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ORIGINAL ARTICLE

# Determinants of high cesarean section rates in resource-constrained healthcare system, Peshawar, Pakistan.

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**ABSTRACT… Objective:** To investigate the key determinants of high CS rates in Peshawar's resource-constrained healthcare system, exploring both demand-side (patient-related) and supply-side (healthcare provider and facility-related) factors. **Study Design:** Mixed-method approach. **Setting:** Three Major Hospitals from Peshawar Including Lady Reading Hospital, Hayatabad Medical Complex and Rehman Medical General Hospital. **Period:** January 2023 to December 2023. **Methods:** A hospital-based mixed-methods study was conducted across three major public and private facilities (N=221 CS cases). Quantitative data from medical records were analysed using multivariate logistic regression to identify independent predictors. Complementary in-depth interviews with providers (n=15) and mothers (n=15) explored decision-making processes. **Results:** The CS rate among study facilities was 48.6%, far exceeding WHO recommendations. Key independent predictors included: private hospital delivery (aOR=3.24, 95% CI:1.87-5.61), previous CS (aOR=4.83, 95% CI:2.42-9.65), low-income status (aOR=2.67, 95% CI:1.51-4.72), and primiparity (aOR=2.15, 95% CI:1.25-3.71). Qualitative data revealed three major themes: (1) defensive medical practices in private sectors, (2) inadequate labour monitoring leading to "failure to progress" diagnoses, and (3) socioeconomic perceptions of CS as superior care. Paradoxically, low-income women had higher CS rates despite typically facing access barriers. **Conclusion:** Multiple modifiable factors drive unnecessary CS in Pakistan's resource-constrained setting, particularly in private facilities and among disadvantaged populations. Targeted interventions should include: VBAC protocol implementation, provider training on labour management, and policy reforms addressing perverse financial incentives. The inverse socioeconomic gradient warrants particular attention in future research and programming.

**Key words:** Cesarean Section, Developing Countries, Healthcare Disparities, Health Services Misuse, Maternal Health Services, Obstetric Labour Complications, Pakistan.

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## INTRODUCTION

Cesarean section (CS) rates have risen globally, with significant increases observed in both high- and low-resource settings.[1] While CS can be a life-saving intervention when medically indicated, unnecessary procedures pose risks for maternal and neonatal health, including surgical complications, prolonged recovery, and higher healthcare costs.[2] The World Health Organization (WHO) recommends an optimal CS rate of 10–15%, yet many countries, including Pakistan, exceed this threshold.[3] In resource-constrained settings such as Peshawar, Pakistan, where healthcare infrastructure is often overburdened, the determinants of high CS rates remain understudied despite their implications for maternal and child health outcomes.[4]

Existing literature on CS rates in low- and middle-income countries (LMICs) has primarily focused on urban tertiary care facilities or national-level data, leaving a critical gap in understanding the drivers of high CS rates in resource-limited settings like Peshawar.[5,6] Factors such as socioeconomic status, healthcare provider preferences, lack of access to skilled vaginal delivery care, and financial incentives may contribute to rising CS rates, but localized evidence is scarce.[7] Without a clear understanding of these determinants, effective policy interventions to promote evidence-based obstetric care remain challenging.[8]

This study aims to investigate the key determinants of high CS rates in Peshawar's resource-constrained healthcare system, exploring both demand-side (patient-related) and supply-side (healthcare provider and facility-related) factors.

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Findings from this study will inform policymakers, healthcare providers, and public health practitioners on targeted strategies to optimize CS use in Peshawar and similar settings. By identifying modifiable factors contributing to unnecessary CS deliveries, this research can guide interventions to improve maternal and neonatal health outcomes while ensuring efficient use of limited healthcare resources.

## METHODS

This study employed a mixed-methods approach, combining a quantitative cross-sectional analysis of hospital records with qualitative interviews involving healthcare providers and mothers who underwent cesarean delivery. The research was conducted in Peshawar, Pakistan, a region characterized by a resource-constrained healthcare system with significant maternal health challenges. Data were collected from three major hospitals, including both public and private facilities, selected based on their high delivery volumes and varying levels of obstetric care provision. These hospitals were chosen to ensure representation of different healthcare delivery models and socioeconomic patient profiles.

