

CESAREAN SECTION RATES AND THEIR INDICATIONS USING THE ROBSON
TEN-GROUP CLASSIFICATION SYSTEM: A NARRATIVE REVIEW OF
EVIDENCE FROM PAKISTANI TERTIARY-CARE HOSPITALS

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Abstract

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Received on 12 Feb, 2026

Accepted on 16 March, 2026

Published on 18 March, 2026

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Background: The rising global and national rate of cesarean section (CS) is a pressing maternal and public health concern. The World Health Organization (WHO)-endorsed Robson Ten-Group Classification System (RTGCS) offers a standardized method for auditing, monitoring, and comparing CS rates according to clinically relevant obstetric characteristics, enabling institutions and health systems to identify the specific patient groups driving their overall CS rate. To synthesize published evidence from Pakistani

tertiary-care hospitals that have applied the RTGCS, in order to characterize overall CS rates, the relative contribution of individual Robson groups, and the leading clinical indications for cesarean delivery. **Methods:** A narrative review of the literature was conducted using PubMed, Google Scholar, and institutional repositories for studies published between 2015 and 2026 that reported RTGCS-based audits from Pakistani tertiary-care obstetric units. Data on study design, sample size, overall CS rate, group-specific contributions, and indications were extracted and synthesized descriptively; no formal meta-analysis or systematic quality appraisal was performed. **Results:** Four Pakistani tertiary-care audits meeting the review criteria reported overall institutional CS rates ranging from 39.9% to 54.2%, several-fold above the WHO reference range of 10-

15% and considerably above Pakistan's national rate of 19.6% (Pakistan Demographic and Health Survey, 2017-18). Across the three hospitals reporting group-specific contributions, Robson Group 5 (women with a previous cesarean section) was consistently the largest single contributor, accounting for 34.3-51.9% of the overall CS rate, followed variably by Group 10 (preterm singleton cephalic pregnancies, 14.4-28.5%) and Group 2 (nulliparous women induced or delivered by CS before labor, 12.7-18.5%). In the most detailed audit (Holy Family Hospital, Karachi), the leading clinical indications for emergency CS were previous cesarean section (32.3%), non-progress of labor (21.15%), and cephalopelvic disproportion (16.92%). **Conclusion:** Evidence from Pakistani tertiary-care hospitals consistently identifies previous cesarean delivery, preterm singleton pregnancies, and nulliparous induced labor as the principal contributors to elevated institutional CS rates. Promotion of vaginal birth after cesarean (VBAC) where appropriate, judicious use of induction in nulliparous women, and structured management of preterm pregnancy are plausible targets for reducing potentially avoidable CS. Routine, standardized RTGCS-based auditing is recommended across Pakistani obstetric units to enable meaningful benchmarking and to guide targeted quality-improvement interventions.

Keywords: Cesarean section; Robson Ten-Group Classification System; obstetric audit; previous cesarean section; tertiary care hospital; Pakistan; vaginal birth after cesarean.

Introduction

The cesarean section (CS) is one of the most frequently performed surgical procedures in obstetric practice and, when medically indicated, is a life-saving intervention for both mother and infant. Over the past three decades, however, CS rates have risen steadily across almost all regions of the world, prompting concern among clinicians, health-system planners, and global health bodies. The World Health Organization (WHO) has repeatedly stated that population-level CS rates above 10-15% are not associated with additional reductions in maternal or neonatal mortality, and that rates beyond this range more plausibly reflect non-clinically-indicated use of the procedure rather than improved outcomes.[1] Global estimates place the worldwide CS rate at approximately 21% as of the most recent projections, with models suggesting a rise to nearly 29-30% by 2030 if current trends continue, driven disproportionately by increases in middle-income countries.[2,3]

Pakistan mirrors this global trajectory. Nationally representative Demographic and Health Survey (PDHS) data show that the CS rate among child-bearing women rose from approximately 3.2% in 1990-91 to 19.6% in 2017-18, a roughly six-fold increase over three decades, with the steepest rises seen among urban, better-educated, and

wealthier women delivering in private facilities.[4,5] At the level of individual tertiary-care hospitals, where case complexity and referral patterns differ substantially from the general population, reported institutional CS rates are frequently far higher still, in some series exceeding 50%.[6] This gap between national and institutional rates underscores the need for standardized, comparable methods of auditing CS practice at the facility level, rather than relying on a single aggregate rate that obscures which patient groups are actually driving it.

