GMR
The Original

EVALUATION OF C-SECTION TRENDS USING ROBSONS TEN GROUP CLASSIFICATION SYSTEM

Dr Syeda Fatima Mohsin[1], Prof Haleema Yasmin[2], Dr Arifa Tabasum[1], Dr Hareem Riaz[3], Mr M Nizamuddin[4], Dr Bisma[1]

[1] Postgraduate Trainee, Department of Obstetrics & Gynecology, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan.
[2] Professor and Head of Department / Dean, Department of Obstetrics & Gynecology, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan.
[3] Clinical Attachment, Ward 8, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan.
[4] Biostatistician, Health RAB Clinical Research Centre, Jinnah Postgraduate Medical Centre (JPMC), Karachi, Pakistan.
*Corresponding Author: Dr Syeda Fatima Mohsin, Email: Fatimamohsin45@gmail.com

ABSTRACT
Objective: To evaluate cesarean section trends using the Robson Ten Group Classification System.
Study Design and Setting: This cross-sectional study was conducted in Ward 8, Jinnah Postgraduate Medical Centre, from 1st July to 31st December 2025.
Methodology: In total, 160 women undergoing cesarean section with gestational age of 24 weeks or more were included using calculated OpenEpi used for sample size calculation. Data was collected after signing an informed consent from hospital records, including maternal demographics, obstetric characteristics, and neonatal outcomes. The participants were divided into groups according to Robson's Ten Group Classification System that depended on parity (whether or not they had had a previous c-section), onset of labor, fetal presentation (that is posterior or anterior), gestational age and plurality (i.e. singleton or multiple birth).
Results: The mean maternal age was 29.5 years and mean gestational age was 38 weeks. Most women were multiparous (71.3%), with 58.8% having a prior cesarean section. The majority (67.5%) underwent cesarean delivery without labor onset. Robson Group 5 (previous cesarean, single cephalic ≥37 weeks) contributed the highest proportion (42.5%), followed by Group 10 (preterm cephalic) at 17.5% and Group 2 at 11.3%. The most frequent indications included previous cesarean section with fetal compromise, fetal distress, and obstetric complications such as placental abnormalities and malpresentation.
Conclusion: The fifth group is still the leading contributor to cesarean rates, exposing the impact of repeat cesarean sections. Policies which encourage vaginal delivery after the previous cesarean section and right labor management can help reduce unnecessary C-Sections.

KEYWORDS: Cesarean Section; Classification; Labor, Obstetric; Obstetrics; Pregnancy Outcome.

INTRODUCTION:

During the last several decades, the incidence of cesarean sections (CS) has become a worrisome trend all over the world. [1] Prevention of CS can endanger the life of the mother and the fetus in cases of non-feasibility and contraindication of spontaneous vaginal delivery (SVD). CSs are also performed without clear reasons or with unclear signs, like obstructed labor, intact membrane leads to risks of current and future pregnancies, as well as childbirth (CSs) also has the most frequent short- and long-term outcomes. [2]

To achieve the monitoring, evaluation, and optimization of the CS rate in a consistent manner, worldwide health regulatory bodies suggest using the Ten Group categorization method of women instead of indications-based or urgency-based methods. [3] On the basis of the evaluation, there is a need to adopt the Ten Group Classification System (RTGCS) developed by Robson to be used both domestically and internationally. Later, international health regulatory organizations, such as WHO in 2014 and FIGO in 2016, proposed that RTGCS should be used as a global standard of the assessment, monitoring, and optimization of the CS rate in a standard fashion as well as of the comparison of CS rates across and within health facilities over time. [4-5]

The Robson 10-group categorization system was developed by Michael Robson in 2001 and is currently a popular method of analysis of CS rates. [6] Based on important obstetric factors, such as number of parities, prior CS, beginning of labor, number of fetuses, gestational age, and fetal presentation, this method divides CSs into ten different classes. [7] To analyze contributions to the total CS rate, each group is represented. To reduce unnecessary CSs, healthcare

systems can focus on reducing clinical practices, training more staff, and enhancing clinical practices by focusing on specific population groups that have higher-than-average CS rates. This will ultimately guarantee improved results in expectant mothers and infants, a history of previous C-section, old age, defensive medicine, and technological advances, have been suggested to be the cause of high rate of CS. [8]

