient tachypnoea of newborn (1.3%), pneumonia (1.1%) and meconium aspiration syndrome (0.6%) (Table-I).

Regarding the outcome of the neonates, 41.7% were discharged with advice after completion of treatment,

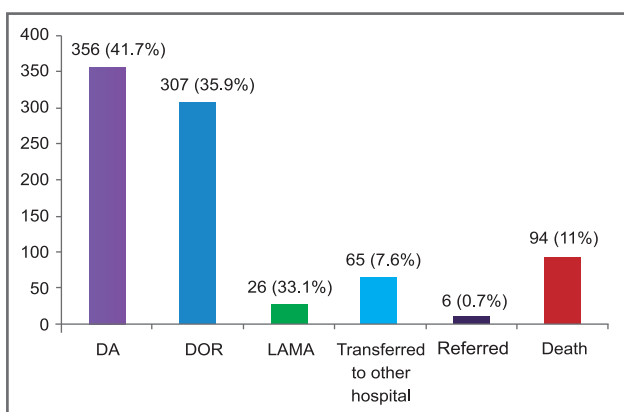


**Figure-7:** Distribution of the newborns according to mode of delivery, N=854

\*SVD: spontaneous vaginal delivery, VD: vaginal delivery, LSCS: lower segment caesarean section

35.9% were discharged on request, 3.1% left against medical advice, 7.6% were transferred to other hospitals, and 0.7% were referred to specialized hospital. Death occurred in 11% of admitted neonates (Figure-8). Sepsis (60.6%), LBW (59.6%), asphyxia (55.3%), and prematurity (51.1%) were all significant contributors to neonatal death (Table-II).

Death was not significantly associated with gender and age at admission ( $p > 0.05$ ), but was significantly associated with preterm baby, birth weight <1500 grams, out born baby, vaginal delivery, birth asphyxia and sepsis ( $p < 0.05$ ). Death was 1.8 times higher in asphyxiated neonates and 4.5 times higher when asphyxia was associated with hypoxic ischemic encephalopathy ( $p < 0.05$ ). Death was also 2 times higher in neonatal septicaemia ( $p < 0.05$ ) (Table-III).



**Figure-8:** Outcome of the admitted neonates, N=854

\*DA- Discharged with advice, DOR- Discharged on request, LAMA- Left against medical advice

**Table-I:** Aetiology of neonatal admission, N=854

Diagnosis	Frequency	Percentage
LBW	383	44.8
Sepsis	364	42.6
Asphyxia	347	40.6
Neonatal jaundice	212	24.8
Prematurity	201	23.6
Congenital anomaly	69	8.1
IDM	43	5
Birth injury	27	3.2
RDS	11	1.3
TTN	11	1.3
Pneumonia	9	1.1
MAS	5	0.6

\*One respondent considered more than one reason.

\*\*LBW: Low birth weight, IDM: Infants of diabetic mothers, RDS: Respiratory distress syndrome, TTN: Transient tachypnoea of newborn, MAS: Meconium aspiration syndrome

**Table-II:** Causes of neonatal death, N=94

Diagnosis	Frequency	Percentage
Sepsis	57	60.6
LBW	56	59.6
Asphyxia	52	55.3
Prematurity	48	51.1
RDS	9	9.6
Congenital anomaly	7	7.4
Pneumonia	2	2.1
MAS	1	1.1

\*One respondent considered more than one reason.

## DISCUSSION

This study was carried out at the neonatal care unit of Jalalabad Ragib-Rabeya Medical College Hospital, Sylhet. A total of 854 neonates were enrolled in the study. Among them, males made up 57.4% and 42.6% were females. The male-to-female ratio was 1.35:1. In 2005, Nahar et al.<sup>7</sup> and Shahidullah et al.<sup>6</sup> in 2013 found similar results in two different studies in Bangladesh. Multiple international studies in Pakistan, South Africa, Nepal, and India also found similar results<sup>1,8,9,10</sup>.

