

## ANALYSIS OF CAESAREAN SECTION USING ROBSON TEN GROUP CLASSIFICATION SYSTEM AT MADHESH INSTITUTE OF HEALTH SCIENCES

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### CITATION

Mahato RD, Karki S, Issar CR, Subedi S, Analysis of Caesarean Section Using Robson Ten Group Classification System at Madhesh Institute of Health Sciences, MJEN. 2025 December;4(2); (16-20)

### ABSTRACT

#### Background

Caesarean section (CS) is one of the most commonly performed and lifesaving surgical procedures in modern obstetrics. The World Health Organization (WHO) recommends the Robson Ten Group Classification System (TGCS) as a global standard for evaluating, monitoring, and comparing CS rates across healthcare institutions. This study was conducted to assess the rate of caesarean deliveries and to analyze their distribution using the Robson classification system at the Madhesh Institute of Health Sciences (MIHS), Janakpur, Nepal.

#### Methods:

This hospital-based, descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynecology at MIHS. All women who underwent caesarean deliveries between February 17, 2024, and February 16, 2025, were classified into Robson groups. The study calculated the relative size of each group, its contribution to the overall CS rate, and the CS rate within each group.

#### Results:

Out of 7,059 total deliveries, the overall caesarean section rate was 22.70%. Robson Group 5 (31.1%) multiparous women with at least one previous CS, a singleton pregnancy, and a cephalic presentation at term was the highest contributor to the overall CS rate. This was followed by Group 1 (22.5%) nulliparous women with singleton, term, cephalic pregnancies in spontaneous labor.

#### Conclusion:

Women with a previous caesarean section (Robson Group 5) represent the largest contributor to the overall CS rate. Promoting trial of labor after one previous caesarean and reducing primary caesarean deliveries may help in lowering the overall caesarean section rate.

**Keywords:** *Cesarean Section, Female, Labor, Induced, Pregnancy*



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#### ARTICLE INFO:

Received Date: 7<sup>th</sup> May 2025

Accept Date: 2<sup>nd</sup> September 2025

Published Date: 29<sup>th</sup> December 2025

## INTRODUCTION

**Caesarean section (CS)** is the most commonly performed surgical procedure in obstetric practice. It is a life-saving intervention for both the mother and the baby when complications occur during pregnancy or labor [1]. According to the World Health Organization (WHO), CS rates above 10–15% are not medically justified in any region [1]. However, over the past two decades, global CS rates have increased from 20% to 28% [2]. Unnecessary use of CS can harm maternal and child health, while inadequate access reflected in CS rates below 10%—can also lead to preventable maternal and fetal morbidity and mortality [3]. CS can result in various short-term and long-term health complications for both the mother and the baby [4]. In Nepal, the CS rate is steadily rising, with marked disparities between urban and rural regions, as well as between public and private healthcare facilities. In 2016, the overall caesarean section rate in Nepal was significantly lower in rural areas (7.1%) compared to urban areas (19%) [5]. To address maternal health issues, the Government of Nepal has implemented safe motherhood programs, including free institutional delivery services and transport incentives, which have contributed to an increase in institutional births from 10% in 1996 to 80% in 2022 [6]. Although CS can be essential in saving lives, its overuse may lead to serious and sometimes permanent complications, including maternal death, disability, psychological issues such as depression, and increased healthcare costs [7-9]. A key challenge in monitoring and understanding the rise in CS rates globally, is the absence of a standardized, internationally accepted classification system [10-12].

To address this, Robson introduced the **Ten-Group Classification System**, [13] which facilitates a comprehensive analysis of CS rates based on specific obstetric characteristics. (Table 1) These include:

1. Singleton or multiple pregnancy
2. Parity (nulliparous, multiparous, or with previous CS)
3. Fetal presentation (cephalic, breech, or other malpresentation)
4. Onset of labor (spontaneous or induced)
5. Gestational age (term or preterm)

**Table 1: Robson' 10-Group Classification.**

No.	Groups
1	Nulliparous, single cephalic, >37 weeks in spontaneous Labor
2	Nulliparous, single cephalic, >37 weeks, induced or CS before labor
3	Multiparous (excluding previous CS), single cephalic, >37 weeks in spontaneous labor
4	Multiparous (excluding previous CS), single cephalic, >37 weeks, induced or CS before labor
5	Previous CS, single cephalic, >37 weeks
6	All nulliparous breeches
7	All multiparous breeches (including previous CS)
8	All multiple pregnancies (including previous CS)
9	All abnormal lies (including previous CS)
10	All single cephalic, <37 weeks (including previous CS)

In 2015, the World Health Organization (WHO) recommended the Robson classification as a global standard tool for assessing, monitoring, and comparing cesarean section rates across healthcare facilities and countries [14,15].