RTGCS provides a framework of CS rates monitoring and evaluation. It is based on four obstetric concepts: gestational age, the course of pregnancy, previous obstetric history, and the type of the pregnancy. On this, women are classified into ten groups. Since the process of classification is both inclusive and mutually exclusive, all women are classified under one group. The main strengths of the Robson classification are that it is easy to design, its purpose is valid, its design is easily implemented and its initial interpretation is straightforward. [9] In a study done by Rashida perveen et al. it was found that, Torloni MR et al. had done a systematic review comparing various classifications of CS and came to the conclusion that Robson 10 Groups classification was the best in monitoring CS. [10]

The aim of the current study is to establish the general rate of cesarean sections, the groups of women who made the highest contribution to the overall rate (using the ten-group classification method by Robson), and the rates of cesarean sections in groups in our institution. [11] The Robson Ten Group Classification System has been extensively employed, even in regional analysis in Pakistan, to provide a systematic analysis of trends in cesarean section (CS). Nonetheless, institutional practices differ, which would require center-specific analysis to get a clearer picture of local factors that increase CS rates. [12]

To this end, the current study applies the Robson classification in our department to determine the major obstetric groups with regard to the overall CS rate. This will help to develop evidence-based interventions that are targeted and develop strategies that will optimize the use of CS. In addition, this project aims to help build a systematic and similar database of CS rates in Pakistan, which can be used to compare rates across institutions and help the country to enhance its maternal and perinatal outcomes.

METHODOLOGY

During 1st July 2025 and 31st December 2025.This cross-sectional study was carried out in Ward 8, Department of Gynecology and Obstetrics at Karachi. The investigation took six months to complete from 1st July 2025 until 31st December 2025. This work was authorized by the IRB of JPMC, Karachi (Ref No. F.2-81/2026-GENL/35/JPMC). A total of 160 persons participated in the study. We used OpenEpi (Version 3) to determine the sample size. The assumptions of this calculation were that the population size is 1000, the possible frequency of occurrence is 14.4%, the margin of error is 5% and Benjamin-Gould design effect 1. [11]

All pregnant women aged more than 24 weeks' gestation who underwent cesarean section during the study period were included. Women who underwent laparotomy for uterine rupture, incomplete records, or those with a gestational age less than 24 weeks were excluded. Data were collected retrospectively from hospital records using a structured proforma after ensuring confidentiality. Variables recorded included mother's age, parity, gestational age at delivery, onset of labor (spontaneous, induced, or no labor), fetal presentation, number of fetuses, previous cesarean section history, and neonatal outcomes.

All patients were classified as per Robson's Ten Group Classification System based on parity, previous cesarean section, onset of labor, fetal presentation, gestational age, and plurality-l so as to have in itself standalone, mutually exclusive and comprehensive categories.

SPSS software (version 26) was used to enter and analyze the data. Quantitative variables were presented as mean ± standard deviation or median with interquartile range based on distribution, while qualitative variables were expressed as frequencies and percentages. Stratification was performed where needed; results were tabulated.

RESULTS

The mean maternal age of the study population was 29.5 (IQR 2433), and mean gestational age was 38 (IQR 3739), which suggests that the study population was mainly term.t. The average birth weight was found to be 3.0 kg (IQR 2.6345) which is normal distribution in birth weight. The majority of the respondents were multiparous (71.3% n=114), with the nulliparous women making up 28.8 percent (n=46). In 58.8% (n=94) cases, there was a history of a previous cesarean section.

In terms of the start of labor, most women did not have labor before delivery (67.5%, n=108), 16.9% (n=27) experienced induced labor and 15.6% (n=25) experienced spontaneous labor. The cephalic (86.3% n=138) presentation was most predominant. APGAR scores conducted to determine neonatal outcomes showed 93.8% (n=150) of neonatal outcomes had reassuring or normal scores.

