

Insight on patient profile undergoing caesarean delivery: a hospital based study in Karnali Academy of Health Sciences

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ABSTRACT

Introduction: Cesarean section (CS) rates are rising globally, often exceeding World Health Organization recommendations. While well-documented in urban centers, data from remote, resource-limited regions such as Nepal's Karnali Province are scarce. This study aims to determine the key maternal characteristics and clinical indications for CS at a tertiary hospital in a remote setting.

Methods: This was a retrospective, cross-sectional study of all deliveries at Karnali Academy of Health Sciences between June 2023 and June 2024. Data on maternal demographics, obstetric history, and CS indications were collected from hospital maternity records. Descriptive statistics were used to analyze the data.

Results: Among 801 deliveries, 180 were cesarean sections, yielding a CS rate of 22.5%. The mean maternal age was 24.75±4.92 years, and nulliparous women constituted the largest group (42.8%). Most CSs were emergency procedures (84%). The leading indications were previous CS (16.1%), breech presentation (13.9%), meconium-stained liquor (10.6%), and fetal distress (10.6%). Robson classification analysis identified women with a previous CS (Group 5) as the largest contributor to the overall rate (23.3%).

Conclusion: The CS rate in this remote Nepalese hospital is elevated. The high proportion of emergency procedures and the prominence of previous CS as a primary indication highlight critical areas for intervention. To optimize CS use, targeted strategies such as promoting vaginal birth after cesarean and strengthening standardized intrapartum monitoring are urgently needed.

Keywords: Cesarean Section, Delivery Indications, Emergency Obstetrics, Maternal Profile, Robson Classification

INTRODUCTION

Cesarean section (CS) is a critical surgical procedure that has significantly contributed to reducing maternal and neonatal mortality worldwide. The World Health Organization (WHO) recommends a cesarean delivery rate of 10–15% as optimal, ensuring that necessary procedures are performed without excessive medical interventions.¹ However, cesarean rates have been rising globally, particularly in low- and middle-income countries, where both medical necessity and non-medical factors influence decision-making.^{2,3}

In Nepal, the increasing institutional delivery rate due to government-led safe motherhood programs has been associated with a rise in CS rates.⁴ While cesarean deliveries are life-saving in cases of obstetric

complications such as fetal distress, cephalopelvic disproportion, placenta previa, and hypertensive disorders,^{5,6} the growing trend of non-medically indicated CS raises concerns regarding maternal and neonatal risks, economic burden, and health system sustainability.^{7,8}

The determinants of CS are multifactorial and include maternal, fetal, institutional, and provider-related factors. Maternal factors, such as age, parity, and prior obstetric history, play a crucial role in CS decisions.⁹ Institutional factors, including hospital policies, access to emergency obstetric care, and health provider preferences, also contribute to the increasing trend.¹⁰ Additionally, socio-economic and cultural influences, such as patient preference, perceived convenience, and fear of labor pain, have been reported as emerging contributors to CS decisions in various settings.^{11,12}

Karnali Academy of Health Sciences (KAHS) serves as a tertiary referral center in a geographically remote region of Nepal, providing essential maternal health services to a large population. Despite the increasing CS rate in Nepal, limited research has been conducted in remote areas' facility centers to evaluate the underlying determinants influencing the mode of delivery.¹³

Despite rising global and national CS rates, there is limited data on the factors influencing this trend in remote tertiary hospitals like KAHS. Understanding the clinical (e.g., obstetric indications, maternal comorbidities) and non-clinical (socio-demographic factors) factors influencing CS decisions is essential to ensure cesarean sections are performed when medically indicated. This study aims to bridge the knowledge gap by providing evidence to inform policies and

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optimize obstetric care in resource-limited settings, and by offering valuable insights into factors influencing CS trends in a rural tertiary setting. Findings from this study will help formulate evidence-based recommendations to enhance obstetric care practices, improve maternal and neonatal health outcomes, and guide policymakers in optimizing the appropriate use of cesarean delivery in similar healthcare settings.¹⁴

METHODS

This was a retrospective descriptive study conducted at the Department of Obstetrics and Gynecology, Karnali Academy of Health Sciences (KAHS), Jumla, Nepal. After approval from the Institutional Review Committee (IRC) with reference number 2025/026.