The Robson Ten-Group Classification System (RTGCS), first proposed by Michael Robson in 2001 and formally endorsed by the WHO in 2015 as the global standard for CS auditing, addresses this need.[1,7] The system classifies all deliveries into ten mutually exclusive groups based on five readily available obstetric characteristics: parity, number of previous cesarean deliveries, onset of labor (spontaneous, induced, or pre-labor CS), fetal presentation (cephalic, breech, or transverse/oblique lie), number of fetuses (singleton or multiple), and gestational age (term or preterm). Because every delivery can be assigned to exactly one group using data that are almost universally recorded, the RTGCS allows hospitals to describe the relative size of each group, the CS rate within each group, and each group's absolute and relative contribution to the overall institutional CS rate. This, in turn, allows clinicians and administrators to identify precisely which obstetric populations are contributing most to a rising CS rate and to design targeted, evidence-based interventions rather than blunt, hospital-wide policies.[7,8]

A growing number of Pakistani tertiary-care hospitals have adopted the RTGCS for internal audit purposes over the past decade, generating a body of institution-level evidence that, to date, has not been systematically drawn together. Bringing this evidence into a single narrative synthesis can help clarify whether the same Robson groups recur as leading contributors across different Pakistani settings, whether the specific clinical indications driving CS are similar across institutions, and where the most promising targets for quality-improvement interventions may lie. This review aimed to synthesize published RTGCS-based audits from Pakistani tertiary-care hospitals, describing overall CS rates, the relative contribution of individual Robson groups, and the leading indications for cesarean delivery, in order to inform local obstetric practice and future audit efforts.

Methods

Study design

This was a narrative (non-systematic) review of published literature. No study protocol was registered in advance, and the review does not follow the PRISMA reporting

standard for systematic reviews; it is intended as a descriptive synthesis of available institution-level evidence rather than a formal, exhaustively-searched systematic review or meta-analysis.

Search strategy and eligibility criteria

A literature search was conducted using PubMed, Google Scholar, ResearchGate, and medRxiv, using combinations of the search terms "Robson classification", "Ten Group Classification System", "cesarean section rate", "caesarean section", and "Pakistan", supplemented by manual review of the reference lists of retrieved articles (snowballing). Studies were eligible for inclusion if they: (i) were conducted at a tertiary-care hospital located in Pakistan; (ii) classified deliveries using the standard or a clearly described modified RTGCS; (iii) reported an overall institutional CS rate and/or the relative contribution of individual Robson groups; and (iv) were published between 2015 and 2026. Studies were excluded if they reported only aggregate national survey data without institutional Robson classification, or if the full text could not be accessed to verify reported figures.

Data extraction and synthesis

For each eligible study, the following data were extracted where reported: study design, hospital and city, study period, total number of deliveries and cesarean sections, overall institutional CS rate, the relative contribution of each Robson group (or, where full breakdowns were unavailable, at least Groups 5, 2, and 10, which are consistently the largest contributors in comparable South Asian settings), and the leading clinical indications for cesarean delivery. Given the narrative nature of this review, data were synthesized descriptively and are presented as reported by the original authors; no statistical pooling (meta-analysis) or formal risk-of-bias/quality appraisal tool was applied. Percentages are reported to the precision given in the original source and have not been independently recalculated except where noted.

Results

Overview of included studies

Four RTGCS-based audits from Pakistani tertiary-care hospitals met the eligibility criteria and are summarized in Table 1: a retrospective audit from Holy Family Hospital, Karachi (2022 data);[9] a retrospective record review from the Aga Khan University Hospital, Karachi (2022 data);[10] a cross-sectional audit across three tertiary-care facilities in Rawalpindi (2019 data);[11] and a cross-sectional study from Nishtar Medical University Hospital, Multan (2019-2020 data).[12] Sample sizes ranged from 167 cesarean deliveries analyzed in the Multan study to 5,657 total deliveries screened in the Rawalpindi audit.