When categorized using the Robson ten-group classification system, the highest percentage of cases was in Group 5 (previous cesarean section, single cephalic, ≥37 weeks), 42.5% (n=68) of the cases. This was followed by Group 10 (single cephalic, <37 weeks) at 17.5% (n=28). Group 2 was nulliparous women who had induced labor or pre-labor cesarean section (11.3% n=18) and Group 1 consisted of nulliparous women who had spontaneous labor (7.5% n=12). The contribution of breech presentations was 5.6 (n=9) and 4.4 (n=7), respectively, in nulliparous and multiparous

women. Women who had never undergone cesarean section and were multiparous constituted 3.8 (n=6) and 5.6 (n=9) in spontaneous labor (Group 3) and induced or pre-labor cesarean deliveries (Group 4), respectively. There were multiple pregnancies (1.3% n=2), abnormal lie (0.6% n=1). (Table 1)

Table 1: Robson parameter and Groups

Robson parameter and Groups		
Age (years)		29.5 (24-33)
Gestational age (Months)		38 (37-39)
Birthweight kg		3 (2.6-3.45)
Parity	Multiparous	114 (71.3)
	Nulliparous	46 (28.8)
History of previous CS	Yes	94 (58.8)
	No	66 (41.3)
Onset of labor	Nil	108 (67.5)
	induced labour	27 (16.9)
	spontaneous labour	25 (15.6)
Fetal Presentation	Cephalic	138 (86.3)
	Breech	16 (10)
	Other	6 (3.8)
APGAR SCORE	absent vital signs	4 (2.5)
	very poor	0 (0)
	moderately depressed	6 (3.8)
	reassuring/normal	150 (93.8)
Robsons	Nulliparous, single, cephalic, >/=37 weeks, spontaneous labour.	12 (7.5)
	Nulliparous, single cephalic, >/=37 weeks, induced or CS before labour.	18 (11.3)
	Multiparous (excluding previous CS), single cephalic, >/=37 weeks, spontaneous labour	6 (3.8)
	Multiparous (excluding previous CS), single cephalic, >/= 37 weeks, induced or CS before labour.	9 (5.6)
	Previous CS, single cephalic, >/=37 weeks.	68 (42.5)
	Nulliparous, breech	9 (5.6)
	Multiparous, breech.	7 (4.4)
	All multiple (twins/triplets etc) pregnancies.	2 (1.3)
	Abnormal lie (transverse/oblique)	1 (0.6)
	Single cephalic, < 37 weeks (preterm)	28 (17.5)

Signs of cesarean section in this sample were heterogenous and the signs covered a wide range of maternal, fetal, and obstetric factors. The most common single indication was previous one cesarean section with ST positivity (12.5%, n=20), previous two cesarean section with ST positivity (9.4%, n=15). Another most common sign was fetal distress, both as a stand-alone (6.3%, n=10) and a comorbidity with other clinical disorders. Other cases involved fetal distress with grade III meconium-colored liquor, placental abruption and lack of progress of labor.

The most commonly reported in this cohort was a repeat cesarean section especially in cases where the fetus is suspected of being compromised. Acute intrapartum issues, such as fetal distress and obstetric crises, and malpresentation and placental anomalies also played a significant role. These results emphasize the multifactorially of decision-making in cesarean delivery, and the focus on maximizing maternal and fetal outcomes (Table 2).

Table 2: Indications of C-Section

Indications Of C-Section:	**N (%)**
1 C/S With Breech	2 (1.3)
Absent Diastolic Flow	1 (0.6)
Aph With Abruption	1 (0.6)
Aph With Fetal Distress	1 (0.6)
Breech Presentation	7 (4.4)
Breech Presentation In Labour	3 (1.9)
Breech Presentation With Nill Liquor	3 (1.9)
Brow Presentation	1 (0.6)
Cord Preolapse	1 (0.6)
Cord Prolapse	1 (0.6)
Failed Induction	2 (1.3)
Failed Induction	1 (0.6)
Failed Induction Of Labour	2 (1.3)
Fetal Bradycardia With Placental Abruption	3 (1.9)
Fetal Distress	4 (2.5)
Fetal Distress	10 (6.3)
Fetal Distress With Grade 3 Liquor	3 (1.9)
Fetal Distress Grade 3 Liqor	3 (1.9)
Grade 3 Liqor	1 (0.6)
Grade 3 Liquor	1 (0.6)
Grade 3 Liquor+Fetal Distress	2 (1.3)
Hand Presentation	3 (1.9)
Npol+Fetal Distress	2 (1.3)
Placenta Accreta With Aph	1 (0.6)
Placenta Previa With Aph	4 (2.5)
Placental Abruption With Fetal Distress	1 (0.6)
Precisios Pregnancy	1 (0.6)
Previous 1 C/S At 39 Wks	3 (1.9)
Previous 1 C/S At Term	3 (1.9)
Previous 1 C/S In Labour	1 (0.6)
Previous 1 C/S With Breech Presentation	1 (0.6)
Previous 1 C/S With Drainage Of Liqor	5 (3.1)
Previous 1 C/S With Hydroceph	1 (0.6)

