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Systematic Review

Trends in Cesarean Section Rates and Indications over the Last 5 Years in a Tertiary Center

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Abstract

Background: Cesarean section (CS) is necessary and lifesaving in certain situations, but many tertiary centers report high and increasing use. **Objective:** To discuss articles on CS rates and indications in tertiary hospitals over the last five years. **Methods:** A PRISMA guided systematic review was conducted. We included English language, record based observational studies from tertiary centers reporting CS rates or indications with data covering at least one year within a recent five year window. We extracted data including (setting, study period, sample size, CS rate, indications, emergency and elective status, and Robson Ten-Group contributions). Findings were qualitatively synthesized. **Results:** Eight studies from Africa and Asia were included. CS rates ranged from 21.6% to 55.0%. One study reporting time points found increasing CS

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-rates and rising maternal request CS. Where indications were reported, previous cesarean, uterine surgery and fetal distress were most frequent, while failure to progress and mal presentation also recurred. Four studies applied the Robson classification; Group 5 was the leading contributor. **Conclusion:** Recent tertiary center study found high CS rates, commonly driven by repeat CS and fetal status indications. Robson based audit and targeted efforts to reduce avoidable primary CS should be considered to improve safety and reduce variation.

Keywords: cesarean section; Robson Ten Group Classification; tertiary hospital; indications; trends

Introduction

Cesarean section (CS) is essential when clinically indicated, but many health systems report increasing rates that exceed medical need. Because patient risk profiles, referral pathways, and service capacity differ in facilities, the aim is not to reach a single institutional rate, but to ensure CS is applied appropriately for clear indications (Abubeker et al. 2020). To enable valid comparison in hospitals and over time, the World Health Organization used standardized classification rather than relying only on indications, which are often variably defined and can overlap. Robson's Ten Group Classification System addresses this by assigning every woman to one of ten mutually exclusive, totally inclusive groups using routinely collected obstetric variables (parity, previous CS, onset of labor, fetal presentation, plurality, and gestational age) (1,2).

Robson based analyses also identify which groups drive overall CS burden. In many settings, women with a previous CS (group 5) are a major contributor, this reflect the long term impact of primary CS decisions and the value of safe, context appropriate approaches to trial of labor after CS when suitable (1). CS use can be influenced by non clinical factors. A meta-analysis reported higher rates of CS in private for profit hospitals compared with non profit facilities, so financial incentives and organizational context affect decision making (Hoxha et al. 2017). Maternal request is another contributor in some settings, with commonly reported reasons including fear of labor pain, concerns about pelvic floor or vaginal injury, negative prior experiences, and misconceptions about comparative safety (3).

The CS consequences differ by context and timing. Emergency CS is associated with higher maternal and neonatal morbidity than elective CS in pooled analyses, indicating the importance of early risk identification, appropriate intrapartum monitoring, and preventive strategies that avoid progression to urgent operative delivery when safe (4). In addition, prior CS is associated with increased risks in next pregnancies, including placenta previa and accreta spectrum, uterine rupture, hysterectomy, and preterm birth, so we should minimize avoidable primary CS while maintaining maternal fetal safety (5).

Multiple strategies were evaluated to reduce unnecessary CS. Guideline implementation, audit and feedback, second opinion policies, opinion leaders, and organizational change, reduce CS in some cases, but effectiveness varies (6). Robson based audit and feedback has shown reductions in before and after studies, but data is uncontrolled and at risk of bias (7). Supportive intrapartum care also matters: continuous labor support decrese CS and increases spontaneous vaginal birth compared with usual care (8). This review aimed to summarize CS rate trends and reported indications over the last five years in tertiary centers.

Methods

This systematic review was conducted in accordance with the PRISMA 2020 reporting guideline. We aimed to review *reported trends in cesarean section (CS) rates and the common indications for CS during the most recent five year period in tertiary or referral hospital settings.*

Eligibility criteria

We included original, quantitative studies that were conducted in a tertiary, teaching, or referral hospital; reported CS rate and CS indications; and provided data covering at least one calendar year within the most recent five year window of the study setting. Eligible designs were observational studies based on collected hospital records (retrospective cohort, retrospective cross sectional, or record review analyses). We included full text articles in English. We excluded case reports and series, qualitative only studies, editorials, protocols, conference abstracts without full data, studies not conducted in tertiary settings, and studies that did not report extractable CS rate and indication outcomes.

Information sources and search strategy

A structured search strategy was conducted using keywords and controlled vocabulary related to cesarean delivery, trends, rates, indications, tertiary care, and Robson classification. Searches were run in major biomedical databases (PubMed, MEDLINE, Web of Science and Scopus) and supplemented by manual screening of reference lists of included studies and relevant reviews to identify eligible articles not captured in the database search. The search keywords include (cesarean, caesarean, cesarean section, trend, rate, time series, indication, tertiary, teaching, referral, hospital) with optional terms for standardized classification.