Table 1. Characteristics of Included Pakistani Robson Ten-Group Classification System Studies

Study Year	(Author,	Hospital / City	Design; Study Period	Deliveries Screened / CS Performed	Overall Rate	CS
Abidi et al., 2025 [9]		Holy Family Hospital, Karachi	Retrospective audit; Jan-Dec 2022	1,464 / 507	54.2%	
Arshad et al., 2024 [10]		Aga Khan University Hospital, Karachi	Retrospective record review; Jul-Dec 2022	2,616 / 1,198	45.8%	
Chaudhri et al., 2025 [11]		3 tertiary hospitals, Rawalpindi	Cross-sectional; Jun-Aug 2019	5,657 / 2,255	39.9%	
Parveen et al., 2021 [12]		Nishtar Medical University Hospital, Multan	Cross-sectional; Oct 2019-Mar 2020	167 analyzed*	CS Not separately reported*	

*The Multan study analyzed a sample of 167 women who underwent CS during the study period without reporting the total number of deliveries screened; an institutional CS rate could therefore not be calculated from the published data.[12]

Overall institutional cesarean section rates

The overall CS rate ranged from 39.9% to 54.2% across the three hospitals for which an institutional denominator was available, with all three rates several-fold higher than the WHO reference range of 10-15% and more than double Pakistan's national CS rate of 19.6% reported in the 2017-18 Demographic and Health Survey.[1,4] Figure 1 illustrates this gap between institutional tertiary-care rates and both the national and WHO benchmark figures.

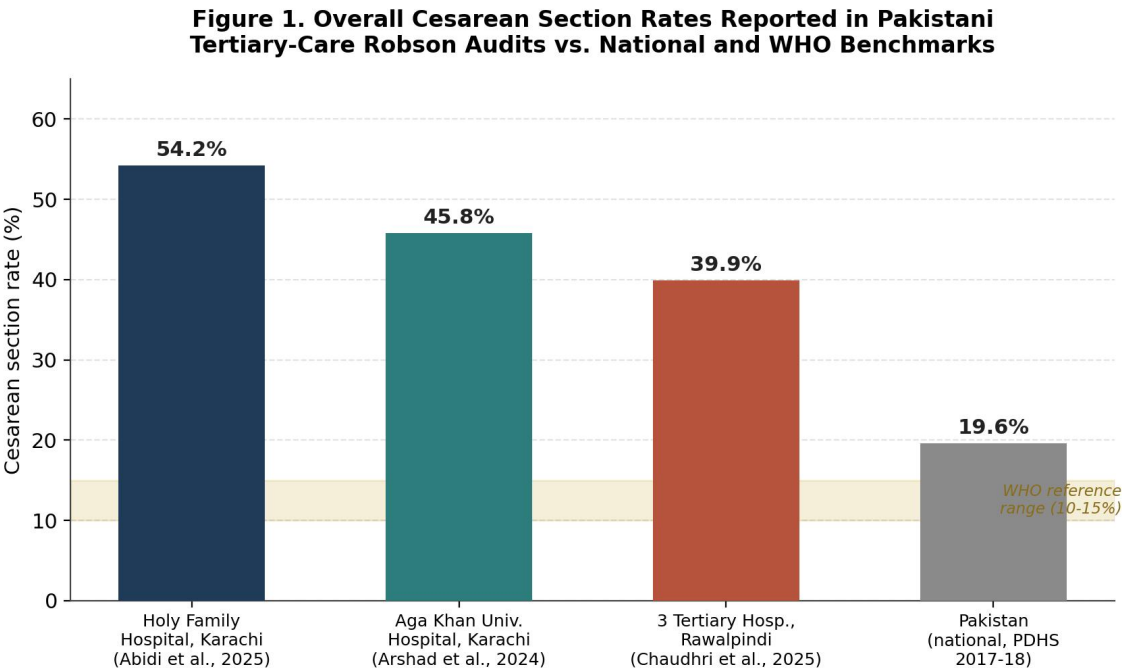


Figure 1. Overall cesarean section rates reported in Pakistani tertiary-care Robson audits compared with the national rate (PDHS 2017-18) and the WHO reference range.

Contribution of individual Robson groups

Across the three hospitals reporting group-specific contributions, Robson Group 5 (women with a previous cesarean delivery, singleton, cephalic, term pregnancy) was consistently the single largest contributor to the overall CS rate, ranging from 34.3% at the Aga Khan University Hospital to 51.9% at Holy Family Hospital, Karachi.[9-11] Group 10 (all singleton, cephalic, preterm pregnancies, including those with a previous CS) was the second- or third-largest contributor in every study, ranging from 14.4% to 28.5%. Group 2 (nulliparous women with a singleton cephalic term pregnancy who were induced or delivered by CS before the onset of labor) contributed between 12.7% and 18.5% at the three Karachi- and Rawalpindi-based hospitals. The Multan study was a notable outlier: Group 10 was reported as the largest contributor there (50.9%), with Group 5 second (14.4%), a pattern the original authors attributed to a comparatively high proportion of preterm referrals to that unit.[12] These comparisons are summarized in Table 2 and Figure 2.

