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A CROSS-SECTIONAL STUDY OF CAESAREAN SECTION RATES IN A TERTIARY CARE HOSPITAL USING ROBSON'S TEN-GROUP CLASSIFICATION SYSTEM

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ABSTRACT

Background: Rising caesarean section (CS) rates are a global public health concern. Robson's Ten Group Classification System (RTGCS) is the WHO-endorsed standard for auditing, monitoring, and comparing CS rates across healthcare facilities. This study aimed to analyse CS rates using RTGCS at a tertiary care hospital in Chennai, India, and identify the major contributing groups.

Methods: A cross-sectional study was conducted among 900 women who delivered in CS at Sree Balaji Medical College and Hospital from July 2024 to December 2025. Data on maternal demographics, obstetric history, and mode of delivery were collected. Each delivery was classified into one of ten Robson groups. Group size, group-specific CS rate, absolute and relative contribution to overall CS were calculated.

Results: The largest Robson groups were Group 1 (nulliparous, term, cephalic, spontaneous labour) – 24.0%, and Group 3 (multiparous without scar, term, cephalic, spontaneous labour) – 22.0%. Group-specific CS rates were highest in Group 9 (abnormal lie) – 100%, Group 6 (nulliparous breech) – 75.0%, Group 5 (previous CS) – 71.4%, and Group 7 (multiparous breech) – 70.0%. The major contributors to overall CS were Group 5 (28.6% relative contribution), Group 2 (nulliparous induced/prelabour) – 22.9%, and Group 1 – 17.1%. Together, Groups 1, 2, and 5 accounted for 68.6% of all caesarean sections. The most common indication for CS was previous CS (47.4%), followed by fetal distress (13.7%) and hypertensive disorders (9.7%).

Conclusion: The overall CS rate at this tertiary care centre is 35.0%, exceeding WHO recommendations. Robson Groups 5, 2, and 1 are the predominant contributors, accounting for more than two-thirds of all CS. Targeted interventions to promote trial of labour after caesarean and to reduce primary CS in nulliparous women are essential. RTGCS is a valuable tool for identifying areas for quality improvement in obstetric care.

KEYWORDS: Caesarean section, Robson classification, RTGCS, tertiary care hospital, India, previous caesarean section, induction of labour, labour management

INTRODUCTION

Caesarean section (CS) is one of the most commonly performed surgical procedures in obstetric practice worldwide, serving as a life-saving intervention for both mother and fetus when vaginal delivery poses significant risks. The procedure involves delivery of a viable fetus through incisions made in the maternal abdominal wall and uterine wall. When appropriately indicated, CS can prevent adverse outcomes, including maternal death, stillbirth, neonatal death, obstetric fistula, uterine prolapse, and long-term pelvic floor dysfunction [1]. However, the exponential rise in CS rates globally has transformed this essential obstetric intervention into a public health concern of considerable magnitude [2].

The global prevalence of CS has more than tripled over the past three decades, increasing from approximately 7% in 1990 to 21% in 2021, with significant regional variations. In Latin America and the Caribbean, rates exceed 40%, while in sub-Saharan Africa, rates remain below 10% in many countries [3]. This disparity reflects not only differences in healthcare infrastructure and obstetric risk profiles but also varying cultural practices, medicolegal environments, and healthcare financing systems. The World Health Organization (WHO) has stated that there is no justification for any region to have a CS rate higher than 10–15%, as rates beyond this threshold do not confer additional benefit to maternal or neonatal outcomes at the population level [4].

In India, the rising trend of CS deliveries has been particularly pronounced over the past decade. Analysis of national data reveals that the prevalence of CS across India increased from 17.2% in 2016 to 21.5% in 2021 [5]. More striking is the disparity between public and private healthcare sectors: in the private sector, CS rates increased from 43.1% in 2016 to 49.7% in 2021, meaning that nearly one in two deliveries in private facilities occurs via caesarean section [5]. This pattern has significant implications for healthcare expenditure at both individual and national levels, and has the potential to divert human and financial resources from higher priority healthcare needs [6].