The majority of the neonates (76.4%) were admitted within 24 hours of birth and 78.7% were inborn. A study in the Combined Military Hospital, Kharian, Pakistan, showed that, 70.55% of neonates had an age <24 hours at the time of admission, which is similar to our study<sup>11</sup>. Baruah et al.<sup>10</sup> and Tekleab et al.<sup>12</sup> found



**Table-III:** Case fatality and relative risk of deaths associated with selected variables (N=854, death=94)

Variable	Death, n (%)	p-value	RR (95% CI)
<b>Gender</b>			
Male	59 (62.8%)	.263	1.252 (0.843-1.859)
Female	35 (37.2%)		
<b>Age at admission</b>			
<1 Day	71 (75.5%)	.884	0.956 (0.614-1.489)
>1 Day	23 (24.5%)		
<b>Gestational age</b>			
Term	46 (48.9%)	.000	0.295 (0.203-0.428)
Preterm	48 (51.1%)		
<b>Birth weight</b>			
>1500 grams	71 (75.5)	.000	0.237 (0.161-0.351)
<1500 grams	23 (24.5)		
<b>Place of delivery</b>			
Inborn	48 (51.1%)	.000	0.283 (0.195-0.409)
Out born	46 (48.9%)		
<b>Mode of delivery</b>			
LSCS	44 (46.8%)	.000	0.421 (0.288-0.614)
VD	50 (53.2%)		
<b>Asphyxia</b>			
Yes	52 (55.3)	.002	1.809 (1.233-2.653)
No	42 (44.7)		
<b>HIE</b>			
Yes	33 (35.1)	.000	4.536 (3.154-6.524)
No	61 (64.9)		
<b>Sepsis</b>			
Yes	57 (60.6%)	.000	2.074 (1.403-3.066)
No	37 (39.4)		

that 75.6% and 81.9% of neonates were inborn, which is comparable with our study. But Shahidullah et al.<sup>6</sup> found that 56.1% of the neonates admitted were inborn, which is lower than our study.

Prematurity was found to be a major cause of hospital admission in previous research in Bangladesh. In 2005, Nahar et al.<sup>7</sup> at Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM), Dhaka, found that 60.7% of admissions were due to prematurity, while in 2017, Shahidullah et al.<sup>6</sup> at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, found that the proportion was 40.3%. Similar results were found in multiple studies conducted in other developing countries<sup>11,12,13,14</sup>. In our study, prematurity was present in 23.6% of the admitted neonates, which is lower than in previous studies. The opposite result was found in a study in Nepal where only 10.8% of admitted newborns were premature<sup>15</sup>.

Low birth weight was a major cause of hospital admission in this study, which was present in 44.8% of the admitted neonates. Similar findings were found in

Bangladesh<sup>7</sup>, India<sup>10</sup>, Nepal<sup>14</sup>, Pakistan<sup>1</sup>, South Africa<sup>8</sup> and Ethiopia<sup>12</sup>. A much lower result was found by Jan et al.<sup>16</sup>, where only 10.5% of admitted newborns were premature.

In both term and preterm infants, 52.2% and 69.1%, respectively, had appropriate for gestational age. Preterm neonates had rates of small and large for gestational age of 45.3% and 2.5%, respectively, whereas term neonates had rates of 28.6% and 2.3%. Nahar et al.<sup>7</sup> in a study at BIRDEM, Dhaka, found that the majority of newborns were AGA, which is similar to our study. However, SGA was found in 13.9% of the neonates, which is lower than in our study. On the other hand, Shahidullah et al.<sup>6</sup> at BSMMU, Dhaka found that 27.5% of neonates admitted were SGA, which supports our study.

Lower segment caesarean section was the most common mode of delivery in our study and was present in 67.7% of the study population. According to the Bangladesh Demographic and Health Survey (BDHS) report 2014<sup>5</sup>, among births delivered in health facilities, 61% are delivered by caesarean section,

which is lower than in our study. This high number of caesarean sections is possibly due to the admission of the most complicated cases, as this is a tertiary care referral hospital. On the other hand, only sick babies and babies at risk were admitted to the neonatal ward or NICU, not all babies delivered in the obstetrics ward. Another possibility is that sick babies delivered by LSCS in private clinics without NICUs were referred to this hospital. Our study is supported by multiple national and international studies<sup>6,7,10,11,17</sup>. Studies in South Africa<sup>8</sup>, Ethiopia<sup>12</sup>, Nepal<sup>15</sup> and Pakistan<sup>18</sup>, on the other hand, had the dissimilar results, where vaginal delivery was higher than LSCS.