Study selection

All records were exported to a reference manager, and duplicates were removed. Two reviewers screened titles and abstracts for eligibility, followed by full text screening of retained records. Discrepancies were resolved by discussion, with arbitration by a third reviewer when needed. Reasons for exclusion at the full text stage were documented.

Data extraction and outcomes

A standardized extraction form was used to collect: author, year, country, hospital type, design, study period, sample size, CS rate,

indications for CS, emergency or elective CS, primary or repeat CS, and Robson Ten Group distribution and contributions. The primary outcomes were CS rate and its temporal pattern within the available data; secondary outcomes were the most frequently reported indications and the Robson groups contributing most to CS.

Risk of bias and synthesis

Risk of bias was assessed by two reviewers using a validated checklist appropriate for prevalence and cross sectional record based studies. Study periods, outcome definitions, and results were analyzed qualitatively, reporting ranges of CS rates and summarizing recurrent indications and Robson group contributions rather than pooling estimates quantitatively.

Result

Eight observational studies from tertiary hospitals were included, all using routinely collected delivery records to report cesarean section (CS) rates, indications, or Robson group contributions (2,9–15).

In included centers, CS rates ranged from 21.6% to 55.0%. The lowest rate was 21.6% in Somalia (15). Rates of one third were reported in Ethiopia (34.7%) and Turkiye (34.89%) (2,9). Other reported rates were 38.2% in Somalia (13), 44.51% in Ghana (14), 51.2% in Nigeria (10), and 55.0% in Turkiye (12).

Time trend analysis was reported in one Indian tertiary center study (2011 to 2021), showing an increase in CS rate from 39.63% to 52.42% (11). In the same period, cesarean delivery on maternal request increased from 3.28% to 11.41% (11). In Somalia (2015 to 2021), emergency CS was 59.2% of CS and primary CS 77.7%. Maternal mortality was 1.7%, with most deaths attributed to obstetric hemorrhage (15). In Türkiye (2018 to 2020), previous CS (38.1%) and fetal distress (12.5%) were the most frequent indications (9). In another Turkiye study (2019 to 2023), previous uterine surgery accounted for 56.2% of CS and fetal distress for 24.3% (12). In Somalia (2015–2021), previous CS (22.3%) and fetal distress (22.1%) were also leading indications (15).

Four studies applied the Robson Ten Group Classification. Group 5 (previous CS, singleton cephalic, ≥37 weeks) was the most common contributor to total CS in Turkiye (35.4%), Nigeria (37.6%), and Ghana (34.01%) (9,10,14). In Somalia (2022 to 2023), Group 5 had the largest contribution to the CS rate (11.4%), followed by Group 10 at 9.4% (13). In Nigeria, Groups 2 and 10 were the most common contributors (10).Table 1 and 2 represent the characteristics of the included studies and main findings respectively.

Table 1. Characteristics of included studies

Study	Country and setting	Design	Study period	Sample size	Main measures and outcomes
Bulut and Ceyhan (2022) (9)	Turkiye, Kayseri Training and Research Hospital	Retrospective record review	2018 to Apr 2020	18,576 births	CS rate, indications, Robson 10 group distribution
Abubeker et al. (2020) (2)	Ethiopia, St. Paul's Hospital Millennium Medical College	Retrospective cross-sectional	Jan 2018 to Dec 2019	4,200 deliveries	CS rate, associated factors (obstetric and demographic)
Akadri et al. (2023) (10)	Nigeria, Babcock University Teaching Hospital	Retrospective cross-sectional	Aug 2020 to Feb 2022	447 deliveries	Robson 10-group classification, CS rate, group contributions, indications
Malik et al. (2024) (11)	India, tertiary care center (Uttar Pradesh)	Retrospective record analysis	2011 to 2021	9,775 deliveries	CS rate trends over time, primary vs repeat CS, indications

Study	Country and setting	Design	Study period	Sample size	Main measures and outcomes
Guner and Karabudak (2025) (12)	Türkiye, tertiary referral center (Istanbul)	Record-based cross-sectional analysis	Jun 2020 to 2025	68,944 deliveries	CS rate, primary vs repeat CS, indications
Barut et al. (2025) (13)	Somalia, Mogadishu Somali Turkey Training and Research Hospital (tertiary center)	Retrospective cross-sectional	Jan 2022 to Jul 2023	3,030 deliveries	Robson 10 group classification, CS rate, absolute contributions
Adam et al. (2025) (14)	Ghana, Komfo Anokye Teaching Hospital (tertiary center)	Retrospective cross-sectional	Jan to Dec 2019	6,814 deliveries	Robson 10 group classification, CS rate, group contributions, data completeness
Hussein et al. (2023) (15)	Somalia, tertiary care hospital (first report from Somalia)	Retrospective review (electronic records)	2015 to 2021	12,540 deliveries (2,703 CS)	CS rate, indications, emergency vs elective, maternal mortality