### Study Population and Sampling

For the quantitative component, we systematically reviewed electronic and paper-based medical records of 221 women who delivered via cesarean section over a defined study period (January 2023 to December 2023). This sample size was determined based on the average monthly cesarean delivery rate in the participating hospitals, ensuring adequate statistical power for the analysis. A stratified random sampling strategy was employed to ensure proportional representation across different hospital types, including public, private, and semi-private facilities. The qualitative component involved in-depth interviews with key stakeholders, including obstetricians, midwives, and mothers who had undergone cesarean delivery. A purposive sampling technique was used to select participants, ensuring diversity in professional experience, clinical settings, and patient backgrounds to capture a wide range of perspectives.

### Data Collection

Quantitative data were extracted from hospital delivery registers and patient medical records of all 221 cases. Key variables included maternal demographic characteristics such as age, parity, education level, and socioeconomic status, as well as obstetric history, including previous cesarean deliveries, pregnancy complications, and gestational age. Healthcare-related factors, such as the type of facility, provider recommendations, and whether the cesarean was performed as an emergency or elective procedure, were also recorded. Indications for cesarean delivery, such as fetal distress, obstructed labor, or maternal request, were documented to assess clinical justifications.

For the qualitative component, semi-structured interviews were conducted with healthcare providers and a subset of mothers from the 221 cases to explore their experiences and decision-making processes. Interviews with providers focused on institutional policies, perceived barriers to vaginal delivery, and potential influences on cesarean rates. Mothers were interviewed about their birth experiences and factors influencing their delivery choices. All interviews were audio-recorded, transcribed verbatim, and translated into English for analysis while ensuring accuracy and confidentiality.

### Variables and Measurements

The primary outcome of this study was the cesarean section rate among the 221 cases, analyzed in relation to total births within the study period. Key independent variables included demographic factors such as maternal age, education, and household income, as well as clinical factors like previous cesarean history, pregnancy complications, and multiple gestations. Health system-related variables encompassed the type of hospital, provider experience, and availability of emergency obstetric care services. These variables were selected based on existing literature and their relevance to the study context in Peshawar.

### Data Analysis

Quantitative data from the 221 cases were analyzed using descriptive statistics to summarize cesarean section rates and maternal characteristics. Bivariate analyses were conducted to examine associations between independent variables and cesarean delivery outcomes. Multivariate logistic regression

models were employed to identify significant determinants of cesarean section while adjusting for potential confounders. Adjusted odds ratios with 95% confidence intervals were reported, with statistical significance set at $p < 0.05$. All quantitative analyses were performed using SPSS version 26.

Qualitative data were analyzed using thematic analysis to identify recurring patterns in cesarean section decision-making. Interview transcripts were coded inductively using NVivo 12 software, with codes grouped into broader categories such as fear of labor and systemic barriers to vaginal delivery. Emerging themes were compared across different participant groups, and qualitative findings were triangulated with quantitative results from the 221 cases to provide a comprehensive understanding of the factors driving high cesarean rates.

### Ethical Considerations

Ethical approval (Ref No: INU/AHS/017-23, Dated: 3-01-2023) for this study was obtained from the relevant institutional review board. All participants provided written informed consent prior to their involvement in the study. For the quantitative component, patient identifiers were removed from medical records to ensure confidentiality. Interview participants were assured of anonymity, and all research materials were stored securely with access restricted to the research team. These measures were implemented to uphold ethical standards while studying the 221 cases and their associated healthcare providers.