The rise in CS rates is multifactorial, influenced by changes in maternal demographics, increasing rates of obesity and advanced maternal age, higher prevalence of multiple pregnancies due to assisted reproductive technologies, declining rates of vaginal breech delivery, reduced tolerance for operative vaginal delivery, concerns regarding medicolegal liability, and in some settings, maternal preference for scheduled delivery [7,8]. Additionally, the widespread availability of electronic fetal monitoring has contributed to increased diagnosis of fetal distress, which has become one of the leading indications for primary CS [9].

While CS is undoubtedly a life-saving procedure when medically indicated, unnecessary CS exposes women to significant short-term and long-term health risks. Short-term complications include postpartum haemorrhage, surgical site infection, puerperal sepsis, thromboembolic events, and longer hospital stays. The risk of maternal mortality is approximately six to ten times higher following CS compared to vaginal delivery [1,2]. Long-term consequences include increased risk of placenta praevia, placenta accreta, uterine rupture in subsequent pregnancies, and increased risk of miscarriage in future pregnancies [2,10]. Neonatal risks associated with CS include respiratory morbidity due to delayed clearance of fetal lung fluid, increased risk of NICU admission, and potential implications for the developing microbiome [11].

To address the global concern of rising CS rates, the World Health Organization in 2015 recommended the use of Robson's Ten Group Classification System (RTGCS) as a standard tool for assessing, monitoring, and comparing CS rates both within and across healthcare facilities [12]. The International Federation of Gynaecology and Obstetrics (FIGO) subsequently endorsed this recommendation in 2016 [13]. RTGCS classifies all deliveries into ten mutually exclusive and totally inclusive groups based on five simple obstetric parameters: parity, previous uterine scar, gestational age, fetal presentation, number of fetuses, and onset of labour. This classification system allows identification of which groups contribute most significantly to overall CS rates, enabling targeted interventions to reduce unnecessary caesarean deliveries [14].

Several studies from India have applied RTGCS to analyse CS rates. Heera Shenoy and colleagues from Kerala (2019) found that Robson Group 5 (women with previous CS) made the greatest contribution to overall CS rates at 27.24% [15]. Renu Jain and Vrunda Joshi (2021) reported an overall CS rate of 42.39%, with multiparous women with previous CS being the dominant contributors [16]. Gopika Ambati and colleagues from Varanasi (2023) similarly identified Groups 5 and 1 as major contributors to CS [17]. Meka Kamala Laya and Vijaya Sree from Telangana (2023) found Groups 5 and 10 were major contributors [18]. However, variations in the pattern of CS across different institutional settings underscore the importance of facility-level analysis using RTGCS to develop context-specific interventions [19,20].

Rationale of the Study

Despite the increasing CS rates in Tamil Nadu and the availability of the Robson classification system as a validated tool for CS analysis, there is limited data from our institution regarding the pattern of CS deliveries using this classification. Understanding which Robson groups contribute most significantly to CS rates at our tertiary care centre is essential for developing targeted strategies to reduce unnecessary interventions. Moreover, baseline data on CS rates by Robson classification will enable future comparisons to assess the impact of quality improvement initiatives. This study will provide facility-specific evidence that can inform clinical practice, guide training needs, and contribute to the broader goal of optimising CS rates while maintaining maternal and neonatal safety.

This study represents the first application of Robson's Ten Group Classification System to analyse CS rates at Sree Balaji Medical College and Hospital, Chennai. By providing facility-specific data on CS distribution across all ten Robson groups, this study will establish a baseline for future audits and quality improvement initiatives. The findings will contribute to the growing body of evidence on CS patterns in tertiary care settings in South India and will enable comparison with other institutions using the standardised RTGCS framework. Additionally, the study will identify which patient groups represent the highest priority for intervention to reduce unnecessary CS rates at our institution.

Aim and Objectives:

Aim

To study caesarean section rates in a tertiary care hospital using Robson's Ten Group Classification System.

Objectives

① To study caesarean section rates in a tertiary care hospital using Robson's Ten Group Classification System.
② To identify which of Robson's ten groups are major contributors to the overall incidence of caesarean section.