Previous 1 C/S With Impending Rupture	2 (1.3)
Previous 1 C/S With St Positive	20 (12.5)
Previous 1 C/S With St Positive +Polyhydramnios	2 (1.3)
Previous 1 C/S With St Positive+Sga	2 (1.3)
Previous 1c/S With St Positive	2 (1.3)
Previous 2 C/S At Term	2 (1.3)
Previous 2 C/S In Labour	2 (1.3)
Previous 2 C/S With Fetal Distress	2 (1.3)
Previous 2 C/S With Iud Fetus	4 (2.5)
Previous 2 C/S With Placenta Accreta	3 (1.9)
Previous 2 C/S With St Positive	15 (9.4)
Previous 3 C/S With Iugr	1 (0.6)
Previous 3 C/S With Placenta Accreta	1 (0.6)
Previous 3 C/S With Placenta Percreta	1 (0.6)
Previous 3 C/S With Reduced Fetal Movements	3 (1.9)
Previous 3 C/S With St Positive	3 (1.9)
Previous 3c/S With Reduced Fm	1 (0.6)
Previous 3c/S With St Positive	1 (0.6)
Previous 4 C/S In Labour	2 (1.3)
Primigravida With Leading Breach Twin	1 (0.6)
Scanty Liquor	2 (1.3)
Severe Iugr	3 (1.9)
Severe Pre-Eclampsia With Iugr	2 (1.3)
Severe Pre-Eclampsia With Iugr	1 (0.6)
Severe Pre-Eclampsia With Previous 1 C/S + Iugr	2 (1.3)
Twin With Leading Breech	1 (0.6)

DISCUSSION

The research population was mostly composed of women who are of normal reproductive age and whose newborns have normal birth weights meaning that there was no extreme impact of prematurity or abnormal fetal development on the obstetric cohort. There was a high rate of multiparity and most of the participants had a previous cesarean section which had a major impact on the delivery patterns. The fact that a large part of the cases was not followed by labor implies that they used the planned cesarean births. The majority of the fetuses were in cephalic position, and the number of malpresentations was less but still clinically significant. The overall neonatal outcomes were good with the majority of newborns recording good APGAR results and few cases of adverse outcomes. [13]

The Robson classification revealed that Group 5 (a prior cesarean section, single cephalic, term pregnancy) was the highest proportion of cases and that there was a cumulative effect of previous cesarean deliveries on the contemporary obstetric practice. Other groups did not make a significant contribution, such as nulliparous, multiparous women, spontaneous or induced labor, preterm, and malpresentation. [14]

The distribution of Robson groups to determine the obstetric practices and cesarean section (CS) trends are based on the World Health Organization (WHO) recommendations. Group 9 WHO recommendations advocate that group 9 should be less than 1% size in this study group 9 size is 0.6. [15] Another study has reported similar size of 0.88%, [16] whereas studies from Indonesia have reported slightly higher group sizes.