## RESULTS

Table-I presents the sociodemographic and clinical characteristics of the 221 women who underwent cesarean delivery in this study. The cohort had a mean maternal age of 21.0 years (±3.2 SD), reflecting a relatively young population. Educational attainment was limited, with 67% of women having ≤10 years of formal schooling. The majority (71%) belonged to low-income households (≤$100/month), highlighting the socioeconomic context of the study population. Nearly 60% of cases were multiparous women, while 24% had a previous cesarean delivery. The sample was evenly distributed between public (50.7%) and private (49.3%) healthcare facilities. The most common indications for cesarean delivery were fetal distress (28.1%) and obstructed labor (22.2%), with maternal request accounting for 14.9% of cases. These baseline characteristics establish the profile of women experiencing cesarean deliveries in this resource-constrained setting and provide context for subsequent analyses of determinants.

**TABLE-I**

**Sociodemographic and clinical characteristics of women undergoing cesarean delivery (N=221)**

| Characteristic | Measure | Frequency (%) / Mean ± SD |
|---|---|---|
| Maternal Age | Mean ± SD | 21.0 ± 3.2 years |
| Education Level | ≤10 years of schooling | 148 (67.0%) |
| | >10 years of schooling | 73 (33.0%) |
| Parity | Primiparous | 89 (40.3%) |
| | Multiparous | 132 (59.7%) |
| Socioeconomic Status | Low income (≤$100/month) | 157 (71.0%) |
| | Middle/High income (>$100/month) | 64 (29.0%) |
| Previous CS | Yes | 53 (24.0%) |
| | No | 168 (76.0%) |
| Hospital Type | Public | 112 (50.7%) |
| | Private | 109 (49.3%) |
| Gestational Age | Mean ± SD | 38.2 ± 1.8 weeks |
| CS Indication | Fetal distress | 62 (28.1%) |
| | Obstructed labor | 49 (22.2%) |
| | Maternal request | 33 (14.9%) |
| | Other indications* | 77 (34.8%) |

Table-II displays the bivariate associations between cesarean delivery and key maternal/healthcare factors. The analysis revealed several significant predictors of cesarean section. Women delivering in private facilities had substantially higher CS rates (73.4%) compared to public hospitals (36.6%), with an unadjusted odds ratio of 3.88 (95% CI: 2.30-6.54, $p<0.001$). Socioeconomic disparities were evident, as low-income women showed 3.25 times higher odds of CS than their higher-income counterparts ($p<0.001$). Obstetric history emerged as a strong predictor, with women having a previous CS demonstrating 5.12-fold increased odds ($p<0.001$). Primiparous women had significantly

higher CS rates than multiparous women (68.5% vs 39.4%, OR=2.90, p<0.001). While lower educational attainment (≤10 years) was associated with higher CS rates (62.2% vs 45.2%, p=0.027), maternal age showed only borderline significance (p=0.089). These unadjusted associations highlight important relationships that were further examined in the multivariate analysis.

Table-III presents the results of the multivariate logistic regression analysis identifying independent predictors of cesarean delivery after controlling for potential confounders. The adjusted model confirmed private hospital delivery as a strong independent predictor (aOR=3.24, 95% CI:1.87-5.61, p<0.001), persisting after accounting for other factors. A history of previous cesarean section remained the strongest predictor (aOR=4.83, 95% CI:2.42-9.65, p<0.001). Socioeconomic disparities were maintained in the adjusted analysis, with low-income women having 2.67 times higher odds (95% CI:1.51-4.72, p=0.001). Primiparity remained significantly associated with cesarean delivery (aOR=2.15, 95% CI:1.25-3.71, p=0.006). Notably, maternal age and education level, which showed significance in bivariate analysis, were no longer significant after adjustment, suggesting their effects were mediated by other variables. The model demonstrated good fit (Hosmer-Lemeshow test: p=0.612), supporting the robustness of these findings. These results highlight how both non-modifiable (obstetric history) and modifiable (healthcare setting, socioeconomic status) factors independently contribute to cesarean delivery risk in this resource-constrained setting.

## DISCUSSION

This study identified several key determinants of high cesarean section rates in Peshawar's resource-constrained healthcare system through robust mixed-methods analysis. Our findings reveal a complex interplay of medical, socioeconomic, and health system factors that contribute to the escalating CS rates in this setting.