In developing countries like Bangladesh, septicaemia is a common cause of neonatal morbidity and mortality<sup>7</sup>. In our study, sepsis was one of the most common causes of neonatal admission, and it constituted 42.6% of the total admissions. This finding was similar to studies conducted in Bangladesh, India, Nepal, and Pakistan<sup>6,10,14,16</sup>. In contrast, sepsis was discovered in 10% of hospitalised neonates in a research by Nahar et al. in Bangladesh<sup>7</sup>.

In Bangladesh, perinatal asphyxia is a major newborn health issue<sup>19</sup>. In our study, perinatal asphyxia was present in 40.6% of the admitted neonates and different grades of hypoxic-ischemic encephalopathy were present in 10.7% of the cases. Haque et al.<sup>8</sup> found similar results in a study in South Africa, where asphyxia was present in 38% of the neonates. In a review article, Islam MN stated that in Bangladesh, perinatal asphyxia accounted for 21.98% of the total neonatal admissions, which is lower than our study<sup>19</sup>. Another study in Dhaka, Bangladesh found that perinatal asphyxia was present in 16.8% of the admitted neonates, which is also lower than our study<sup>6</sup>. The higher percentage of asphyxia in our study was probably related to trying home delivery with an untrained birth attendant, inadequate antenatal care, and other socio-economic and cultural factors.

Other causes of neonatal admission in our study were neonatal jaundice (24.8%), congenital anomaly (8.1%), IDM (5%), birth injury (3.2%), RDS (1.3%), TTN (1.3%), pneumonia (1.1%) and meconium aspiration syndrome (0.6%). In a study conducted in Bangladesh, Nahar et al.<sup>7</sup> discovered neonatal jaundice, congenital anomaly, RDS, TTN, pneumonia, and MAS in 23.3%, 1.7%, 6.4%, 10.8%, 0.8%, and 1.7% of admitted neonates, respectively. Congenital anomaly was found to be higher in our study when compared to this study, but RDS and TTN were lower. Shahidullah et al.<sup>6</sup> found that congenital anomalies were present in 17.6% of the admitted neonates, which was more than twice

the number from our study.

Regarding the outcome of the neonates, 41.7% were discharged with advice after completion of treatment, 35.9% were discharged on request, 3.1% left against medical advice, 7.6% were transferred to other hospitals, and 0.7% were referred. Death occurred in 11% of admitted neonates. Similar death rates were found in different studies in Bangladesh, India, Nepal, Pakistan, Jordan, and South Africa<sup>2,7,8,10,16,17</sup>. However, the mortality rate ranged from 3.32% to 30.9% in different studies<sup>9,11,12,18,20</sup>. A significant number of neonates were transferred to other hospitals, especially government medical college hospital in our study. Financial constraint is an important cause of these transfers, especially for those newborns who need hospitalization for prolonged periods, like very low-birth-weight babies and babies with HIE and sepsis.

Sepsis (60.6%), LBW (59.6%), asphyxia (55.3%), and prematurity (51.1%) were all major contributors to neonatal death. In a study, Shahidullah et al.<sup>6</sup> discovered that LBW is the leading cause of newborn death (78.4%), followed by prematurity (76.5%), sepsis (51.9%), congenital anomalies (36.2%) and perinatal asphyxia (27.4%). This study has a higher death rate from LBW and prematurity than ours, but a lower death rate from perinatal asphyxia.

In our study, neonatal mortality was significantly associated with preterm baby, birth weight <1500 grams, out born baby, vaginal delivery, birth asphyxia and sepsis ( $p < 0.05$ ). The death rate was 1.8 times higher in asphyxiated neonates and 4.5 times higher when asphyxia was associated with hypoxic ischemic encephalopathy. In neonatal septicaemia, the number of fatalities was likewise two times greater. In a study conducted at BIRDEM in Dhaka, Nahar et al.<sup>7</sup> discovered a similar finding, with the death rate being 2 times greater in perinatal asphyxia and 2.3 times higher in neonatal sepsis. In another study, Takleab et al.<sup>12</sup> in Ethiopia also found that neonatal death is significantly associated with prematurity and asphyxia. However, they did not find any significant relationship between death and mode of delivery or place of delivery, which is dissimilar to our study.

## CONCLUSION

In our analysis, the three main reasons of newborn hospitalisation and fatality were low birth weight, sepsis, and asphyxia. Preterm newborns had a higher mortality rate. By raising the standard of prenatal, natal, and postnatal care, a considerable proportion of these fatalities can be avoided.

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