The total group size of 1 and in our work was lower than the recommendations of 35-42 mentioned by the WHO. In a study, Groups 1 and 2 (28.6) size was also smaller, [17] probably because of a larger percentage of multiparous women. But, our study Groups 3 and 4 (9.4%) also fell short of the recommended 30, another study has also had the same size of Group 3 and 4 (21.1) coinciding with a higher Group 5 size (42.5%) in our study. This is significantly higher than the WHO-suggested 7.2 percent, [15] which indicates a consistently high primary CS rates in previous years. Otherwise, an additional study has found a higher size of group 5 (25%). [16] Indonesian and Nigerian study indicated the high

number of group 5, [17-18] In another Turkish study, group 5 was found to have over a quarter CS. [19] Most CS have been reported in group 5 in a study conducted in USA and Brazil. [20-21]
A turkey study has reported group 3 as the biggest group of CS, and Group 5 as the second greatest contributor of CS. [22]

Group 6 and 7 in this study had a size of 10% as compared to the WHO recommendation of 3-4%. A study reported lower size (2.28%) as well. [16] In this study, Group 8 size 1.3% were slightly below recommended ranges (1.5-2%), similarly another study has reported a size of (1.40%). Group 10 (17.5) was significantly greater than the recommended less than five percent [15] probably because of the tertiary care environment that dealt with a significant number of preterm and high-risk pregnancies. The results are comparable to those in another study (group 10 size 20.07%). [16]
The most frequent indication of cesarean delivery was a previous cesarean section, particularly when it was accompanied with a suspected fetal compromise. In our research, Multiparous women who had a previous cesarean section (Group 5) and nulliparous women undergoing induction or pre-labor CS (Group 2) made up more than half the CS population compared to studies where it made about 1/4 of the CS, but made up almost half of all CS. [23,24]. The high contribution of Group 5 indicates low levels of vaginal births following the uptake of CS (VBAC); VBAC is usually provided following a single previous CS, whereas repeat CS is the preferred choice in case of multiple scars or contraindications, [24]
Nulliparous women with single, cephalic presentation at term who had induction of labour or pre-labour CS (Robson group 2) had the second largest contribution to the total CSs in this study. Group 1 Group 2 Group 3 Group 4 Our study had 27% in Groups 1–4 as per the Robson classification. But in study it is reported 58.4% of all cesarean sections. This is higher than the World Health Organization reference values which indicate that almost two-thirds of women in these categories must deliver vaginally. [25]

Limitations of Study:

The research enjoys the advantages of the use of a standardized classification system and the presence of key clinical variables, which help to establish internal consistency and interpretability. Nevertheless, the observational design, lack of specific clinical parameters, lack of long-term follow-up, and possible limitations to generalizability because of the single-center environment are its limitations. Data precision can also be interfered by variability in documentation of indications.

CONCLUSION

Overall, the results show that repeat cesarean section and fetal distress are the two main factors that led to cesarean delivery in this cohort. The prevalence of Robson Group 5 emphasizes the need to use strategies that would lead to lower cesarean rates during the primary csection. In spite of these trends, neonatal outcomes were overall positive, indicating that there was proper clinical management in the research environment.

REFERENCES

1. Betran AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in cesarean section rates: global, regional and national estimates: 1990–2014. *PLoS One*. 2016;11:e0148343. doi:10.1371/journal.pone.0148343
2. Ye J, Zhang J, Mikolajczyk R, Torloni MR, Gülmezoglu AM, Betran AP. Association between rates of cesarean section and maternal and neonatal mortality in the 21st century: a worldwide population-based ecological study with longitudinal data. *BJOG*. 2016;123(5):745–753. doi:10.1111/1471-0528.13592
3. Torloni MR, Betran AP, Souza JP, Widmer M, Allen T, Gülmezoglu AM, et al. Classifications for cesarean section: a systematic review. *PLoS One*. 2011;6:e14566. doi:10.1371/journal.pone.0014566
4. Mumtaz S, Bahk J, Khang YH. Rising trends and inequalities in cesarean section rates in Pakistan: evidence from PDHS 1990–2013. *PLoS One*. 2017;12(10):e0186563. doi:10.1371/journal.pone.0186563
5. Richards C, Black M. Short and long-term maternal and neonatal outcomes of cesarean section. In: Pelvic floor, perineal, and anal sphincter trauma during childbirth. Cham: Springer; 2024. p. 89–104. doi:10.1007/978-3-031-51310-7_6
6. Opiyo N, Bellizzi S, Torloni MR, Souza JP, Betran AP. Association between prelabour cesarean section and perinatal outcomes. *BMJ Open*. 2022;12(1):e053049. doi:10.1136/bmjopen-2021-053049
7. World Health Organization. WHO statement on cesarean section rates. *Reprod Health Matters*. 2015;23(45):149–150. doi:10.1016/j.rhm.2015.07.007
8. Visser GH, Ayres-de-Campos D, Barnea ER, de Bernis L, Di Renzo GC, Vidarte MF, et al. FIGO position paper: how to stop the cesarean section epidemic. *Lancet*. 2018;392(10155):1286–1287. doi:10.1016/S0140-6736(18)32113-5
9. Jamwal D, Sharma P, Mehta A, Pannu JS. Analysis of cesarean sections using Robson classification system. *Int J Reprod Contracept Obstet Gynecol*. 2021;10(6):2281–2286. doi:10.18203/2320-1770.ijrcog20212231

