

# Assessment of Indication and Feto-Maternal Outcome of Caesarean Section among the Preterm Pregnant Patients

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## ARTICLE INFO

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## ABSTRACT

**Background:** Caesarean section (CS) is an essential intervention in managing preterm pregnancies complicated by maternal or fetal conditions. However, increasing CS rates, especially in preterm deliveries, raise concerns regarding its indications and associated feto-maternal outcomes. **Aim of the study:** The aim of this study was to evaluate the indications and feto-maternal outcomes of caesarean sections performed among preterm pregnant women in a tertiary care hospital in Bangladesh. **Methods & Materials:** This prospective observational study included 95 preterm pregnant women (<37 weeks) undergoing CS over one year. Data on demographics, obstetric history, indications for CS, anesthesia type, and maternal and fetal outcomes were collected and analyzed using SPSS v26. Descriptive statistics summarized the findings. **Result:** Most participants were young (37.89% aged 15–20 years) and primigravida (65.26%). The leading indications for CS were previous cesarean section (31.58%) and fetal distress (30.53%). Emergency CS accounted for 93.68% of cases, with spinal anesthesia used in 75.79%. Maternal complications included hemorrhage (12.63%) and blood transfusion (9.47%). Neonatal complications were predominantly respiratory distress (29.47%) and hyperbilirubinemia (16.84%), with a fetal mortality rate of 5.26%. **Conclusion:** Preterm cesarean sections are mostly emergency procedures driven by fetal distress and prior CS. The significant maternal and neonatal morbidity highlights the necessity for improved antenatal care and judicious use of CS in preterm deliveries.

**Keywords:** Preterm pregnancy, Caesarean section, Feto-maternal outcome, Emergency cesarean, Neonatal complications, Bangladesh

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## Introduction

A Cesarean section (CS), also known as a C-section, is a surgical procedure in which a baby is delivered through incisions made in the mother's abdomen and uterus [1]. While CS is a lifesaving intervention in cases of maternal or fetal complications, the global rise in its use has become a pressing public health concern. According to the World Health Organization (WHO), the global CS rate has escalated from approximately 7% in 1990 to 21% in 2018, and it is projected to reach nearly 29% by 2030 if current trends continue [2]. This increase is particularly evident in low- and middle-income countries, where inequalities in access to quality maternal healthcare are often pronounced. In Bangladesh, the situation is especially alarming. According to the Statistics, the national CS rate rose sharply from 41.4% to 50.7% in 2023, far exceeding the WHO-recommended threshold of 10–15% [3]. Preterm birth defined as delivery occurring before the completion of normal gestation is a major contributor to neonatal morbidity and mortality worldwide. Management of such cases often necessitates critical clinical judgment, especially when maternal or fetal complications are present [4]. In certain conditions such as preeclampsia, eclampsia, placenta previa, malpresentation, or fetal distress, cesarean section (CS) may be justified to safeguard the well-being of both mother and child. When performed based on valid medical

indications, CS can be life-saving [5]. Evidence suggests that non-medically indicated CS in preterm deliveries can adversely affect both maternal and neonatal outcomes. Mothers may experience higher risks of postoperative complications including hemorrhage, infection, thromboembolism, and delayed recovery [6]. Furthermore, surgical delivery increases the chance of complications in future pregnancies such as uterine rupture and placental abnormalities [7]. In Bangladesh, the pattern of increasing CS use especially in preterm births is driven by a combination of medical, social, and institutional dynamics [8]. Factors such as maternal age, education level, parity, and socio-economic status influence the choice of delivery mode. Families with greater financial means often opt for private health facilities where CS is disproportionately more frequent [9]. These facilities may prioritize surgical delivery due to perceived patient demand, convenience, or economic incentives. In such settings, the distinction between clinical necessity and elective choice is often blurred [10]. Influenced by institutional norms and medicolegal concerns, some clinicians favor cesarean delivery for convenience, while widespread public perception of CS as a safer [11], more modern option combined with inadequate health education and weak regulatory oversight fuels a rise in preterm cesareans lacking robust clinical justification [12]. Despite these challenges, limited empirical

data are available that specifically examine the indications for CS among preterm births and the resultant feto-maternal outcomes in the Bangladeshi context [13]. This study aims to the indications and feto-maternal outcomes of caesarean sections in preterm pregnancies in Bangladesh to inform evidence-based strategies for their appropriate and medically justified use.

