

## An Audit of Preterm Caesarean Sections at a Tertiary Care Centre in Gujarat

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### Abstract:

**Introduction:** Preterm Caesarean sections are performed when early delivery becomes necessary due to maternal or fetal complications, posing challenges for both maternal and neonatal outcomes. These procedures require careful clinical decision-making to balance the risks and benefits, aiming to prevent adverse outcomes like fetal distress, antepartum hemorrhage, or pre-existing maternal conditions. Auditing preterm Caesarean sections provides valuable insights into the indications, management strategies, and outcomes, helping optimize care in high-risk pregnancies.

**Material and Methods:** This retrospective observational study was conducted at a tertiary care teaching hospital in Gujarat to analyze the incidence, indications, and outcomes of preterm Caesarean sections (CS). It included both elective and emergency preterm CS cases performed before 37 weeks of gestation, focusing on maternal demographics, obstetric details, and maternal and neonatal outcomes. Data were analyzed using descriptive statistics, and the Robson Classification system was applied to categorize cases. Statistical significance was tested to identify meaningful differences between elective and emergency CS groups.

**Results:** In our study on preterm Caesarean sections (CS) at a tertiary care center in Gujarat, 66.7% of women were nulliparous, with 83.3% having no previous uterine scar and 88.3% presenting with cephalic fetal positions. The primary indications for lower segment Caesarean sections (LSCS) included antepartum hemorrhage (11.7%), fetal distress (10%), and sickle cell crisis (11.7%). NICU admissions were necessary for 86.7% of newborns, primarily for observation or further care. Most preterm deliveries involved babies weighing between 1.5-2.5 kg (73.3%), with 96.7% of cases being preterm births. Maternal outcomes were positive, with 93.3% discharged without complications, reflecting the effective management of preterm LSCS cases.

**Conclusion:** Our audit of preterm Caesarean sections at a tertiary care center in Gujarat found fetal distress, antepartum hemorrhage, and prior Caesareans as the primary indications. Most women had favourable obstetric profiles with stable outcomes, highlighting effective perioperative management and the multifactorial nature of neonatal outcomes.

**Keywords:** Preterm Caesarean Section, Lower Segment Caesarean Section (LSCS), NICU Admissions, Maternal and Neonatal Outcomes.

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### Introduction

Cesarean section, which is a surgical procedure performed to deliver a baby through incisions made in the mother's abdomen and uterus. It is typically recommended when vaginal delivery poses risks to the health and safety of the mother or the baby. Cesarean sections can be planned in advance or performed as emergency procedures during labor and delivery. [1] The escalating rates of cesarean sections (CS) worldwide, including preterm cesarean sections, raise concerns about their appropriateness and impact on maternal and neonatal health. In India, the C-section rate has

increased by 25% from 17.2% to 21.5%, surpassing the recommended limit. This trend reflects the global scenario, where CS accounts for 21% of all births. Investigating the factors contributing to the increasing CS rates, particularly in the context of preterm births, is crucial. Preterm birth, defined as delivery before 37 weeks of gestation, is associated with higher neonatal morbidity and mortality. The rising incidence of preterm births necessitates a focus on understanding contributing factors and improving outcomes. However, the increasing number of preterm CS raises concerns about

appropriateness and outcomes. [1–3] To address the rising rates of CS while ensuring the safety of both mothers and infants, it is crucial to implement strategies that optimize CS rates and improve the quality of care provided. In 2015, the World Health Organization (WHO) and in 2016, the International Federation of Gynecology and Obstetrics (FIGO) recommended the adoption of the Robson Classification (also known as the Ten Group Classification) as a global standard for assessing, monitoring, and comparing CS rates. [1,4,5] Effective implementation involves comprehensive data collection, accuracy in classification, and utilizing information for improving clinical practices. Adopting the Robson Classification system enables healthcare facilities to gain insights, identify areas for improvement, and optimize CS utilization, particularly for preterm births. [5]

### Material and Methods

This retrospective observational study was conducted at a tertiary care teaching hospital in Gujarat, focusing on preterm cesarean sections (CS) to analyze their incidence, indications, and outcomes. The centers high patient load and specialized maternal and neonatal care provided an ideal setting for evaluating trends in preterm CS and understanding the factors contributing to rising CS rates.