Table 2. Relative Contribution (%) of the Leading Robson Groups to the Overall Cesarean Rate

Study	Group 5 (%)	Group 2 (%)	Group 10 (%)	Largest Contributor	Single
Holy Family Hospital, Karachi [9]	51.9	18.5	14.4	Group 5 (previous CS)	
Aga Khan University Hospital, Karachi [10]	34.3	16.4	28.5	Group 5 (previous CS)	
3 tertiary hospitals, Rawalpindi [11]	41.7	12.7	17.3	Group 5 (previous CS)	
Nishtar Hospital, Multan [12]	14.4	Not separately reported	50.9	Group 10 (preterm singleton)	

Figure 2. Relative Contribution of the Three Leading Robson Groups to the Overall Cesarean Rate Across Pakistani Tertiary Hospitals

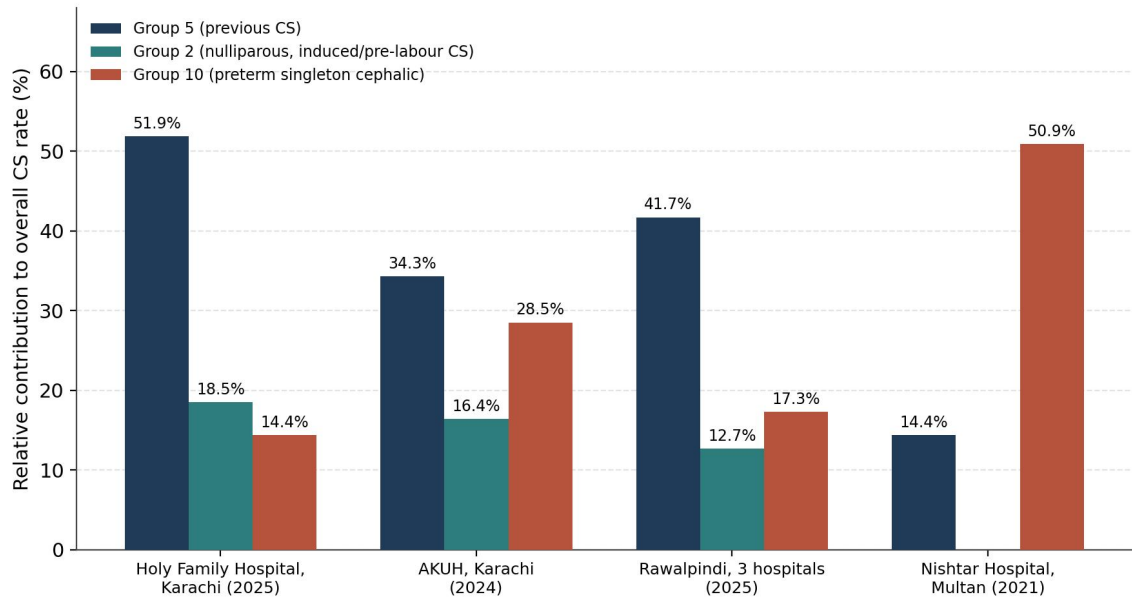


Figure 2. Relative contribution of Robson Groups 5, 2, and 10 to the overall cesarean rate across four Pakistani tertiary-care hospitals.

Because it provided a complete ten-group breakdown, the Holy Family Hospital, Karachi audit allows a full illustration of how the overall CS rate is distributed across all ten Robson groups (Figure 3). Group 5 alone accounted for just over half of all cesarean deliveries at that institution, with Groups 2 and 10 together contributing a further third,

leaving the remaining seven groups collectively responsible for less than 15% of the overall CS rate.[9]

Figure 3. Relative Contribution of Each Robson Group to the Overall Cesarean Rate — Holy Family Hospital, Karachi (n=507 CS)