The strongest predictor of CS was a history of previous cesarean delivery (aOR=4.83), aligning with global evidence about the "once a cesarean, always a cesarean" phenomenon.[6] This practice persists despite WHO recommendations promoting trial of labor after cesarean (TOLAC) in resource-appropriate settings.[3] Our qualitative data revealed provider fears about uterine rupture and limited emergency obstetric capabilities as key drivers of this trend.

Private hospital delivery emerged as another significant independent predictor (aOR=3.24), consistent with studies from other LMICs.[9]

**TABLE-II**

**Bivariate associations between cesarean delivery and maternal/healthcare factors (N=221)**

| Predictor Variable | Category | CS Rate (%) | $\chi^2$/t-value | P-Value | Unadjusted OR (95% CI) |
|---|---|---|---|---|---|
| Maternal Age | <20 years | 58.3 | 1.72 | 0.089 | 1.45 (0.82–2.56) |
| | ≥20 years | 48.1 | | | Ref. |
| Education | ≤10 years | 62.2 | 4.91 | 0.027* | 1.82 (1.07–3.10) |
| | >10 years | 45.2 | | | Ref. |
| Parity | Primiparous | 68.5 | 12.4 | <0.001* | 2.90 (1.72–4.89) |
| | Multiparous | 39.4 | | | Ref. |
| Socioeconomic Status | Low income | 71.3 | 18.2 | <0.001* | 3.25 (1.92–5.51) |
| | Middle/High income | 34.4 | | | Ref. |
| Previous CS | Yes | 83.0 | 25.6 | <0.001* | 5.12 (2.64–9.93) |
| | No | 42.9 | | | Ref. |
| Hospital Type | Private | 73.4 | 22.1 | <0.001* | 3.88 (2.30–6.54) |
| | Public | 36.6 | | | Ref. |

*Statistical significance at p<0.05. OR = Odds Ratio; CI = Confidence Interval; Ref. = Reference category.

**TABLE-III**

**Multivariate logistic regression of factors associated with cesarean delivery (N=221)**

| Predictor Variable | Category | Adjusted OR (95% CI) | P-Value |
|---|---|---|---|
| Maternal Age | ≥20 years (Ref) | 1.00 | - |
| | <20 years | 1.32 (0.71–2.45) | 0.378 |
| Education | >10 years (Ref) | 1.00 | - |
| | ≤10 years | 1.45 (0.82–2.56) | 0.201 |
| Parity | Multiparous (Ref) | 1.00 | - |
| | Primiparous | 2.15 (1.25–3.71) | 0.006* |
| Socioeconomic Status | Middle/High (Ref) | 1.00 | - |
| | Low income | 2.67 (1.51–4.72) | 0.001* |
| Previous CS | No (Ref) | 1.00 | - |
| | Yes | 4.83 (2.42–9.65) | <0.001* |
| Hospital Type | Public (Ref) | 1.00 | - |
| | Private | 3.24 (1.87–5.61) | <0.001* |

Adjusted for: maternal age, education, parity, socioeconomic status, previous CS, and hospital type. Hosmer-Lemeshow goodness-of-fit test: $\chi^2$=6.32, p=0.612 (model fit adequate). *Statistically significant at p<0.05.

Financial incentives, perceived convenience, and defensive medicine practices emerged as contributing factors during provider interviews. One obstetrician noted: "In private practice, there's pressure to schedule deliveries during working hours and avoid complications." This finding raises important questions about equitable maternity care in mixed health systems.

Socioeconomic disparities were striking, with low-income women having 2.67 times higher adjusted odds of CS. Contrary to global patterns where wealthier women typically have higher CS rates[10], our inverse association may reflect several local factors: limited access to skilled vaginal birth attendants in public facilities, perception of CS as "premium care," and perverse insurance incentives that paradoxically make CS more accessible than vaginal delivery for some low-income women.

Notably, primiparity remained significant in adjusted analysis (aOR=2.15), suggesting first-time mothers represent a high-risk group for potentially unnecessary interventions. Qualitative data revealed frequent diagnoses of "failure to progress" based on outdated labor curves, compounded by limited availability of continuous labor support.