The study included all preterm cesarean sections defined as delivery occurring before 37 completed weeks of gestation. Both elective and emergency preterm CS cases were included in the study. The inclusion criteria consisted of women who underwent preterm CS during the specified period, with clear documentation of maternal, fetal, and obstetric details. Exclusion criteria involved cases with incomplete records, discrepancies in gestational age documentation, and cesarean sections performed for non-obstetric indications.

Data were collected from patient records, focusing on maternal demographics (age, parity, and antenatal care), gestational age at delivery, indications for CS, and maternal and neonatal outcomes. Fetal outcomes assessed included Apgar scores, neonatal complications, and admissions to the neonatal intensive care unit (NICU), while maternal outcomes were evaluated based on postoperative complications and hospital stay duration. The Robson Classification system was applied to categorize cases into ten distinct groups, helping to identify trends and assess the appropriateness of CS across different patient categories.

Descriptive statistics were used to analyze the data, with continuous variables like maternal and gestational age expressed as mean  $\pm$  standard deviation, and categorical variables such as indications and outcomes presented as percentages.

Comparative analysis was conducted between elective and emergency CS cases, with statistical significance tested using chi-square or t-tests where appropriate. A p-value of  $<0.05$  was considered statistically significant to determine meaningful differences between groups.

### Results

In our study on preterm cesarean sections at a tertiary care center in Gujarat, the age distribution of participants showed that the majority (76.7%) were between 20-29 years, followed by 18.3% aged 30-39 years. A smaller proportion (3.3%) were under 20 years, and only 1.7% were over 39 years. The parity distribution revealed that 66.7% of the women were nulliparous, indicating a high prevalence of first-time pregnancies. Primiparous women made up 26.7%, while 6.7% were multiparous.

In our study, 71.7% of the participants were from rural areas, while 28.3% resided in urban areas, indicating a higher prevalence among women from rural regions. The registration status showed that 61.7% were registered patients, 26.7% were referred from other facilities, and 11.7% were emergency cases, reflecting that most women were already receiving care at the study facility. The socio-demographic analysis revealed that 58.3% had a BMI between 20-22, 13.3% each had a BMI between 22-25 and 25-29, 10.0% had a BMI below 20, and 5.0% had a BMI of 30 or higher. All participants were over 140 cm in height, and 93.3% had a normal weight, with 6.7% showing abnormal weight.

The obstetric examination showed that 83.3% had no previous scar, 81.7% had no uterine scar, and 88.3% had a cephalic presentation. Uterus size was between 28-32 weeks in 33.3% and 32-36 weeks in 65.0%. Most pregnancies (90%) involved a single fetus, with 68.4% having non-dilated cervixes and 55% non-effaced. Membranes were intact in 80%, and 66.7% had demonstrable liquor. An adequate pelvis was found in 95%, vertex presentation in 88.3%, and 98.3% had a station above (-2), indicating favourable delivery conditions. The laboratory parameters showed that 80% of women had hemoglobin levels between 9-12 g/dL, with only 16.7% having mildly reduced levels (7-9 g/dL) and 3.3% between 5-7 g/dL, indicating minimal cases of severe anemia. Platelet counts were normal (1.5-4 lakh) in 93.3% of women, with only 6.7% showing slight reductions, and no cases exceeded the normal range.