10. World Health Organization. Robson classification: implementation manual. Geneva: WHO; 2017. (No DOI available)
11. Tanaka K, Mahomed K. The Ten-Group Robson Classification. *Obstet Gynecol Int*. 2017;2017:5648938. doi:10.1155/2017/5648938
12. Senanayake H, Piccoli M, Valente EP, Businelli C, Mohamed R, Fernando R, et al. Implementation of WHO manual for Robson classification. *BMJ Open*. 2019;9(2):e027317. doi:10.1136/bmjopen-2018-027317
13. Guner G, Yeniocak AS. Robson classification system: experience from Türkiye. *BMC Pregnancy Childbirth*. 2025;25:674. doi:10.1186/s12884-025-07815-7
14. Imtiaz R, Husain S, Izhar R. Adoption of Robson classification in Pakistan. *Ann Abbasi Shaheed Hosp Kar Med Dent Coll*. 2018;23(1):46–52. (No DOI available)
15. Hasnain S, Ambreen A, Kashmiri MJ, Sadaf SS. Robson classification in tertiary hospital Lahore. *J Soc Obstet Gynaecol Pak*. 2025;15(2):103–108. (No DOI available)
16. Khan MA, Sohail I, Habib M. Auditing cesarean section rate using Robson classification. *Prof Med J*. 2020;27(4):700–706. doi:10.29309/TPMJ/2020.27.04.3633
17. Nazeer S, Rehman M, Khan S, Sadiq S, Bano K. Assessment using Robson classification system. *J Ayub Med Coll Abbottabad*. 2023;35(2):275–279. (No DOI available)
18. Ulgu MM, Birinci S, Ensari TA, Gözükara MG. Cesarean section rates in Turkey 2018–2023. *Turk J Obstet Gynecol*. 2023;20(3):191–197. doi:10.4274/tjod.galenos.2023.38333
19. Hehir MP, Ananth CV, Siddiq Z, Flood K, Friedman AM, D'Alton ME. Cesarean delivery in the United States. *Am J Obstet Gynecol*. 2018;219:105.e1–11. doi:10.1016/j.ajog.2018.04.012
20. Rudey EL, Leal MC, Rego G. Cesarean section rates in Brazil. *Medicine (Baltimore)*. 2020;99:e19880. doi:10.1097/MD.0000000000019880
21. Akadri AA, Imaralu JO, Salami OF, Nwankpa CC, Adepoju AA. Robson classification in Nigeria. *BMC Pregnancy Childbirth*. 2023;23:243. doi:10.1186/s12884-023-05574-5
22. Bolognani CV, Reis LBSM, Dias A, Calderon IMP. Robson classification in Brazil. *PLoS One*. 2018;13(2):e0192997. doi:10.1371/journal.pone.0192997
23. Strambi N, Sorbi F, Bartolini GM, Forconi C, Sisti G, Seravalli V, et al. Non-clinical variables influencing cesarean rates. *Medicina (Kaunas)*. 2020;56(4):180. doi:10.3390/medicina56040180
24. Gardner K, Henry A, Thou S, Davis G, Miller T. Improving VBAC rates. *Aust N Z J Obstet Gynaecol*. 2014;54(4):327–332. doi:10.1111/ajo.12229
25. Souza JP, Betran AP, Dumont A, de Mucio B, Gibbs Pickens CM, Deneux-Tharaux C, et al. C-Model for cesarean rates. *BJOG*. 2016;123:427–436. doi:10.1111/1471-0528.13509