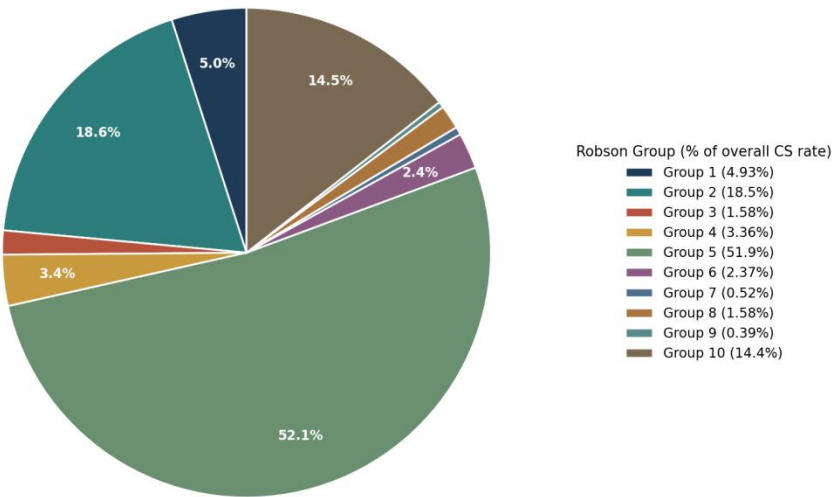


Figure 3. Relative contribution of each of the ten Robson groups to the overall cesarean rate, Holy Family Hospital, Karachi (n = 507 cesarean sections).[9]

Leading clinical indications for cesarean delivery

Among the included studies, the Holy Family Hospital, Karachi audit provided the most granular breakdown of clinical indications for the 260 emergency cesarean deliveries in its sample. Previous cesarean section was the leading indication (32.3%), followed by non-progress of labor (21.15%) and cephalopelvic disproportion (16.92%); fetal distress (8.46%), breech presentation (6.54%), pre-eclampsia (6.15%), refusal of a trial of vaginal birth after cesarean (VBAC) (5.00%), low-lying placenta (3.09%), and transverse lie (0.39%) accounted for the remainder (Figure 4).[9] The Multan study similarly identified previous cesarean section (20.4%) and fetal distress (19.8%) as its two leading indications, and the Aga Khan University Hospital audit likewise reported previous CS and preterm delivery among its principal drivers, broadly corroborating the pattern seen at Holy Family Hospital.[10,12] Across all reporting studies, refusal of VBAC was consistently among the least common indications, suggesting that VBAC is rarely being offered as a counseled option rather than being frequently declined by eligible women.