## Methods & Materials

This prospective observational study was conducted at the Department of [name], [hospital name], Bangladesh over a one-year period from [time] to [time]. After excluding incomplete records or those not meeting eligibility criteria, data from 95 preterm pregnant women who underwent caesarean section during the study period were initially enrolled using a purposive consecutive sampling technique.

### Inclusion Criteria:

- Pregnant women age more than 15 years
- Preterm pregnancies (<37 weeks)
- Singleton pregnancies
- All presentations
- Primi/multigravida

### Exclusion Criteria:

- Pregnant women who had term deliveries.

- Patients who declined to provide consent or were unwilling to participate.

**Ethical Considerations**

The study protocol was approved by the Ethical Review Committees of the Institution. Informed consent was obtained from all participating patients, and confidentiality of their data was maintained throughout the study.

**Data Collection**

Data were collected using a structured and pretested questionnaire that included variables related to demographic characteristics, obstetric history, indications for caesarean section, type of surgery, anesthesia used, and maternal and fetal outcomes. Patient information was

retrieved from medical records, surgical notes, and post-operative follow-up during their hospital stay. Additional history was obtained through direct interviews with the patients when necessary.

**Statistical Analysis**

All collected data were entered into a structured data sheet and analyzed using Statistical Package for Social Sciences (SPSS) software version 26.0. Descriptive statistics such as frequency and percentage were used to summarize the findings related to maternal age, education, socio-economic status, obstetric variables, surgical indications, and post-operative outcomes for both mother and fetus.

**Result**

The study included a total of 95 participants who underwent preterm caesarean section. The majority (36, 37.89%) were between 15–20 years of age, followed by 21–25 years (21, 22.11%) and 26–30 years (17, 17.89%). Participants aged 31–35 years and above 36 years were 12 (12.63%) and 9 (9.47%), respectively. Most of the women were graduates (71, 74.74%), while 21 (22.11%) had secondary education. Only 2 (2.11%) had primary education and 1 (1.05%) was illiterate. Socio-economically, 73 (76.84%) belonged to the poor category, 20 (21.05%) to the lower middle class, and 2 (2.11%) to the upper class. A significant proportion lived in urban areas (66, 69.47%) and 29 (30.53%) resided in rural areas (*Table I*).

| <b>Table I</b><br>Demographic characteristics of the study population (n=95). |               |                |
|-------------------------------------------------------------------------------|---------------|----------------|
| Variables                                                                     | Frequency (n) | Percentage (%) |
| <b>Age in years</b>                                                           |               |                |
| 15-20                                                                         | 36            | 37.89          |
| 21-25                                                                         | 21            | 22.11          |
| 26-30                                                                         | 17            | 17.89          |
| 31-35                                                                         | 12            | 12.63          |
| >36                                                                           | 9             | 9.47           |
| <b>Educational qualification</b>                                              |               |                |
| Illiterate                                                                    | 1             | 1.05           |
| Primary                                                                       | 2             | 2.11           |
| Secondary                                                                     | 21            | 22.11          |
| Graduate                                                                      | 71            | 74.74          |
| <b>Socio-economic status</b>                                                  |               |                |
| Poor                                                                          | 73            | 76.84          |
| lower middle class                                                            | 20            | 21.05          |
| Upper class                                                                   | 2             | 2.11           |
| <b>Living area</b>                                                            |               |                |
| Rural                                                                         | 29            | 30.53          |
| Urban                                                                         | 66            | 69.47          |

Primigravida women were most common (62, 65.26%), followed by gravida 2 (16, 16.84%) and gravida 3 (9, 9.47%). Gravida 4, 5, and 6 accounted for 5 (5.26%), 2 (2.11%), and 1 (1.05%), respectively. Regarding parity, multiparous women made up 35 (36.84%), nulliparous 30 (31.58%), primiparous 27 (28.42%), and grand-multiparous 3 (3.16%). *Table II* demonstrated the gravida and parity status of the study population.