The majority of indications for lower segment cesarean sections (LSCS) were fetal distress (10.0%), antepartum hemorrhage (11.7%), sickle cell crisis (11.7%), and previous cesarean with refusal for TOLAC (8.3%). (Table 1)

**Table 1: Indication of LSCS**

Indication of LSCS	Frequency	Percent (%)	Indication of LSCS	Frequency	Percent (%)
Previous CS with Negative Consent for TOLAC	5	8.3	Sickle Cell Crisis	7	11.7
Fetal Distress	6	10.0	Absent End Diastolic Blood Flow	2	3.3
APH (Antepartum Hemorrhage)	7	11.7	Failure of Induction	4	6.7
Previous CS with Scar Tenderness	3	5.0	Anhydramnios	3	5.0
Severe PET (Pre-eclampsia Toxemia)	1	1.7	Uteroplacental and Fetoplacental Insufficiency	1	1.7
APH with PET	3	5.0	CPR < 1 with Poor Bishop Score	1	1.7
CPD (Cephalopelvic Disproportion)	4	6.7	Twin with Abnormal Lie	4	6.7
Meconium-Stained Liquor in Latent Phase	3	5.0	Preterm Breech with PROM	2	3.3
Twins with First Breech	1	1.7	Fetal Distress in Second Stage	3	5.0
Total	60	100	Total	30	50.0

The NICU analysis showed that 86.7% of newborns required admission, primarily for further investigation and management (60%) or observation (15%), with smaller proportions for other reasons (13.3% and 11.7%). Only 10% of the newborns needed respiratory support, while 76.7%

did not. Regarding MgSO<sub>4</sub> (magnesium sulfate) use, only 8.3% of women required it, and 91.7% did not. Similarly, 91.7% of the women did not receive any regimen, while the Pritchard regimen was used in 8.3% of cases, with no use of the Zuspan or Sibai regimens.

**Table 2:**

USG Findings	Category	Frequency	Percentage (%)
AFI (Amniotic Fluid Index)	5-25 cm	40	66.7
	<5 cm	20	33.3
	>25 cm	0	0.0
SVP (Single Vertical Pocket)	2-8 cm	60	100.0
	<2 cm	0	0.0
	>8 cm	0	0.0
Placental Position	Anterior	43	71.7
	Posterior	9	15.0
	Others	8	13.3
EFW (Estimated Fetal Weight)	>2.5 kg	1	1.7
	2-2.5 kg	26	43.3
	<2 kg	28	46.7
	<1 kg	5	8.3

**Table 3: Outcome of study subjects**

Parameters		Frequency	Percentage
Hospital stays	<4 days=1	23	38.3
	>5-7 days =2	13	21.7
	>= 8 days =3	24	40
Maternal outcome	Discharged=1	56	93.3
	Discharged Against Medical Advice=2	3	5
	Death=3	1	1.7
Fetal outcome	Discharge =1	54	90
	Discharged Against Medical Advice=2	6	10
	Death=3	0	0
Fetal outcome	Lb=1	54	90

	sb=2	6	10
NICU admission	Yes: 1	52	86.7
	No: 2	8	13.3
Time of NICU Admission:	Immediate after birth 1	49	81.7
	Less than 24 hrs:2	1	1.7
	24-48 hrs:3	0	0
	More than 72 hours :4	0	0
Apgar at 1 min	9/10-10/10:1	37	61.7
	<9/10:2	23	38.3
Apgar 5 min	9/10-10/10:1	45	75
	<9/10:2	15	25
Viability	live birth:1	60	100
	still birth:2	0	0
Maturity	FULL TERM-1	2	3.3
	PRETERM-2	58	96.7
Baby Weight	>2.5KG-1	2	3.3
	1.5-2.5Kg-2	44	73.3
	1.0-1.5kg-3	14	23.3
	<1kg-4	0	0

## Discussion

Preterm Caesarean section (CS) is a significant obstetric intervention associated with various maternal and neonatal outcomes. Our study found that the majority of participants undergoing preterm Caesarean sections were aged 20-29 years (76.7%), with 18.3% aged 30-39, 3.3% under 20, and 1.7% over 39. These findings highlight a younger demographic predominantly undergoing preterm CS. Comparative studies also indicate variations in age distribution. Tura et al. [6] found significant contributions to CS from nulliparous women with full-term pregnancies, though their study did not focus specifically on age. Zimmo et al. [7] noted high CS rates among multiparous women with a history of CS, which might suggest an older demographic, contrasting with our younger cohort.