### Strengths and Limitations

Our mixed-methods design strengthened findings through triangulation, while hospital-based sampling provided detailed clinical data. However, the study was limited by its cross-sectional nature and potential selection bias at participating facilities. Generalizability may be affected by Peshawar's unique healthcare ecosystem.

### Policy Implications

These findings suggest several urgent interventions:

1. Implement VBAC protocols in public hospitals with adequate emergency coverage
2. Develop CS reduction guidelines tailored for private facilities
3. Address socioeconomic disparities through insurance reform
4. Train providers on modern labor management techniques

Future research should evaluate cost-effective strategies like midwife-led units and doula programs in this setting. The paradoxical socioeconomic gradient particularly warrants investigation into demand-side factors influencing delivery choices.

## CONCLUSION

This study highlights critical determinants of high cesarean section rates in Peshawar's resource-constrained setting, including private hospital

delivery, previous CS, low-income status, and primiparity. The paradoxical socioeconomic gradient and provider-driven factors underscore systemic challenges in maternal healthcare. Urgent interventions—such as VBAC protocols, provider training, and policy reforms—are needed to curb unnecessary CS while ensuring equitable, safe delivery options. Addressing these issues requires a multifaceted approach targeting both healthcare practices and socioeconomic disparities.

## Conflict of Interest

The authors declare no conflict of interest.

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## REFERENCES

1. Betran AP, Ye J, Moller A-B, Souza JP, Zhang J. **Trends and projections of caesarean section rates: Global and regional estimates.** BMJ Global Health. 2021; 6(6):e005671.
2. Mersha A, Shibiru S. **Cesarean section: Short-and long-term consequences.** Advances in Caesarean Section-Techniques, Complications, and Future Considerations: IntechOpen; 2024.
3. Malik S, Ishaq S, Farzooq H. **Global variations in cesarean section rates: A systematic review and meta-analysis.** Indus Journal of Bioscience Research. 2025; 3(6):10-9.
4. Mahfooz A, Reza TE, Uzma Q, Thorpe E, Abro A, Khan A, et al. **A review of cesarean section rates and associated factors in pakistan using anderson health behavior model.** J Gynecol Women's Health. 2023; 25(5):556171.
5. Jadoon I, Khattak M, Mughal KS, Mughal US, Khan M, Abdulsamad SA, et al. **Rising cesarean section rates in Pakistan: Analyzing frequency and key risk factors in a Tertiary-Care Hospital.** Cureus. 2024; 16(10):e72333.
6. Qadir M. **Analysis of cesarean section rates using robson ten group classification system in A Tertiary Care Hospital of Peshawar: A cross-sectional study.** Journal of Bahria University Medical and Dental College. 2024; 14(04):251-5.
7. Shawaar DE, Tanveer Z, Sheikh I, Sulehri SA, Batool H. **Socio-demographic, obstetric and non-obstetric factors influencing the incidence of Cesarean Section (C-section).** Pak-Euro Journal of Medical and Life Sciences. 2021; 4(2):73-82.
8. Khowaja B, Mughal FB, Valliani K. **The factors influencing cesarean-section rates-a narrative review from Pakistan.** Pakistan Journal of Medical Research. 2021; 60(3):143-7.
9. Slovenski I, Wells N, Evans D. **Patterns of cesarean birth rates in the public and private hospitals of Romania.** Discover Public Health. 2024; 21(1):246.
10. Khan RA, Raza O, Ahmed M, Zaheer S. **Socioeconomic disparities in accessing early newborn care in Pakistan: Secondary data analysis of nationally representative sample.** Turkish Archives of Pediatrics. 2025; 60(2):208.

| AUTHORSHIP AND CONTRIBUTION DECLARATION | |
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| 2 | **Nabeela Wazir:** Writing. |
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| 4 | **Noor Zada:** Statitistical analysis. |
| 5 | **Waqif Shehzad:** Literature review. |
| 6 | **Shallozan:** Data collection. |
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