REVIEW OF LITERATURE

Detailed Briefing on Robson's Ten Group Classification System (RTGCS)

The Robson Ten Group Classification System (RTGCS), also known as the Robson classification, is a standardized method for classifying all women giving birth into ten mutually exclusive and totally inclusive groups based on five simple obstetric characteristics. Developed by Dr. Michael Robson in 2001, this system was endorsed by the World Health Organization (WHO) in 2015 and the International Federation of Gynecology and Obstetrics (FIGO) in 2016 as the global standard for assessing, monitoring, and comparing caesarean section rates across different healthcare facilities and populations [1,2]. The system's strength lies in its ability to provide meaningful case-mix adjustment, enabling fair comparisons between institutions with vastly different patient populations.

The five parameters used for classification are: parity (nulliparous or multiparous), previous uterine scar, gestational age (term ≥37 weeks or preterm <37 weeks), fetal presentation (cephalic, breech, or transverse/oblique), number of fetuses (singleton or multiple), and onset of labour (spontaneous, induced, or prelabour caesarean) [3,4]. Its shown in Figure 1a and 1b.

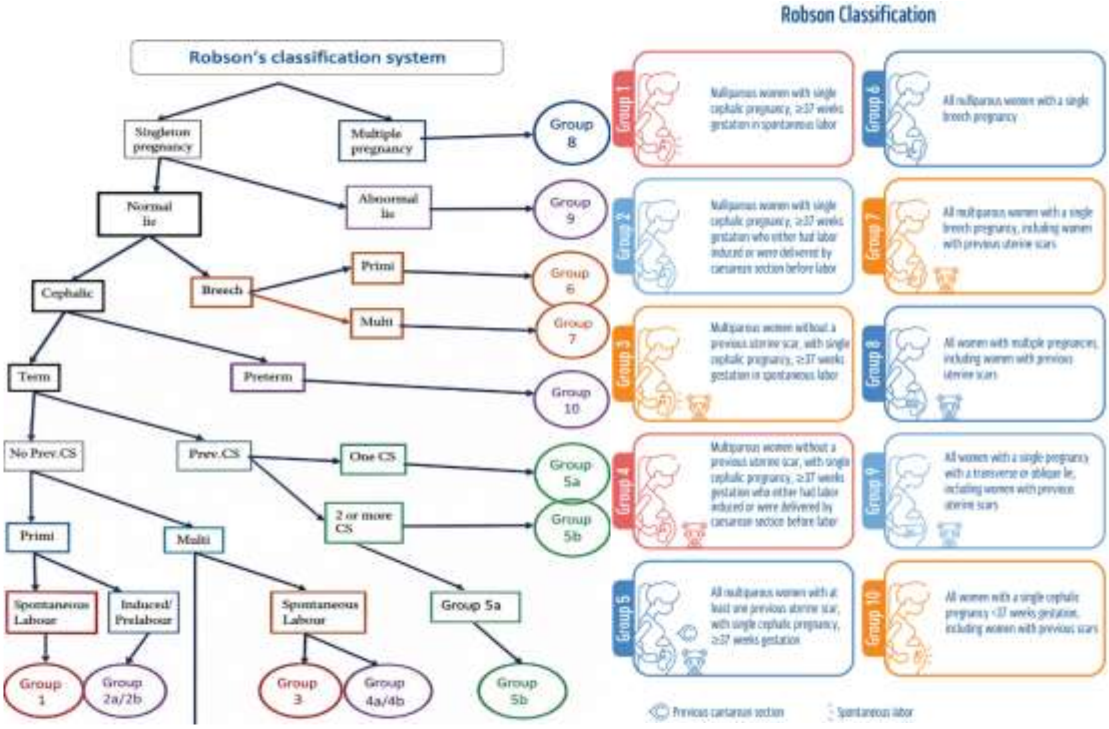

Figure 1a and 1b: Robson Ten Group Classification System

Robson Group 1
Nulliparous, single cephalic term pregnancy, spontaneous labour
Group 1 comprises first-time mothers who have a singleton pregnancy with the baby in cephalic (head-down) presentation, are at term (≥37 weeks of gestation), and go into labour spontaneously. This group is considered the "lowest risk" obstetric population and serves as a crucial indicator of a healthcare facility's ability to manage normal labour without unnecessary intervention [5]. In most tertiary care settings, this group constitutes approximately 20-30% of all deliveries [6]. The expected caesarean section rate in this group, according to WHO reference standards, is under 10%. Rates exceeding this threshold suggest potential overuse of caesarean section for indications such as failure to progress, fetal distress, or maternal request in otherwise healthy first-time mothers with spontaneous labour onset [7]. Monitoring CS rates in Group 1 is essential because women in this group who undergo primary caesarean section become part of Group 5 in subsequent pregnancies, perpetuating the cycle of repeat caesarean deliveries.

Robson Group 2
Nulliparous, single cephalic term pregnancy, induced labour or prelabour caesarean section