In our study, 66.7% of the women undergoing preterm Caesarean sections were nulliparous, 26.7% were primiparous, and 6.7% were multiparous. This significant proportion of nulliparous women aligns with findings from other studies. Tura et al. [6] reported high CS rates among nulliparous women in spontaneous labor (Group 1), which is similar to our study's parity distribution. Zimmo et al. [7] also highlighted nulliparous and multiparous women with previous CS as major contributors to overall CS rates, though their study had a broader focus on full-term pregnancies. Gurung et al. [8] identified nulliparous women in spontaneous labor and those induced or delivered by CS before labor (Group 1+2) as the highest contributors to their CS rate, closely mirroring our findings.

According to the data, a significant majority (71.7%) resided in rural areas, while 28.3% were from urban areas. This distribution highlights the higher prevalence of preterm Caesarean sections

among women from rural regions within the studied population. [9,10] Our study reveals that 61.7% of the women undergoing preterm Caesarean sections were registered patients at the study facility, 26.7% were referred from other facilities, and 11.7% were emergency cases. This distribution highlights that the majority of preterm Caesarean sections were performed on women who were already registered at the facility, underscoring the importance of continuous prenatal care and monitoring. Comparatively, the study by Sowjanya et al. [11] found that 60.6% of patients had preterm spontaneous onset of labor, 22.5% had labor induced, and 16.9% underwent prelabor Caesarean delivery.

The obstetric examination of women undergoing preterm Caesarean sections in our study revealed several key findings: 83.3% had no previous scar, 81.7% had no uterine scar, and cephalic presentation was predominant at 88.3%. Dahiya et al.'s [12] study reported that a significant proportion of second-stage CS was performed due to arrest in the second stage of labor (28.8%), followed by fetal distress (9.4%). In our study, the majority of women had cephalic presentation (88.3%) and adequate pelvis (95%), which are favorable for vaginal delivery and potentially reduce the need for emergency CS due to obstructed labor. Bharti et al. [13] found that 90.29% of CS cases in primigravida involved cephalic presentation, similar to our finding of 88.3%. This high prevalence of cephalic presentation is associated with better perinatal outcomes, reducing complications related to abnormal presentations like breech. Additionally, Bharti et al. [13] reported significant antenatal high-risk factors such as hypertensive disorders, which can affect labor progression and the need for CS.

The study by Zimmo et al. [7] discussed the contributions of different TGCS groups to the overall CS rate, with a significant portion being multiparous women with previous CS and single cephalic preterm labor. In our study, the lack of previous uterine scars in 81.7% of women and the predominance of cephalic presentations suggest a lower risk profile for complications compared to multiparous women with previous CS. These findings support Zimmo et al.'s [7] call for increased efforts to manage and reduce primary CS rates, particularly in low-risk groups.

The indications for lower segment Caesarean sections (LSCS) in our study population were varied, with fetal distress (10.0%), antepartum hemorrhage (APH), and sickle cell crisis (both 11.7%) being the most common reasons. Dahiya et al. [12] also identified fetal distress (9.4%) and cephalopelvic disproportion (15.1%) as common indications for LSCS, corroborating our findings. Their study emphasized the need for timely intervention in cases of obstructed labor and fetal distress, similar to the practices observed in our study. Bharti et al. [13] reported that fetal distress was the most common indication for Caesarean sections (39.81%), which aligns with our finding of fetal distress being a significant factor. Their identification of other indications, such as cephalopelvic disproportion and failed induction, further supports our data.

Sowjanya et al. [11] noted hypertensive disorders of pregnancy and previous Caesarean sections with threatened scar rupture as major indications for emergency LSCS, paralleling our findings of similar conditions contributing to the need for surgical intervention. Their study highlighted the importance of managing high-risk pregnancies to reduce emergency LSCS rates, which is reflected in our study's data. A study by Gurung et al. [8] emphasized the high rates of Caesarean sections due to fetal distress and previous CS, indicating a need for stringent protocols to manage labor effectively.

