International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Dass A et al. Int J Reprod Contracept Obstet Gynecol. 2025 Sep;14(9):3065-3070
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20252742

Original Research Article

Evaluation of caesarean deliveries using the modified Robson's classification: a prospective observational study at a tertiary care hospital

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Received: 15 July 2025
Revised: 11 August 2025
Accepted: 12 August 2025

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ABSTRACT

Background: Caesarean section (CS) is one of the most frequently performed obstetric procedures, crucial for reducing maternal and perinatal morbidity and mortality when indicated. However, rising global and national CS rates, surpassing the World Health Organization's recommended 10-15%, have raised concerns about potential overuse. The Robson Ten-Group Classification System (RTGCS) provides a standardized method for auditing and analyzing CS rates. This study aimed to determine the caesarean section rate and identify the Robson groups contributing most to CS rates at a tertiary care hospital in Himachal Pradesh.
Methods: In the Department of Gynecology and obstetrics at Dr. R.P.G.M.C., Kangra (Tanda), a prospective observational study was performed, spanning from May 1, 2024 to October 31, 2024. The study included all pregnant women at 28 weeks of gestation or more who underwent cesarean section. Participants were categorized into ten groups based on the modified Robson classification system. Real-time data collection was followed by statistical analysis using SPSS version 27. Chi-square test was applied, with $p<0.05$ considered statistically significant.
Results: Among 3755 deliveries, 1296 were caesarean sections, yielding a CS rate of 34.51%. Group 5 (previous CS, singleton, cephalic, ≥37 weeks) was the leading contributor (30.4%), followed by Group 2 (24.5%) and Group 1 (14.5%). Groups 6 and 10 contributed 7.9% and 6.9%, respectively.
Conclusions: The study highlights a high CS rate, with repeat and primary caesareans in low-risk groups as major contributors. Targeted strategies, including reducing primary CS, promoting vaginal birth after caesarean (VBAC), and adopting standardized labour management protocols, are urgently needed.

Keywords: Caesarean section, Obstetric audit, Robson classification, Vaginal birth after caesarean

INTRODUCTION

Caesarean section (CS) remains one of the most frequently performed surgical interventions in modern obstetric practice and has played a pivotal role in reducing maternal and perinatal morbidity and mortality worldwide. While the procedure is a vital, often life-saving intervention when medically indicated, an unwarranted increase in caesarean delivery rates has been observed globally over the past few decades. The World Health Organization (WHO) recommends that the ideal caesarean rate should range between 10% and 15% at the population level, as rates beyond this threshold are not associated with additional improvements in maternal and neonatal outcomes.[1] However, recent trends suggest a considerable rise in CS rates, especially in developing countries, raising serious concerns about the potential overuse of this surgical

procedure and its long-term consequences on maternal and child health.

In India, the situation mirrors the global scenario. As per the findings of the National Family Health Survey-5 (NFHS-5), the overall caesarean delivery rate in the country has increased substantially, particularly within private healthcare institutions, where it has climbed to 47.4%, while the rate in public healthcare settings remains at 14.3%.[2] This increasing trend is attributed to various factors, including changes in maternal demographics, obstetric practices, medicolegal concerns, patient preferences, and clinical decision-making patterns. Such a rise underscores the necessity for institutional and population-based audits to monitor and rationalize caesarean delivery practices.

To facilitate uniformity in assessing and comparing caesarean section rates within and across healthcare settings, the Robson Ten-Group Classification System (TGCS) was introduced by Dr. Michael Robson in 2001.[3] This system categorizes all women admitted for childbirth into ten mutually exclusive and completely inclusive groups, using five fundamental obstetric parameters: parity, history of previous caesarean section, onset of labour, gestational age, and fetal presentation. The World Health Organization (WHO) and the International Federation of Gynecology and Obstetrics (FIGO) have endorsed this classification as a global standard for evaluating and auditing caesarean section rates, as it facilitates objective comparisons and helps identify the specific groups contributing most to institutional CS rates.[4]

Several international and Indian studies have employed the Robson classification to audit CS rates and their indications. Thomas and Robson originally introduced this system to standardize caesarean audits, and subsequent studies have validated its applicability across diverse obstetric populations.[3] Torres et al in a multicentric study across Latin America, identified groups 1, 2, 5, and 10 as the major contributors to the high CS rates, a pattern echoed by Indian studies.[5] Nair et al reported that group 5 (previous CS, singleton, cephalic, term pregnancies) accounted for the largest proportion of caesarean deliveries in a South Indian tertiary hospital, followed by groups 2 and 1.[6] Similarly, Yadav et al in a study from Madhya Pradesh, documented a caesarean rate of 32%, with group 5 contributing 35% of all CSs.[7] Mishra et al also observed a caesarean rate of 40.2%, again with group 5 being the predominant contributor.[8]