All pregnant women who underwent elective and emergency cesarean deliveries in term, preterm, and post-term women between Asar 2080 to Asar 2081 BS (June 2023 – June 2024 AD) were included in this study. Data were extracted from maternity ward delivery registers, operating theatre records, and patient files.

Information on Maternal age, parity, gestational age, fetal presentation, urgency of cs (elective/emergency), clinical indications, and geographical distribution were collected. Incomplete or missing records were excluded from the study. Data were entered in Microsoft Excel, and statistical analyses were performed using SPSS version 16. Results were analyzed by calculating the mean and frequencies for maternal age, gestational age, parity, and common indications.

RESULTS

Out of 801 cases that were delivered in KAHS, 180 (22.5%) were cesarean sections, while 621 (77.5%) were vaginal births. The mean maternal age of the parturient was 24.75 ± 4.92 years. Most parturients were in the 20-24-year age group (43.9%), followed by the 25-29-year group (24.4%) (Table 1). The median gestational age is 39.50 weeks (38-40 weeks). Nulliparous women comprise the largest group, i.e., 77 (42.8%), followed by para one, i.e., 58 (32.2%), and para two, i.e., 32 (17.8%) (Table 2). Among the patients who underwent CS, 151 (84%) underwent emergency LSCS, whereas 29(16%) underwent LSCS on an elective basis.

Table 1: Cesarean section according to maternal age group (n=180)

Age group	Frequency (percentage)
< 20 years	21 (11.7%)
20- 24 years	79 (43.9%)
25- 29 years	44 (24.4%)
30- 34 years	28 (15.6%)
35-39 years	8 (4.4%)

Table 2: Parity of patients who underwent CS (n=180)

Parity	Frequency (percentage)
0	77 (42.8%)
1	58 (32.2%)
2	32 (17.8%)
3	5 (2.8%)
4	3 (1.7%)
5	3 (1.7%)
6	2 (1.1%)

The most frequent indication was previous CS, followed by breech presentation, meconium-stained liquor, and fetal distress (Table 4). Most CS were categorized under Group 5 (previous cs, single cephalic, ≥ 37 weeks, in labor), representing 23.3% of cases, followed by Groups 1 and 2, which accounted for the majority of primary CS.

Table 3: Cesarean distribution by age group in relation to parity (n=180)

Age Group (years)	Parity						
	0	1	2	3	4	5	6
<20	17	4	0	0	0	0	0
20- 24	44	25	10	0	0	0	0
25- 29	13	14	15	1	0	1	0
30-34	3	12	5	4	1	1	2
35- 39	0	3	2	0	2	1	0

Table 4: Clinical indication of cesarean section (n=180)

Clinical indications	Number (percentage)
Previous cs (in labor, not in labor)	29(16.1)
Breech presentation	25 (13.9)
Meconium-stained liquor	19 (10.6)
Fetal Distress	19 (10.6)
Cephalopelvic disproportion (CPD)	18 (10)
Non-progression of labor and prolonged labor	10 (5.6)
Hypertensive disorders of pregnancy (preeclampsia, severe preeclampsia, eclampsia)	9 (5)
Scar tenderness in previous cs	9 (5)
Failed induction of labor	7 (3.9)
Ante-partum Hemorrhage (APH)	7 (3.9)
Fetal bradycardia	6 (3.3)
Others	22 (12.22)
• Severe IUGR and severe oligohydramnios	
• Cord prolapse	
• Twins	
• Decreased fetal movement	
• PROM with anhydramnios	
• Unstable lie	
• History of subfertility and salpingectomy for ectopic	

DISCUSSION

Our retrospective study at KAHS found a CS rate of 22.5%, which is higher than the WHO's suggested range of 10- 15%.¹ Recent regional and national trends show a rise in CS utilization throughout South Asia and Nepal. A systematic review reported that CS rates have been increasing globally from 12% in 2000 to 21% in 2015 across many regions.² In Nepal, tertiary-level hospitals report a higher CS rate of 31.1%¹⁵ and 34.4%.¹⁶ Thus, the CS rate at KAHS is lower than urban tertiary centers but remains elevated to WHO and rural estimates.¹⁷