Table 2: main findings of the included studies

Included study	Main findings
Bulut and Ceyhan (2022) (9)	Overall CS rate 34.89% (6,485/18,576). The largest Robson contributor was Group 5 (35.4%). Leading indications: previous CS (38.1%), fetal distress (12.5%), cephalopelvic disproportion (11.3%), malpresentation (10.3%), and failure to progress (8.7%).
Abubeker et al. (2020) (2)	Overall CS rate 34.7% (1,458/4,200). Largest absolute contributors: Group 1 (12.9%), Group 3 (9.4%), and Group 5 (6.2%); the largest relative contribution was Group 5 (98.8%).
Akadri et al. (2023) (10)	Overall CS rate 51.2%. Largest contributors were Group 5 (37.6%), Group 2 (12.2%), and Group 10 (11.9%).
Malik et al. (2024) (11)	CS rate increased from 39.63% (2011) to 52.42% (2021). Maternal request CS increased from 3.28% to 11.41%. For primary elective CS, the most common indication in both years was oligohydramnios with IUGR (2011: 34.39%; 2021: 30.38%). For primary CS overall, fetal distress was the most common indication (both years).

Guner and Karabudak (2025) (12)	Overall CS rate 55.0% (40,808/68,944). The most common indications were previous uterine surgery (56.2%) and fetal distress (24.3%).
Barut et al. (2025) (13)	Overall CS rate 38.2% (1,156/3,030). Largest contributors: Group 5 (11.4%) and Group 10 (9.4%), followed by Group 2 (4.5%), Group 1 (3.7%), and Group 3 (3.5%).
Adam et al. (2025) (14)	Overall CS rate 44.51% (3,034/6,814). Major contributing groups: Group 5 (34.01%), Group 10 (15.79%), Group 1 (11.05%), and Group 3 (9.82%).
Hussein et al. (2023) (15)	Overall CS rate 21.6% (2,703/12,540; 2015–2021). Emergency CS 59.2% vs elective 40.8%. Primary CS 77.7% vs repeat 22.3%. Most common indications: previous CS (22.3%) and fetal distress (22.1%). Maternal mortality 1.7%, with 61% due to direct obstetric hemorrhage.

Discussion

We reviewed recent studies on cesarean section (CS) trends and indications in tertiary care settings. In the included studies, CS rates were frequently high, and reported indications included previous CS, labor dystocia and failure to progress, fetal distress or non reassuring fetal status, mal-presentation, hypertensive disorders, and other maternal or fetal complications. These support moving beyond indication labels toward structured, reproducible reporting systems that allow targeted action (1).

Robson based monitoring is practical for tertiary centers because it is simple to implement and avoids key limitations of indication based classification, this overlapping categories and poor reproducibility for diagnoses like fetal distress or dystocia (1). We found a large contribution of women with a previous CS (Robson group 5) to overall CS rate. This indicate the long-term impact of primary CS decisions and suggests that the largest sustained reductions come from preventing avoidable primary CS and supporting selected trial of labor after CS (1).

The clinical importance of limiting avoidable primary CS is reinforced by data linking prior CS to higher risks in subsequent pregnancies, including placenta previa, placenta accreta spectrum, uterine rupture, hysterectomy, and adverse neonatal outcomes (5). Non clinical factors also influence CS use, a meta-analysis found higher rate of CS in private for profit hospitals compared with non-profit facilities, this suggest that payment models, organizational incentives, and practice culture shape utilization independent of medical risk (16). Even in public tertiary systems, similar pressures arise through staffing structures, medico legal concerns, scheduling constraints, or differential reimbursement and should be considered when interpreting changes over time.

Patient preference is another contributor, and maternal request CS has been associated with fear of labor pain, concerns about pelvic floor injury, traumatic prior birth experiences, and misconceptions about safety (3,17). In tertiary settings, counseling is more complex due to co-morbidities and prior uterine scars; structured shared decision making, consistent counseling, and access to effective labor analgesia help address requests without normalizing non indicated CS.

Quality improvement must consider the morbidity profile of procedures. Emergency CS is associated with higher maternal and neonatal adverse outcomes than elective CS, this support efforts to prevent avoidable CS while improving timing, preparedness, and escalation pathways to reduce urgent conversions when CS is necessary (4).

Literature describe several approaches to reduce unnecessary CS, guideline implementation with

audit and feedback, second-opinion policies, and educational outreach reduce CS in some settings, but effects differ and depend on implementation (6). Robson based audit and feedback has been associated with reductions in before and after studies, yet evidence quality is limited and should be evaluated locally with stronger designs where feasible (7). Continuous labor support reduces CS and increases spontaneous vaginal birth in a Cochrane review, which indicate that staffing models enabling sustained intrapartum support can be a practical lever (8). Heterogeneity in populations, definitions, and Robson reporting limits comparability; improved data quality, standardized definitions, are needed for useful evaluation (1).

Conclusion

Cesarean section rates in tertiary centers are high, mainly driven by previous CS and intrapartum factors. Using standardized monitoring, especially the Robson Ten Group Classification, improves comparability, identifies high contributing groups, and supports targeted quality improvement. Because prior cesarean increases risks in future pregnancies, reducing avoidable primary cesarean is a key factor.

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