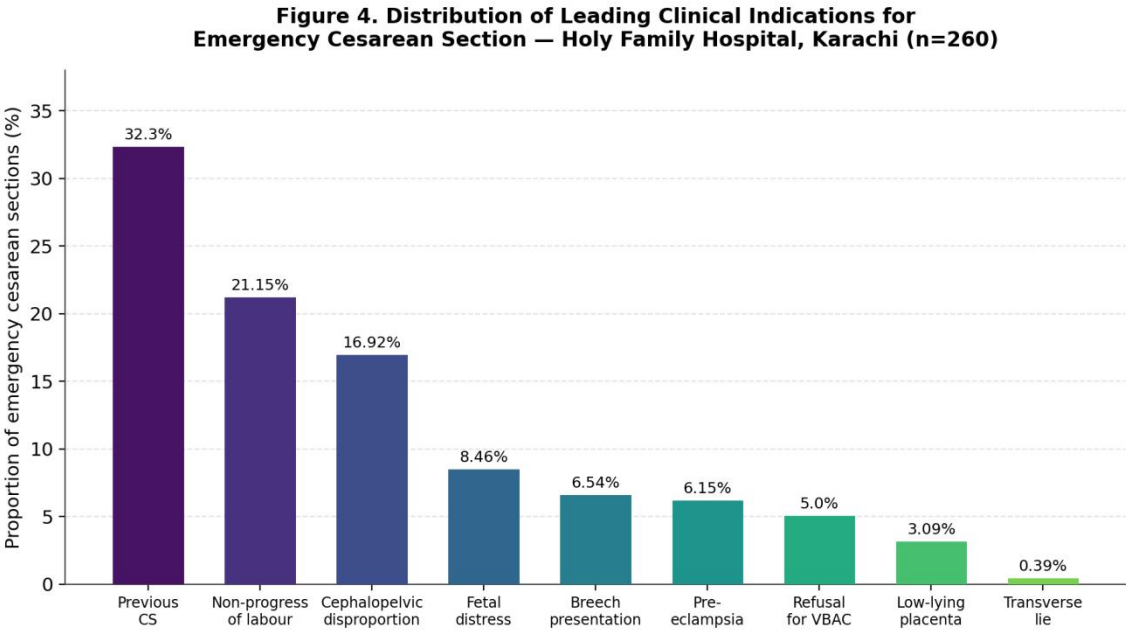


Figure 4. Distribution of leading clinical indications for emergency cesarean section, Holy Family Hospital, Karachi (n = 260 emergency CS).[9]

Discussion

This narrative synthesis of four Pakistani tertiary-care audits demonstrates a strikingly consistent pattern: institutional CS rates several times higher than both the WHO reference range and Pakistan's national rate, with women who have had a previous cesarean delivery (Robson Group 5) accounting for the largest single share of the overall CS rate in three of the four hospitals reviewed. This finding is consistent with audits from comparable tertiary referral settings across South Asia and the wider region, where Group 5 is almost universally among the two or three largest contributors to institutional CS rates.[9-11] The clinical implication is direct: because a large proportion of Group 5 deliveries could, in eligible women, be managed as a trial of labor after cesarean rather than an automatic repeat CS, promoting counseled, protocol-guided VBAC where appropriate is likely to be one of the more tractable levers for reducing institutional CS rates in Pakistani tertiary-care settings.

Notably, across every study that reported indication-level data, refusal of VBAC was among the least frequent reasons recorded for proceeding to CS, a pattern that mirrors the Holy Family Hospital audit's own observation that clinicians in the region may not be routinely offering VBAC as a counseled option, rather than patients declining it when offered.[9] Contributing factors plausibly include clinician concern over the historically reported decline in VBAC success rates in some populations, medico-

legal apprehension regarding uterine rupture, and limited institutional protocols or facilities for closely monitoring a trial of labor after cesarean.[9,13] Structured VBAC counseling programs, supported by clear eligibility criteria and intrapartum monitoring protocols, represent a plausible, evidence-informed target for future quality-improvement work in this setting.

Robson Group 10 (preterm, singleton, cephalic pregnancies) was the second- or third-largest contributor in three of the four studies and was the single largest contributor in the Multan cohort. Because preterm birth is frequently associated with maternal or fetal compromise that may itself necessitate operative delivery, this group is generally considered to reflect a mixture of appropriately indicated and potentially avoidable CS; the wide range observed across studies (14.4% to 50.9%) may partly reflect differing referral patterns, with tertiary centers that function as regional referral hubs for high-risk or preterm pregnancies likely to show a disproportionately large Group 10 contribution.[12] Group 2 (nulliparous women who were induced or underwent pre-labor CS) consistently contributed 12.7-18.5% of the overall CS rate in the three hospitals reporting it, aligning with broader concerns that induction practices and low thresholds for pre-labor CS in first-time mothers may be driving avoidable primary cesarean deliveries; because a primary CS substantially increases the likelihood of repeat CS in future pregnancies (feeding directly back into Group 5), interventions to optimize induction practice and labor management in nulliparous women may have compounding benefits over time.[7,14]

These findings should be interpreted considering the well-documented adverse consequences of an elevated CS rate. Cesarean delivery, particularly when performed for non-clinically-compelling indications, is associated with increased maternal morbidity, longer hospital stays and higher costs, and downstream obstetric risks in future pregnancies including placenta previa and placenta accreta spectrum disorders; the safety of the current generation of children is not improved, and may in specific respects be reduced, by CS rates well above the WHO reference range.[13-15] Routine, standardized RTGCS auditing offers a practical, low-cost mechanism by which individual Pakistani hospitals can monitor whether quality-improvement interventions targeting Groups 5, 2, and 10 are translating into measurable reductions in institutional CS rates over time.

Limitations

This review has several limitations. First, it is narrative rather than systematic in design: the search was not exhaustive across all databases, gray literature and unpublished institutional audits were not systematically sought, and no formal risk-of-bias or quality

appraisal tool was applied to the included studies. Second, only four eligible studies were identified, several with markedly different study periods, designs (retrospective versus cross-sectional), and case-mix (e.g., the Multan cohort analyzed only CS cases without a delivery denominator), limiting the comparability and generalizability of the synthesized figures. Third, none of the included studies adjusted for potential confounders such as maternal age, body mass index, or referral status when comparing Robson group contributions across sites, so observed differences between hospitals may partly reflect differing patient populations rather than differing clinical practice. Finally, as a synthesis of previously published institutional audits, this review reports secondary data as presented by the original authors and did not have access to patient-level records for independent verification or recalculation.