| <b>Table II</b><br>Gravida and parity status of the study population (n=95). |               |                |
|------------------------------------------------------------------------------|---------------|----------------|
| Variables                                                                    | Frequency (n) | Percentage (%) |
| <b>Gravida</b>                                                               |               |                |
| 1                                                                            | 62            | 65.26          |
| 2                                                                            | 16            | 16.84          |
| 3                                                                            | 9             | 9.47           |
| 4                                                                            | 5             | 5.26           |
| 5                                                                            | 2             | 2.11           |
| 6                                                                            | 1             | 1.05           |
| <b>Parity</b>                                                                |               |                |
| Nulliparous                                                                  | 30            | 31.58          |
| Primiparous                                                                  | 27            | 28.42          |
| Multiparous                                                                  | 35            | 36.84          |
| Grand-multiparous                                                            | 3             | 3.16           |

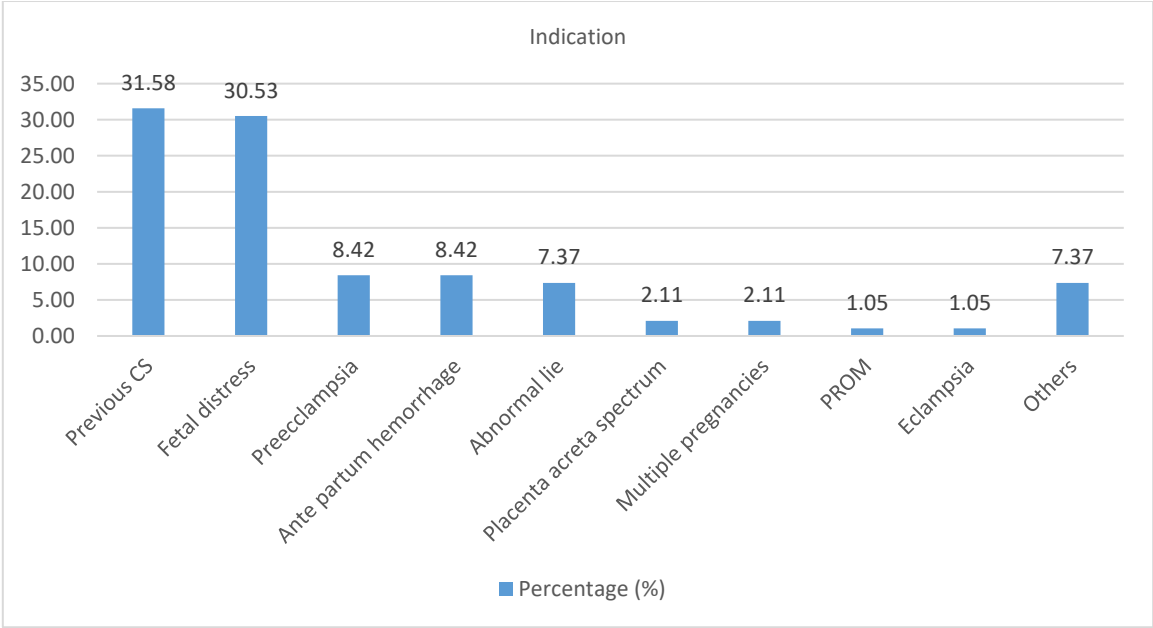


**Figure 1** Distribution of Indications for the preterm caesarean sections among the study subjects (n=95).

Figure 1 illustrated the distribution of indications. The leading indication for preterm caesarean section was previous caesarean section (31.58%), followed by fetal distress (30.53%). Preeclampsia and antepartum hemorrhage were observed in 8.42% each, abnormal lie and others in 7.37% each. Placenta accreta spectrum and multiple pregnancies were 2.11% each, while PROM and eclampsia were reported in 1.05% each. Spinal anesthesia was used in 72 (75.79%) cases, and general anesthesia in 23 (24.21%). Emergency caesarean sections were performed in 89 (93.68%) cases, while 6 (6.32%) were elective (Table III).

| Table III<br>Factors associated with caesarean procedure (n=95). |               |                |
|------------------------------------------------------------------|---------------|----------------|
| Variables                                                        | Frequency (n) | Percentage (%) |
| Type of anesthesia                                               |               |                |
| Spinal anesthesia                                                | 72            | 75.79          |
| General anesthesia                                               | 23            | 24.21          |
| Nature of caesarean section                                      |               |                |
| Emergency                                                        | 89            | 93.68          |
| Elective                                                         | 6             | 6.32           |