Group 2 consists of first-time mothers with a singleton cephalic term pregnancy who either undergo induction of labour (Group 2a) or have a planned prelabour caesarean section (Group 2b) without entering labour. This group is one of the major contributors to overall caesarean section rates globally, second only to Group 5 in most studies [8,9]. Induction of labour in nulliparous women is associated with higher caesarean section rates compared to spontaneous labour, primarily due to the increased likelihood of failed induction, labour dystocia, and non-reassuring fetal heart rate patterns [10]. The expected caesarean section rate in this group ranges from 20-35%. High rates in Group 2 often indicate issues with induction protocols, patient selection for induction, or management of induced labour. Indications for induction commonly include post-dates pregnancy, hypertensive disorders, gestational diabetes, and suspected fetal compromise [11]. Women in Group 2b who undergo planned prelabour caesarean without labour contribute directly to the primary caesarean rate and represent an area where careful evaluation of indications is warranted.

Robson Group 3
Multiparous without uterine scar, single cephalic term pregnancy, spontaneous labour
Group 3 includes women who have given birth at least once before, have no history of previous caesarean section, have a singleton cephalic term pregnancy, and go into labour spontaneously. This group represents the lowest risk among multiparous women and serves as a benchmark for safe vaginal delivery in a population with proven obstetric capacity [12]. In most settings, this group constitutes a significant proportion of deliveries, often 20-25% of the total delivery cohort [13]. The expected caesarean section rate in Group 3 should not exceed 3%, as these women have already demonstrated successful vaginal delivery in the past. Rates above this threshold suggest issues with labour management, intrapartum monitoring, or potentially inappropriate diagnoses of labour dystocia or fetal distress. Since these women have no uterine scar, a low caesarean rate in this group is achievable and desirable, and high rates in this group are considered particularly concerning from a quality improvement perspective [14].

Robson Group 4
Multiparous without uterine scar, single cephalic term pregnancy, induced labour or prelabour caesarean section
Group 4 comprises multiparous women with no previous caesarean scar who have a singleton cephalic term pregnancy and undergo either induction of labour (Group 4a) or planned prelabour caesarean section (Group 4b). This group is the multiparous counterpart to Group 2. Since these women have previously delivered vaginally, they have a high likelihood of successful vaginal delivery even when labour is induced. The expected caesarean section rate in this group is typically below 15% [15]. Induction in multiparous women without a uterine scar is generally more successful than in nulliparous women, and high caesarean rates in this group may indicate inappropriate selection for induction, inadequate protocols, or other management issues [16]. Group 4b women who undergo planned

prelabour caesarean without medical indication represent potentially avoidable caesarean deliveries, as these women with proven vaginal delivery capacity could likely deliver vaginally with appropriate management.