Global research, including a WHO-sponsored survey by Villar et al. has emphasized that rising CS rates, especially among low-risk groups like groups 1 and 2, have not led to corresponding improvements in maternal and neonatal outcomes, suggesting possible overuse.[9] Furthermore, Sharma et al. and Chhabra et al. highlighted that private hospitals tend to report higher CS rates, often influenced by elective procedures and defensive medical practices.[10,11] In urban tertiary care centers, the increase in group 2 CS rates has been attributed to early elective interventions in nulliparous women with singleton, cephalic, term pregnancies.

Given these findings, auditing caesarean delivery rates using the Robson classification system is an essential strategy for monitoring institutional practices, identifying preventable factors contributing to rising rates, and implementing corrective measures. The consistent predominance of group 5 as a leading contributor to overall CS rates underscores the need to promote vaginal birth after caesarean (VBAC) where appropriate and reassess primary CS indications.

With this in mind, the present research was carried out at a tertiary care hospital to compute the overall caesarean section rate and to classify women into groups according to the modified Robson Ten-Group Classification System (RTGCS), contributing most to the overall caesarean section rate. The specific objectives were to calculate the overall caesarean section rate in the study institute, to determine the groups of women (as distributed by the modified Robson classification) that contributed the most to the total number of caesarean deliveries, and to analyze caesarean section rates within each individual Robson group.

METHODS

Study setting

The study was carried out in the Department of Obstetrics and Gynecology, Dr. R.P.G.M.C. Kangra at Tanda, a multispecialty tertiary healthcare facility located in the Kangra valley of Himachal Pradesh in India.

Study design

The study was hospital-based prospective observational study.

Study duration

The study was conducted from 1st May 2024 to 31st October 2024.

Inclusion criteria

All pregnant women with gestational age more than 28 weeks, admitted to the labor room/obstetrics ward decided for CS during the study period.

Exclusion criteria

Women who delivered vaginally, incomplete records, women who underwent laparotomy for ruptured uterus. All pregnant woman who delivered before 28 weeks period of gestation (POG), and women who refuse to participate in the study were excluded from the study.

Study procedure

Data were collected prospectively from the operation theatre records, labour room records, and individual patient case files using a pre-designed structured proforma. Maternal demographic details, parity, history of previous caesarean section, gestational age, number of fetuses, fetal presentation, and onset of labour (spontaneous, induced, or caesarean before labour) were recorded.

Each caesarean section case was classified into one of the ten groups of the modified Robson Ten-Group Classification System based on five obstetric parameters:

1. Parity (nulliparous or multiparous)
2. Previous caesarean section
3. Gestational age (preterm or term)
4. Onset of labour (spontaneous, induced, or caesarean before labour)
5. Fetal presentation and number (cephalic, breech, transverse/oblique; singleton or multiple).

The number and percentage of caesarean sections in each group were calculated. The contribution of each Robson group to the total number of caesarean sections was determined by dividing the number of caesarean sections in each group by the total number of caesarean sections performed during the study period, as per Robson classification principles, using institutional delivery data.

Statistical analysis

The data was collected, cleaned and entered using Microsoft Excel spreadsheet; and was analyzed in Statistical Package for Social Science (SPSS) v27 draw relevant conclusions. The observations were tabulated in the form of frequency and percentage. To find the significance Chi square test for categorical data was applied. Level of significance was assessed based on its p value with $p<0.05$ as significant.

RESULTS

The present study was conducted to apply the Robson's Ten-Group Classification System (RTGCS) to women who delivered by caesarean section at Dr. Rajendra Prasad Government Medical College (RPGMC) Kangra at Tanda, Himachal Pradesh, and to identify specific groups of women contributing most to the caesarean section rate. During the study period of six months from 1st May 2024 to 31st October 2024, a total of 3755 deliveries took place in the Department of Obstetrics and Gynecology at the institute. Out of these, 1296 women delivered by caesarean section, yielding an overall caesarean section rate of 34.51%. The mean age was 26.99 years, with most participants aged ≥27 years. The majority were rural residents (77.9%), from the lower socioeconomic class (54.4%). Nulliparous and multiparous women were nearly equal (50.8% vs 49.2%). Most deliveries occurred at term (87.1%), with 7.7% between 34-37 weeks and 5.2% preterm (<34 weeks) as shown in Table 1.

Table 1: Demographic characteristics of study participants (n=1296).