Maternal complications included hemorrhage in 12 (12.63%) cases and blood transfusion in 9 (9.47%). Wound infection, sepsis, hysterectomy, organ injury, and DVT were each seen in 1 (1.05%) patient. Table IV demonstrated the maternal complications following caesarean section.

| Table IV<br>Maternal complications in preterm caesarean section (n=95). |               |                |
|-------------------------------------------------------------------------|---------------|----------------|
| Maternal Outcome                                                        | Frequency (n) | Percentage (%) |
| Haemorrhage                                                             | 12            | 12.63          |
| Blood Transfusion                                                       | 9             | 9.47           |
| Wound Infection                                                         | 2             | 2.11           |
| Sepsis                                                                  | 1             | 1.05           |
| Hysterectomy                                                            | 1             | 1.05           |
| Organ injury                                                            | 1             | 1.05           |
| DVT                                                                     | 1             | 1.05           |

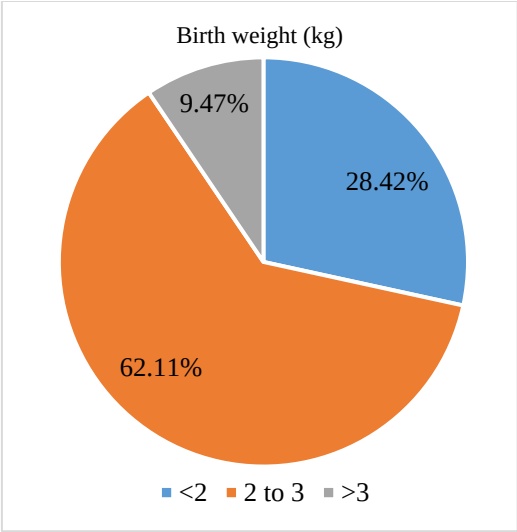


Figure 2 Birth weight of preterm baby (n=95).

Newborns with birth weight between 2 to 3 kg were 62.11%, while those with weight less than 2 kg were 28.42%, and more than 3 kg were 9.47% (Figure 2).

Table V demonstrated the fetal complications. Respiratory distress was the most frequent fetal complication (28, 29.47%), followed by hyperbilirubinemia (16, 16.84%) and symptomatic hypoglycemia (11, 11.58%). Sepsis

occurred in 4 (4.21%) cases, necrotising enterocolitis in 3 (3.16%), intraventricular hemorrhage in 2 (2.11%), hypoxic brain injury in 1 (1.05%), and fetal death in 5 (5.26%).

| Table V<br>Fetal complications in preterm caesarean section (n=95). |               |                |
|---------------------------------------------------------------------|---------------|----------------|
| Fetal outcomes                                                      | Frequency (n) | Percentage (%) |
| Respiratory Distress                                                | 28            | 29.47          |
| Hyperbilirubinemia                                                  | 16            | 16.84          |
| Sepsis                                                              | 4             | 4.21           |
| Necrotising enterocolitis                                           | 3             | 3.16           |
| Hypoxic brain injury                                                | 1             | 1.05           |
| Fetal death                                                         | 5             | 5.26           |
| Symptomatic hypoglycaemia                                           | 11            | 11.58          |
| IVH                                                                 | 2             | 2.11           |

Discussion

Caesarean section among preterm pregnant patients is commonly performed due to a range of maternal and fetal indications, significantly impacting both maternal health and neonatal outcomes [14]. This prospective observational study evaluated the maternal demographics, obstetric characteristics, and fetal-maternal outcomes associated with preterm caesarean sections (CS) in a cohort of 95 women. The demographic profile of the study population revealed that the majority of women (37.89%) were between 15–20 years of age, with nearly 60% aged ≤25 years. This trend aligns with data from developing countries where early marriage and childbearing remain prevalent. A similar age distribution was noted in a study by Patel et al., where over one-third of preterm deliveries occurred in mothers below 25 years of age in India [15]. The predominance of younger mothers may partly explain the higher rate of emergency interventions due to poor antenatal care