The objective of this study was to assess the rate of cesarean sections, identify the contributing factors and indications leading to the overall CS rate, and explore strategies to reduce CS rates in the future at Madhesh Institute of Health Sciences (MIHS), Janakpur, Nepal.

## METHODS

This descriptive hospital-based cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Madhesh Institute of Health Sciences (MIHS), Janakpur, from 17th February 2024 to 16th February 2025, after obtaining ethical approval from the NHRC (Ref No. 1335). All pregnant women admitted for delivery in the Department of Obstetrics and Gynaecology at MIHS were enrolled in the study. Pregnancies resulting in previable deliveries before 28 weeks of gestation were excluded. Data were collected based on the flow chart for the classification of women according to the Robson Ten-Group Classification System. A convenient sampling technique was used. Demographic profiles and obstetric parameters of the participants were documented after obtaining informed written consent. Information was gathered through face-to-face interviews, ultrasonography reports, and operation theatre notes, and recorded in a predesigned proforma. The collected data were entered into Microsoft Excel and analyzed using SPSS version 23. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data.

## RESULTS

During the one-year study period, a total of 7,059 deliveries were conducted, of which 1,603 were caesarean sections. The caesarean section rate was 22.70%. The mean age of the patients included in the study was  $24.12 \pm 3.91$  years, with a minimum age of 18 years and a maximum of 45 years. The majority of the women (67.2%) were between 20 and 25 years of age. Most of the patients (65.9%) were from rural areas. A total of 97.4% were Hindu, 93.1% belonged to the Madhesi ethnic group, 40.7% were illiterate, 98.4% were non-vegetarian, and 99.1% were housewives by occupation, as shown in Figure 2.

**Table 2: Sociodemographic characteristics of respondents (n = 1603)**

Sociodemographic profile		Number (%)
Area of resident	Rural	1056(65.9)
	Urban	547(34.1)
Religion	Hindu	1562(97.4)
	Muslim	41(2.6)
Education	Illiterate	652(40.7)
	Up to Secondary level	767(47.8)
	Intermediate level	116(7.2)
	Bachelor level	68(4.2)
Dietary Habits	Vegetarian	26(1.6)
	Non-Vegetarian	1577(98.4)
Caste	Dalit	49(3.1)
	Janjati	14(0.9)
	Madhesi	1492(93.1)
	Muslim	34(2.1)
	Brahmin/Chhetri	14(0.9)
Occupation	Housewife	1589(99.1)
	Job	14(0.9)

Robson Group 5 (31.1%), which includes multiparous women with at least one previous caesarean section and a single term pregnancy in cephalic presentation, was the largest contributor to the overall caesarean section rate. The second largest group was Robson Group 1 (22.5%), consisting of nulliparous women with a single full-term cephalic pregnancy in spontaneous labour. This was followed by Robson Group 4 (13.7%), which includes multiparous women with a single full-term cephalic pregnancy who underwent either induced labour or pre-labour caesarean section. Next was Robson Group 2 (12.4%), comprising nulliparous women with a single full-term cephalic pregnancy in induced labour or pre-labour caesarean section. Robson Group 3 (9.3%) followed, including multiparous women (excluding previous CS) with a single cephalic pregnancy at more than 37 weeks in spontaneous labour.

This was followed by Robson Group 7 (3.4%), which includes all multiparous breech pregnancies (including previous CS), and Robson Group 6 (3.1%), including all nulliparous breech pregnancies. Robson Group 10 (2.9%) includes all single cephalic pregnancies less than 37 weeks (including previous CS). Lastly, Robson Group 8 (0.8%) includes all abnormal lies (including previous CS), and Robson Group 9 (0.8%) includes all women with a single cephalic pregnancy at more than 37 weeks in spontaneous labour with a history excluding previous CS, as illustrated in Table 3.

**Table 3: Proportion of each Robson groups, Number and CS rate in each group**

Robson Group	Number of CS in group	(%) Contribution made by each group to overall caesarean section
Group 1	361	22.5
Group 2	198	12.4
Group 3	149	9.3
Group 4	220	13.7
Group 5	499	31.1
Group 6	49	3.1
Group 7	54	3.4
Group 8	13	0.8
Group 9	13	0.8
Group 10	47	2.9
Total	1603	100

## DISCUSSION

Cesarean section is a vital surgical intervention that can lower maternal and neonatal risks. It is widely regarded as an important indicator for assessing the quality of maternal healthcare services [16].

While cesarean delivery provides important benefits for maternal and neonatal outcomes, it is not without risks. Possible complications include surgical site infection, excessive bleeding, anesthesia-related problems, and, in rare instances, maternal death. Future pregnancies may be affected by issues such as preterm labor, rupture of the uterus, or abnormal placental implantation. These risks are heightened in settings with limited resources and inadequate access to comprehensive obstetric care [17,18].