The mean maternal age among women undergoing cs is 24.75 ± 4.92 years, consistent with regional data. Our study showed that the largest number of women is in the 20-24-year age group (73.9%), similar to the study conducted at a tertiary care center by Shrestha et al.¹⁵ This shows a regional trend of younger women being more common in CS deliveries. In a survey by Subedi et al.¹⁸ using Robson classification, Group 1 (nulliparous, term, cephalic) contributed 26% of CS, and Group 2 (nulliparous induced/CS before labor) contributed 16% of CS. Similarly, our data showed that nulliparous women comprised 42.8% of CS, indicating that primary cs among young women is prevalent.

Our study showed that 84% of CS were emergency CS, similar to the emergency CS rate of 88% and 76.9% in a survey done by Shrestha et al.¹⁵ and Tamrakar et al.¹⁹ This may reflect late presentation, limited antenatal checkups, and decision-making delays common in rural/ high-altitude areas.

Table 5: Robson's group and clinical indication of cs (n=180)

Robson's group	Clinical indications(number(%))											
	NPOL	MSL	HTN	Breech	APH	FD	Scar Ten.	CPD	Prev. cs	Failed IOL	FB	Others
1	4(12.5)	11(34.4)	2(6.3)	0	0	6(18.8)	0	7(21.9)	0	1(3.1)	0	1
2	1(5)	1 (5)	1 (5)	0	2 (10)	4 (20)	0	4 (20)	0	3 (15)	2(10)	2
3	1(5)	3 (15)	2 (10)	0	1 (5)	4 (20)	0	3 (15)	0	0	3(15)	3
4	2 (10.5)	3 (15.8)	1 (5.3)	0	1 (5.3)	3 (15.8)	0	3 (15.8)	0	3 (15.8)	0	2
5	0	1 (2.6)	0	0	0	0	9 (23)	1 (2.6)	28(73.7)	0	0	0
6	0	0	0	9 (81.8)	0	1 (9.1)	0	0	0	0	0	1
7	0	0	0	15 (93.8)	0	0	0	0	0	0	0	1
8	0	0	0	1 (50)	0	0	0	0	0	0	0	1
9	1 (12.5)	0	0	0	0	0	0	0	1 (12.5)	0	0	6
10	1 (7.1)	0	3 (21.4)	0	3 (21.4)	1 (7.1)	0	0	0	0	1 (7.1)	5

Abbreviations: NPOL: Non progression of labor and prolonged labor; MSL: Meconium-stained liquor; HTN: Hypertensive disorders of pregnancy; Breech: Breech presentation; APH: Antepartum Hemorrhage; FD: Fetal distress; Scar Ten.: Scar tenderness; CPD: Cephalopelvic disproportion; Prev. cs: Previous cesarean section ; Failed IOL: Failed induction of labour; FB: Fetal bradycardia

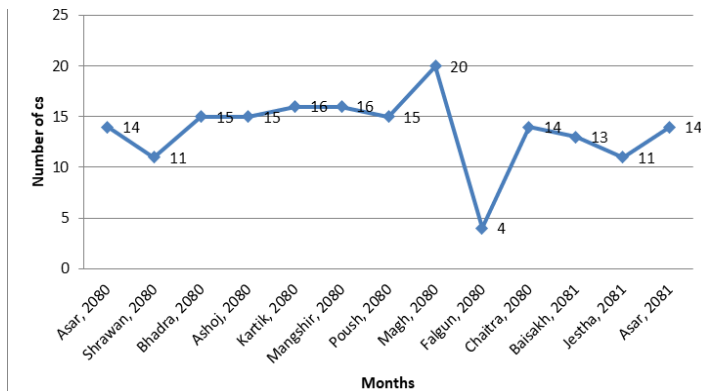


Figure 1: Month-wise distribution of undergone cs (n=180)

In the present study, the most frequent indication was previous CS (16.1%), followed by breech presentation (13.9%), meconium-stained liquor (10.6%), fetal distress (10.6%), and cephalopelvic disproportion (10.0%). This aligns with findings from the study done by Pageni et al,¹⁷ who reported previous cs (21% and CPD (18%) among the top indications in a hospital in Pokhara, whereas Shrestha et al.¹⁸ observed fetal distress as the top cause (31%) and previous CS 18% in a tertiary care centre at Kathmandu. Thus, while fetal distress is more dominant in some urban studies, previous CS remains centrally important across contexts.