Variables	Category	Number (N)	Percentage (%)
Age group (years)	18-20	129	10.0
	21-23	232	17.9
	24-26	263	20.3
	27-29	319	24.6
	≥ 30	353	27.2
Residence	Rural	1010	77.9
	Urban	286	22.1
Socioeco-nomic status	Lower	705	54.4
	Middle	424	32.7
	Upper	167	12.9
Parity	Nulliparous	658	50.8
	Multiparous	638	49.2
Period of gestation (weeks)	<34	67	5.2
	34-37	100	7.7
	>37	1129	87.1

All 1296 caesarean section cases were classified into the ten groups of the modified Robson Ten-Group Classification System (RTGCS). The highest proportion of caesarean deliveries was contributed by Group 5 (previous caesarean section, singleton, cephalic, ≥37 weeks), accounting for 30.4% (n=395) of all caesarean sections. This was followed by Group 2 (nulliparous, singleton, cephalic, ≥37 weeks, induced labour or CS before labour), which contributed 24.5% (n=318), and Group 1 (all Nullipara, singleton cephalic, ≥ 37 weeks, spontaneous labour) contributing 14.5% (n=188). Other notable contributors included Group 6 (All nulliparous breeches) accounting for 7.9% (n=103) and Group 10 (All singleton cephalic, ≤ 36 weeks including previous Caesarean section) at 6.9% (n=90). The remaining groups contributed less significantly to the overall caesarean section rate as shown in Table 2.

Table 2: Distribution of caesarean sections according to modified Robson Ten-Group Classification System (RTGCS) (n=1296).

Robson group	Group description	Sub group	Number of CS	Total CS	Percentage (%)
Group - 1	Nullipara, singleton cephalic, ≥ 37 weeks, spontaneous labour	1	188	188	14.5
Group - 2	Nullipara, singleton	2a	288	318	24.5

Continued.

Robson group	Group description	Sub group	Number of CS	Total CS	Percentage (%)
	cephalic, ≥ 37 weeks Induced labour	2b	30		
Group – 3	Multipara, singleton cephalic, ≥ 37 weeks, spontaneous labour	3	51	51	3.9
Group – 4	Multipara, singleton cephalic, ≥ 37 weeks Induced labour	4a	46	59	4.5
		4b	13		
Group – 5	Previous Caesarean section, singleton cephalic, ≥ 37 weeks	5a	68	395	30.4
		5b	79		
		5c	248		
Group – 6	All nulliparous breeches	6a	13	103	7.9
		6b	0		
		6c	90		
Group – 7	All multiparous breeches (including previous Caesarean section)	7a	19	64	4.9
		7b	0		
		7c	45		
Group – 8	All multiple pregnancies (Including previous Caesarean section)	8a	5	20	1.5
		8b	0		
		8c	15		
Group – 9	All abnormal lies (Including previous Caesarean section but excluding breech)	9a	0	8	0.6
		9b	0		
		9c	8		
Group – 10	All singleton cephalic, ≤ 36 weeks (including previous Caesarean section)	10a	20	90	6.94
		10b	32		
		10c	38		
Total		1296			

These findings indicate that repeat caesarean sections (Group 5) and primary caesareans in nulliparous women (Groups 1 and 2) formed the bulk of the caesarean deliveries in this tertiary care hospital.

DISCUSSION

In the present study, we employed the modified Robson Ten-Group Classification System (RTGCS) to audit caesarean section (CS) rates at a tertiary care teaching hospital in Himachal Pradesh over a six-month period. The overall caesarean section rate was observed to be 34.51%, considerably exceeding the World Health Organization's recommended range of 10-15% at the population level.[1] This finding is consistent with trends reported both nationally and globally, reflecting a continuing rise in caesarean delivery rates, particularly in tertiary care and referral hospitals.[2]

The highest contributor to the overall caesarean section rate in our study was Group 5 (previous caesarean section, singleton, cephalic, ≥37 weeks), accounting for 30.4% of all caesarean deliveries. This pattern mirrors observations from multiple Indian and international studies where Group 5 has consistently emerged as the predominant contributor to institutional CS rates. For instance, Nair et al reported Group 5 to contribute 36% of all caesarean sections in a South Indian tertiary hospital.[6Error! Bookmark not defined.] while Mishra et al. observed a contribution of 38.5% in their study.[8] The consistently high rate in this group underscores the long-term implications of rising primary caesarean rates and the need for promoting trial of labour after caesarean (TOLAC) in carefully selected cases, as per established clinical guidelines.[12]

Group 2 (nulliparous, singleton, cephalic, ≥37 weeks, induced labour or caesarean before labour) was the second-largest contributor, responsible for 24.5% of the caesarean sections. Similar findings have been documented in several Indian studies.[6,10] The increase in caesarean deliveries within this group has been attributed to several factors, including early elective interventions, suboptimal labour monitoring, medico-legal concerns, and a growing tendency towards defensive obstetric practices.[11] Moreover, a global survey conducted by Villar et al. emphasized that rising caesarean rates among low-risk groups like Groups 1 and 2 did not translate into commensurate improvements in maternal and neonatal outcomes.[9]This calls for cautious case selection for labour induction, strict adherence to standardized protocols for induction and augmentation, and promoting vaginal delivery in nulliparous women with favorable obstetric profiles.