Robson Group 5

Multiparous with previous caesarean section, single cephalic term pregnancy

Group 5 consists of women who have had at least one previous caesarean section and currently have a singleton cephalic term pregnancy. This is the most significant contributor to overall caesarean section rates across virtually all settings, accounting for 30-45% of all caesarean deliveries in most tertiary care hospitals [17,18]. The expected caesarean section rate in this group ranges from 50-60%, reflecting the balance between elective repeat caesarean section and trial of labour after caesarean (TOLAC) [19]. Rates significantly above 60% suggest that TOLAC is underutilized, while rates significantly below 50% may indicate that TOLAC is being offered to women with contraindications. The management of women in Group 5 is one of the most important determinants of overall caesarean section rates, as each successful TOLAC prevents a repeat caesarean and reduces the long-term risks associated with multiple caesarean deliveries, such as placenta accreta spectrum disorders [20].

Robson Group 6

All nulliparous women with a single breech pregnancy

Group 6 includes first-time mothers with a singleton breech presentation, regardless of gestational age or onset of labour. Following the results of the Term Breech Trial published in 2000, which demonstrated higher perinatal morbidity and mortality with planned vaginal breech delivery compared to planned caesarean section, the vast majority of breech presentations are now delivered by caesarean section [21]. Consequently, the caesarean section rate in this group approaches 80-100% in most modern obstetric settings [22]. The contribution of Group 6 to overall caesarean section rates is directly proportional to the local incidence of breech presentation in nulliparous women, which is approximately 3-4% of term pregnancies. While vaginal breech delivery remains an option for carefully selected women with appropriate expertise available, the overall caesarean rate in this group is expected to be high, and efforts to reduce caesarean sections should focus on increasing the uptake of external cephalic version (ECV) to convert breech to cephalic presentation before labour.

Robson Group 7

All multiparous women with a single breech pregnancy

Group 7 comprises women who have given birth at least once before and have a singleton breech presentation, regardless of gestational age or onset of labour. Like Group 6, the caesarean section rate in this group is high (70-90%) in contemporary obstetric practice [23]. However, multiparous women with breech presentation have a slightly higher chance of successful vaginal breech delivery compared to nulliparous women, as they have previously demonstrated the capacity for vaginal delivery. Nonetheless, many centres still opt for caesarean section due to concerns about safety and the availability of expertise for vaginal breech delivery [24]. The contribution of Group 7 to overall caesarean rates is smaller than Group 6 because breech presentation is less common in multiparous women. Similar to Group 6, efforts to reduce caesarean sections in this group should focus on ECV, particularly in women who have previously delivered vaginally and may be good candidates for successful version.

Robson Group 8

All women with multiple pregnancy

Group 8 includes all women with multiple gestations (twins, triplets, or higher-order multiples), regardless of parity, gestational age, presentation, or onset of labour. Multiple pregnancies are associated with significantly higher caesarean section rates due to increased risks of malpresentation, preterm labour, and obstetric complications [25]. The caesarean section rate in this group typically ranges from 40-60%, though it can be higher in settings where vaginal delivery of twins is less commonly practiced [26]. The management of multiple pregnancies, particularly twin gestations, has evolved, with vaginal delivery considered safe for dichorionic twins when the presenting twin is cephalic and appropriate facilities are available. The size of Group 8 in a tertiary care centre reflects its role as a referral centre for high-risk pregnancies. Caesarean sections in this group are often indicated for malpresentation (non-cephalic presenting twin), discordant growth, preterm labour, or maternal complications [27].

Robson Group 9

All women with a single oblique or transverse pregnancy

Group 9 comprises women with a singleton pregnancy in which the fetus lies in an oblique or transverse lie (horizontal orientation) rather than the normal longitudinal lie. This group includes both nulliparous and multiparous women, regardless of gestational age or previous uterine scar. Transverse and oblique lies are absolute indications for caesarean section, as vaginal delivery is impossible due to the fetal orientation across the birth canal [28]. Consequently, the caesarean section rate in Group 9 is 100% in all settings. The size of this group should be less than 1% of all deliveries, as transverse and oblique lies are relatively uncommon, particularly at term. However, preterm transverse lie may be more common and contributes to the overall size of this group [29]. Since the caesarean rate is universally 100%, no reduction in CS rates can be achieved in this group, and the focus should be on optimizing the timing and conduct of caesarean delivery to minimize maternal and neonatal morbidity.