Malpresentation (breech) and non-reassuring fetal status (fetal distress, meconium) were other frequent indications. The accuracy and standardization of intrapartum fetal surveillance (intermittent auscultation vs. continuous cardiotocography), the use of partographs, and clinician thresholds for operative delivery vary across centers and influence CS decisions. Several South Asian audits emphasize that suboptimal use of partographs, inconsistent fetal monitoring, and variable interpretation of fetal heart patterns can lead to both under- and overdiagnosis of fetal distress and therefore to potentially avoidable emergency CSs. Strengthening standardized intrapartum monitoring and enhancing staff training are thus practical targets.²⁰

The prominence of previous CS reflects a broader regional pattern: Nepal's Robson-classification audit found that Group 5 (women with prior CS) contributed ~22.6% of CSs,²¹ similar to Group 5 being the main contributor in many South Asian hospitals,¹⁸ similar to the result shown by our study. The increasing contribution of Robson Group 5 is widely reported in South Asia. It is often the most significant single Robson contributor in many centers, as confirmed by scoping reviews of Robson use in the region. Addressing repeat CS through appropriate vaginal birth after cesarean (VBAC) or trial of labor after cesarean (TOLAC)

protocols could therefore yield substantial returns in reducing CS burden.²²

KAHS is located in a remote, mountainous region. Literature from the high-altitude areas indicates that CS rates may be elevated due to referral of complicated pregnancies, altered fetal growth dynamics (lower birth weight, hypoxia), and limited labor monitoring resources.²³ Such contextual factors may have influenced the high proportion of emergency CS and the indication profile at KAHS. Moreover, geographical challenges (delayed access, referral lag) heighten urgency and may increase the rate of operative deliveries. Interventions in such settings thus need to consider the broader health system, transport, and referral infrastructure, not solely clinical indications. In our study, the median gestational age at CS was 39.5 weeks (IQR 38–40 weeks). In a study of women with previous CS, increased gestational age was identified as an indicator for repeat CS delivery.²⁴

This is a single-centre, retrospective study lacking detailed maternal comorbidity data, neonatal outcomes, socioeconomic and provider-related variables. Prospective multicentre studies across high-altitude and rural South Asian settings are needed to capture context-specific drivers, including maternal request, provider decision-making, and resource constraints. Qualitative exploration into women's and families' perceptions of CS in remote regions would also add value.

CONCLUSION

In this cross-sectional study at a remote tertiary hospital in Nepal, we found a CS rate of 22.5%, which exceeds WHO recommendations. Our analysis identified two principal findings: first, a high burden of emergency CS; and second, a prior CS as the most frequent indication. These results suggest that the CS rate is being driven by intrapartum decision-making and repeat procedures.

DECLARATION

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Ethical Clearance

This research was approved by the Institutional Review Committee (IRC) of KAHS with the reference number 2025/026 on 11th April 2025.

Consent/Assent

Not applicable

Conflicts of Interest

Authors SB and RK are members of JKAHS. They had no role in the journal's editorial process.

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Author Contribution

SB and GB developed the research concept. The research design was prepared collaboratively by SB, RS, GB, and SS. SB, RK, SK, and RT conducted the literature search. SB, RK, and RT conducted data collection, while SB, GB, and SS performed the data analysis. SB, GB, and SS interpreted the data. SB, GB, and SS completed the drafting and critical review of the manuscript for important intellectual content. The final version of the manuscript, ready for submission, was approved by SB, RS, GB, RK, SK, RT, and SS. All authors, namely SB, RS, GB, RK, SK, RT, and SS, agreed to be accountable for all aspects of the work and to ensure the accuracy and integrity of the research.

Data Availability Statement

Upon the journal's editorial team's request, the data will be available.

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