Conclusion

Published Robson Ten-Group Classification System audits from Pakistani tertiary-care hospitals consistently show institutional CS rates well above WHO-recommended and national benchmarks, with women who have had a previous cesarean delivery, nulliparous women induced or delivered before labor, and preterm singleton pregnancies accounting for the large majority of the overall CS rate. These findings point toward structured VBAC promotion, more selective induction practice in nulliparous women, and protocolized management of preterm pregnancy as plausible, evidence-informed targets for reducing potentially avoidable cesarean deliveries. Given the consistency of these patterns across otherwise heterogeneous settings, routine, standardized Robson-based auditing is recommended as a low-cost, practical tool for Pakistani obstetric units seeking to monitor and optimize their cesarean section rates, and a prospective, multi-center Pakistani study using a uniform RTGCS protocol would be a valuable next step in confirming and extending these findings.

References

1. World Health Organization. WHO Statement on Caesarean Section Rates. *Reprod Health Matters*. 2015;23(45):149-150.
2. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990-2014. *PLoS One*. 2016;11(2):e0148343.
3. Betrán AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates. *BMJ Glob Health*. 2021;6(6):e005671.
4. Amjad A, Imran A, Shahram N, Zakar R, Usman A, Zakar MZ, Fischer F. Trends of caesarean section deliveries in Pakistan: secondary data analysis from Demographic and Health Surveys, 1990-2018. *BMC Pregnancy Childbirth*. 2020;20:743.

5. Mumtaz S, Bahk J, Khang YH. Rising trends and inequalities in cesarean section rates in Pakistan: evidence from Pakistan Demographic and Health Surveys, 1990-2013. *PLoS One*. 2017;12(10):e0186563.
6. Tasnim N, Naeem S, Shah M, Ayub N, Amin O, Azra S. High cesarean section rate in tertiary care hospital: are we justified? *J Soc Obstet Gynaecol Pak*. 2019;9(2):105-109.
7. Robson MS. Classification of caesarean sections. *Fetal Matern Med Rev*. 2001;12(1):23-39.
8. World Health Organization. Robson Classification: Implementation Manual. Geneva: World Health Organization; 2017.
9. Abidi SMA, Hussain SNF, Abbas S, Abidi STF, Haresh S. Application of the Robson classification in assessing cesarean section rates: an audit of a tertiary care hospital's gynecology department in Karachi, Pakistan. *Ther Adv Reprod Health*. 2025;19. doi:10.1177/26334941251339710.
10. Arshad H, Wadani ZH, Kamal Z, Masheer S. Investigating cesarean section trends: a study using the modified Robson classification in a tertiary care setting. *Cureus*. 2024;16(11):e72827.
11. Chaudhri R, Hanif K, Bilquis H, Reza TE, Uzma Q, Khan A, Aabroo A, Rehman FU, Emmanuel F. Analysis of caesarean section rates using the Robson's ten group classification system (TGCS) at tertiary level healthcare facilities in Rawalpindi, Pakistan: a cross-sectional study. *J Ayub Med Coll Abbottabad*. 2025.
12. Parveen R, Khakwani M, Naz A, Bhatti R. Analysis of cesarean sections using Robson's Ten Group Classification System. *Pak J Med Sci*. 2021;37(2):567-571.
13. Cheng YW, Eden KB, Marshall N, Pereira L, Caughey AB, Guise JM. Delivery after prior cesarean: maternal morbidity and mortality. *Clin Perinatol*. 2011;38(2):297-309.
14. Betrán AP, Torloni MR, Zhang J, Ye J, Mikolajczyk R, Deneux-Tharaux C, et al. What is the optimal rate of caesarean section at population level? A systematic review of ecologic studies. *Reprod Health*. 2015;12:57.
15. Sandall J, Tribe RM, Avery L, Mola G, Visser GH, Homer CS, et al. Short-term and long-term effects of caesarean section on the health of women and children. *Lancet*. 2018;392(10155):1349-1357