To enhance maternal and neonatal outcomes, healthcare institutions should systematically review their obstetric practices in the context of the patient populations they serve. The Robson Ten Group Classification System provides a practical framework for monitoring and auditing at the institutional level, delivering insights that can inform and improve clinical decision-making in diverse healthcare environments [17,19].

Robson's categorization method, which is supported by the WHO, divides women into ten groups based on criteria such as parity, presentation, labor onset, previous C-sections, and gestation duration [20].

In this study, the Robson Ten Group Classification System (RTGCS) was utilized to assess the proportion of each group within the obstetric population, quantify their contribution to the overall caesarean section (CS) rate, and examine the CS rate within each specific group.

In the present study, the overall caesarean section rate



was 22.7%, which was higher compared to a previous study conducted by Thakur M et al. wherein caesarean section rate of 16.7% was reported [21]. The lower rate in that study may be attributed to the fact that it was conducted during the COVID-19 pandemic lockdown, when healthcare professionals were hesitant to perform surgical procedures due to concerns about virus transmission. The caesarean section rate in the present study was higher than the rate recommended by the WHO (10–15%) [1]. This may be because MIHS is a referral center; when complications arise during delivery, patients are referred to MIHS, resulting in a higher caesarean section rate. In comparison, the CS rate at this hospital is lower than that reported at Paropakar Maternity and Women's Hospital, a major referral center in Kathmandu, where it is 31.1%. [22] and most other public and private hospitals in Nepal [23]

In our study, Robson Group 5 (previous CS group) was the leading contributor to the overall caesarean section rate (31.1%), highlighting the importance of thorough counseling on vaginal birth after caesarean (VBAC). Integrating trial of labor after caesarean (TOLAC) into routine obstetric care for appropriately selected low-risk women may help reduce the frequency of repeat caesarean deliveries. Robson Group 1 (Nullipara, Term, spontaneous deliveries) was the second most significant contributor (22.5%), largely due to referrals of women already in spontaneous labor with established indications for caesarean section. The rise in caesarean rates among nulliparous women subsequently increases the number of patients with a previous caesarean section, which in turn raises the likelihood of undergoing caesarean delivery in subsequent pregnancies, thereby further increasing the overall caesarean section rate. This finding is consistent with a study conducted in India by Aggarwal A et al., in which Group 5 and Group 1 contributed 35.31% and 22.47% of all caesarean deliveries, respectively [24]. Similarly, a study conducted by Kazmi et al. reported that Group 5 made the greatest contribution to the total CS rate, while Group 1 had the second highest contribution [25]. Group 5 was the leading contributor to the overall caesarean section rate because trial of labor after caesarean (TOLAC) is not routinely practiced in obstetric care. Robson Group 4 (13.7%), which includes multiparous women with a single full-term cephalic pregnancy who underwent either induction of labour or pre-labour caesarean section, was the

third most common indication for caesarean delivery. In contrast, a study conducted by Thakur M et al. reported a caesarean section rate of 6.6% in Robson Group 4. [21] Group 2 (12.4%) nulliparous women with singleton, term, cephalic pregnancies in induced labor or pre-labor caesarean section. This finding is consistent with the study conducted by Thakur M. et al., which reported a caesarean section rate of 15.6% in Robson Group 2. [21] as the study was conducted in the same setting. In contrast to our study, a study conducted by Paudel et al. showed that Robson Group 2 constituted 18.6% of the overall caesarean section rate [26]. Robson Group 3 (9.3%) followed, consisting of multiparous women (excluding previous CS) with a single cephalic pregnancy at more than 37 weeks in spontaneous labour. This was followed by Robson Group 7 (3.4%), which includes all multiparous breech pregnancies (including previous CS), and Robson Group 6 (3.1%), which includes all nulliparous breech pregnancies. Robson Group 10 (2.9%) includes all single cephalic pregnancies less than 37 weeks (including previous CS). Lastly, Robson Group 8 (0.8%) includes all abnormal lies (including previous CS), and Robson Group 9 (0.8%) includes all women with a single transverse or oblique lie (including previous CS). This finding is consistent with the study conducted by Thakur M. et al. [21] as the study was conducted in the same setting. The decision for caesarean section was made by different doctors on duty, which may have introduced observer bias.

## CONCLUSION

The cesarean section rate at this hospital was higher than the WHO recommendation. According to Robson's Ten-Group Classification, Groups 5 and 1 were the major contributors to cesarean deliveries. Therefore, efforts should be directed toward reducing their incidence, with particular focus on Group 5. Promoting vaginal delivery in nulliparous women and facilitating VBAC are the most relevant areas of intervention.

## ACKNOWLEDGEMENTS

We express our sincere gratitude to everyone for their invaluable cooperation and support throughout this research.

**Funding:** No funding was received for this research.

**Conflict of interest:** We declare no conflict of interest

**Ethical approval:** Yes



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