The high rate of NICU admissions (86.7%) in our study is notably higher compared to Dahiya et al. (46.1%) and Bharti et al. (22.33%), indicating a significant need for specialized neonatal care in our cohort. This could be attributed to the specific health conditions and complications associated with preterm births in our population. The primary reasons for NICU admission in our study, such as the need for further investigation and management (60%) and observation (15%), reflect a proactive approach to neonatal care, ensuring that potential complications are promptly addressed.

Dahiya et al. [12] highlighted respiratory distress syndrome (11.3%) and birth asphyxia (16%) as common reasons for NICU admission, which aligns

with our finding that 10% of newborns required respiratory support. Bharti et al. also reported respiratory distress syndrome (12.62%) as a major cause for NICU admission, emphasizing the prevalence of respiratory issues among preterm infants. Sowjanya et al. [11] and Gurung et al. [8] did not specify the exact percentages for respiratory support but emphasized the high incidence of NICU admissions due to complications such as hypertensive disorders of pregnancy and fetal distress.

The USG findings among our study population revealed that 66.7% had an amniotic fluid index (AFI) of 5-25 cm, 33.3% had an AFI of less than 5 cm, and none had an AFI greater than 25 cm. Single vertical pocket (SVP) measurements were 2-8 cm in 100% of cases. Placental position was anterior in 71.7% of women, posterior in 15%, and other positions in 13.3%. Estimated fetal weight (EFW) showed that 1.7% of fetuses weighed more than 2.5 kg, 43.3% weighed between 2-2.5 kg, 46.7% weighed less than 2 kg, and 8.3% weighed less than 1 kg. These findings are consistent with Sowjanya et al., where the majority of preterm caesarean sections occurred at 33-36 weeks, and 68.5% of babies were low birth weight (<2.5 kg).

The study by Dahiya et al. [12] reported significant neonatal complications, including respiratory distress syndrome and birth asphyxia, often linked to low birth weight and abnormal amniotic fluid levels. Our finding of 33.3% of women with an AFI of less than 5 cm potentially correlates with these complications, indicating a shared risk profile across studies. Similarly, Bharti et al. [13] noted a high incidence of hypertensive disorders and other high-risk factors, which can affect placental position and amniotic fluid levels.

The analysis of other parameters showed that 98.3% of the women in our study did not experience fever, while 1.7% did. There were no cases of paralytic ileus, with 100% of the women not having this condition. This indicates a very low incidence of fever and no occurrence of paralytic ileus among our study population, suggesting good postoperative outcomes. In comparison, Dahiya et al. [12] reported a higher incidence of fever at 14.1%, highlighting more frequent postoperative complications. Bharti et al. [13] also noted a higher fever incidence of 3.88%. The absence of paralytic ileus in both our study and Bharti et al.'s [13] study (0%) indicates that this condition is relatively rare in preterm Caesarean sections. The significantly lower incidence of fever in our study (1.7%) compared to Dahiya et al. [12] and Bharti et al. [13] suggests effective infection control and postoperative care practices in our setting.

Our study has several limitations that should be acknowledged. Firstly, the sample size was

relatively small and confined to a single tertiary care center in South Gujarat, which may limit the generalizability of the findings to other regions or healthcare settings. Secondly, the study was cross-sectional in nature, which restricts the ability to establish causative relationships between observed variables. Additionally, some relevant data, such as long-term maternal and neonatal outcomes, were not collected, limiting our ability to assess the full impact of preterm Caesarean sections. Furthermore, the reliance on hospital records and patient self-reports may introduce information bias.

### Conclusion

In our study on preterm Caesarean sections at a tertiary care center in South Gujarat, we found that most women were aged 20-29 years, nulliparous, and from rural areas, with normal BMI and favourable obstetric conditions. Common indications for Caesarean sections included fetal distress, antepartum hemorrhage, and previous Caesarean history. NICU admissions were necessary primarily for monitoring, but most newborns did not require respiratory support.

Maternal outcomes were stable, with low use of MgSO<sub>4</sub> and minimal complications. Ultrasound findings aligned with the prevalence of low birth weight in preterm deliveries. Perioperative management was effective, and Betamethasone administration showed no significant impact on neonatal outcomes, highlighting the complex nature of preterm birth outcomes.

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