Group 1, comprising nulliparous women with a singleton, cephalic fetus at ≥37 weeks of gestation in spontaneous labour, accounted for 14.5% of the total caesarean section rate. Although lower than Group 5 and Group 2, this is still a concerning finding since this group typically represents low-risk pregnancies where the caesarean section rate

should ideally remain minimal. Studies by Yadav et al and Thomas et al have also identified rising CS rates in Group 1, often linked to non-reassuring fetal status, failed labour progress, and increasing patient and provider preferences for surgical delivery.[7,13] Addressing modifiable factors such as appropriate use of partographic labour monitoring, timely intervention for dysfunctional labour, and offering continuous intrapartum support may help reduce unnecessary caesareans in this group.[14]

Group 6 (nulliparous breeches) and Group 10 (all singleton cephalic ≤36 weeks, including previous caesarean section) were other notable contributors in our study, accounting for 7.9% and 6.9% of caesarean deliveries, respectively. The high rate in Group 6 reflects the prevailing trend towards elective caesarean delivery for breech presentation following the results of the Term Breech Trial, which demonstrated better outcomes associated with elective caesarean section for breech presentations at term.[15] However, some recent reviews have suggested that with adequate case selection and skilled obstetric care, vaginal breech delivery can remain a viable option in selected cases.[16] Similarly, preterm deliveries in Group 10 pose unique challenges due to associated fetal and maternal risks, often necessitating caesarean delivery. Nonetheless, optimizing antenatal care, timely identification of risk factors, and strengthening neonatal support services could improve outcomes and potentially reduce surgical interventions in preterm cases.[17]

Our findings reaffirm the value of the Robson classification system as a reliable audit tool for pinpointing specific groups requiring targeted interventions. The consistent predominance of Group 5 highlights the importance of reducing primary caesarean rates and encouraging VBAC where feasible. Additionally, the substantial contributions from Groups 2 and 1 call for stricter labour management protocols, cautious induction practices, and strategies to address non-medical determinants of caesarean delivery.

The major strength of this study lies in its prospective design and comprehensive application of the internationally endorsed Robson classification system, ensuring complete and unbiased capture of data. However, it is limited by being a single-center study, thereby restricting the generalizability of results to other settings with differing patient profiles and clinical practices. Moreover, maternal and neonatal outcomes post-caesarean were not evaluated, which would have provided additional insights into the clinical appropriateness of caesarean deliveries.

CONCLUSION

The present study highlights a notably high caesarean section rate of 34.51% at a tertiary care hospital in Himachal Pradesh, significantly exceeding the WHO-recommended threshold. Application of the modified Robson Ten-Group Classification System effectively identified Group 5 (previous caesarean section, singleton, cephalic, ≥37 weeks) as the leading contributor to caesarean deliveries, followed by Groups 2 and 1, involving nulliparous women at term. These findings mirror national and global trends and emphasize the long-term impact of rising primary caesarean rates, particularly on future obstetric care.

The study underscores the urgent need for targeted strategies to reduce primary caesarean sections, promote vaginal birth after caesarean (VBAC) in appropriate candidates, and implement evidence-based, standardized labour management protocols. Strengthening the audit process through routine application of the Robson classification can serve as an effective tool for monitoring institutional practices, rationalizing clinical decisions, and ultimately improving maternal and neonatal outcomes. Multicentric studies and inclusion of maternal and neonatal outcome data in future research are recommended to enhance the generalizability and clinical utility of such audits.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Protocol Review Committee (PRC) vide letter no. HFW-H(DRPGMC)PRC/2023-160 Dated: 26/12/2023, and Institutional Ethics Committee (IEC) vide letter no. HFW-H DRPGMC/ETHICS/2024/41 Dated: 03/04/2024

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Cite this article as: Dass A, Gupta A, Chauhan V, Sharma S. Evaluation of caesarean deliveries using the modified Robson's classification: a prospective observational study at a tertiary care hospital. Int J Reprod Contracept Obstet Gynecol 2025;14:3065-70.