utilization and undiagnosed complications. Educational status appeared favorable in our cohort, with 74.74% having attained a graduate level of education. Despite this, socio-economic data showed that 76.84% of participants were from poor backgrounds. This contrast underscores a key health disparity: education alone may not offset the challenges imposed by financial constraints, which can limit access to quality prenatal care, contributing to preventable maternal and fetal morbidity. Studies in Bangladesh and sub-Saharan Africa confirm that low socio-economic status is a significant predictor of adverse perinatal outcomes despite rising literacy [16,17]. Gravida and parity patterns revealed that 65.26% of the mothers were primigravida, and nearly one-third were nulliparous. Previous CS was documented in 31.58% of cases, closely aligning with national trends of increasing CS rates in Bangladesh, as reported by Aminu et al., where repeat CS contributed significantly to preterm surgical deliveries [18]. Fetal

distress (30.53%) was the leading indication for preterm CS in our study, followed by preeclampsia (8.42%), antepartum hemorrhage (8.42%), and abnormal lie (7.37%). These indications are consistent with international literature. Previous studies demonstrated fetal distress and hypertensive disorders as the most common indications for early CS delivery [19,20]. Our data reaffirm the critical role of intrapartum monitoring and timely decision-making in reducing neonatal compromise. Regarding procedural details, 93.68% of the caesarean deliveries were emergency cases, and spinal anesthesia was utilized in 75.79% of procedures. These findings echo the reports of Shahid et al., where emergency CS accounts for the majority of preterm surgical births due to late presentation and insufficient referral systems [21]. Maternal complications were noted in 26.3% of women, with hemorrhage (12.63%) and blood transfusion (9.47%) being most frequent. This is comparable to the findings of Kino

et al., who reported that preterm CS poses a notably higher risk of significant hemorrhage, necessitating transfusion and bloodstream infection prophylaxis.<sup>[22]</sup> The 1.05% incidence of hysterectomy and sepsis, although low, underscores the severity of high-risk emergency obstetrics and the need for comprehensive pre-operative optimization and post-operative monitoring<sup>[23]</sup>. Neonatal outcomes reflected a high burden of morbidity: respiratory distress syndrome (29.47%) and hyperbilirubinemia (16.84%) were the most common complications. The birth weight distribution revealed that 28.42% of neonates weighed <2 kg, in keeping with the well-established association between preterm delivery and low birth weight. These findings parallel the study by Thanh et al., where neonatal respiratory distress and jaundice were prevalent among babies born via preterm CS in low- and middle-income countries<sup>[24]</sup>. Moreover, the fetal mortality rate in our study was 5.26%, which, although relatively low, still indicates a significant burden requiring neonatal intensive care resources<sup>[25]</sup>. It is important to note that our study found a 3.16% incidence of necrotizing enterocolitis (NEC) and 2.11% incidence of intraventricular hemorrhage (IVH), both known complications of prematurity. These findings are consistent with those of Wang et al., who reported NEC and IVH are the most common severe neonatal emergency situations<sup>[26]</sup>.

### Limitations

This study was conducted at a single tertiary care center, which may limit the generalizability of the findings to the broader population. Long-term maternal and neonatal outcomes beyond the immediate postpartum period were not evaluated. Data collection depended on hospital records and patient interviews, potentially introducing reporting bias. Future research involving multiple centers and extended follow-up periods would provide a more comprehensive understanding of preterm cesarean section outcomes.

### Conclusion & Recommendations

The present study demonstrates that caesarean section in preterm pregnancies is frequently performed on an emergency basis, primarily for indications such as fetal distress and previous cesarean delivery. A considerable number of cases involved young, primigravida mothers from poor socio-economic backgrounds, which likely contributed to the need for urgent surgical intervention. Maternal complications, including hemorrhage and the need for blood transfusion, were noted in a significant proportion, while neonatal outcomes revealed high rates of respiratory

distress, hyperbilirubinemia, and low birth weight. The observed fetal mortality rate of 5.26% emphasizes the need for improved perinatal care. Strengthening antenatal monitoring and ensuring medically justified cesarean delivery decisions are essential to improving outcomes.

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**Ethical approval:** The study was approved by the Institutional Ethics Committee.

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