Robson Group 10

All women with a single cephalic preterm pregnancy

Group 10 includes women with a singleton pregnancy in cephalic presentation who deliver before 37 completed weeks of gestation (preterm). This group includes both nulliparous and multiparous women, with or without previous caesarean scar, and regardless of the onset of labour [30]. The expected caesarean section rate in this group is typically 20-35%, though it varies widely depending on the reasons for preterm delivery and the underlying maternal and fetal conditions [31]. Preterm caesarean sections are often performed for maternal indications (such as severe preeclampsia or placenta praevia), fetal indications (such as non-reassuring fetal status or intrauterine growth restriction), or preterm labour with non-cephalic presentation that may have been excluded from Group 6 or 7. This group tends to be larger in tertiary care referral centres that manage high-risk pregnancies and is often the second-largest contributor to overall caesarean rates after Group 5 [32]. Analysis of Group 10 requires careful consideration of the specific indications for preterm delivery, as many are medically justified. However, opportunities for reducing CS rates in this group may exist in the management of preterm labour and the selection of women for induction versus expectant management.

Table 1: Summary Table of Robson's Ten Group Classification along with expected rates

Group	Description	Expected CS Rate
1	Nulliparous, single cephalic term, spontaneous labour	<10%
2	Nulliparous, single cephalic term, induced or prelabour CS	20-35%
3	Multiparous without scar, single cephalic term, spontaneous labour	<3%
4	Multiparous without scar, single cephalic term, induced or prelabour CS	<15%
5	Multiparous with previous CS, single cephalic term	50-60%
6	All nulliparous single breech	80-100%
7	All multiparous single breech	70-90%
8	All multiple pregnancies	40-60%
9	All single oblique or transverse	100%
10	All single cephalic preterm	20-35%

Global Patterns: Group 5 as the Dominant Contributor

A synthesis of numerous cross-sectional studies from diverse geographical regions consistently identifies Robson Group 5 as the single largest contributor to the overall CS rate in tertiary care settings. Fatima and colleagues [21] conducted a cross-sectional study in a tertiary care hospital in Peshawar, Pakistan, analysing 2,175 deliveries over a six-month period. Their findings revealed that Group 5 accounted for a staggering 42.6% of all CS performed, with an intra-group CS rate of 95.8% [21]. This overwhelming dominance of the previous CS group highlights the near-universal practice of elective repeat caesarean sections in this setting.

Similarly, Abubeker and colleagues [22] from Addis Ababa, Ethiopia, conducted a cross-sectional study at a tertiary teaching hospital, analysing 3,352 deliveries over one year. They found that Group 5 was the most numerous group among CS births, contributing 35.7% to the total CS rate, with a CS rate of 92.3% within the group [22]. The authors noted that while the overall CS rate was 31.9%, the high contribution of Group 5 reflected a consistent practice of repeat CS without adequate consideration of TOLAC.

Reefaat and colleagues [23] from Bangladesh conducted an observational study using RTGCS at a tertiary care hospital, analysing 2,856 deliveries over a two-year period. Their findings demonstrated that Group 5 contributed 38.7% of all CS deliveries, with an intra-group CS rate of 94.2% [23]. The study highlighted that the proportion of women opting for TOLAC was extremely low, driven largely by patient preference, provider concerns, and institutional policies.

Nazeer and colleagues [24] from Abbottabad, Pakistan, conducted a cross-sectional study at a tertiary care hospital, analysing 1,890 deliveries. Their results showed that Group 5 was responsible for 36.3% of all CS cases, with an intra-group CS rate of 96.1% [24]. The authors emphasized that the lack of clear protocols for TOLAC and the absence of dedicated counselling services contributed significantly to the high repeat CS rates.

The overwhelming dominance of Group 5 across these diverse geographical settings—from South Asia to Sub-Saharan Africa—underscores the universality of the pressures driving CS rates upward in this specific obstetric population. It suggests that the underlying causes are not merely local idiosyncrasies but are reflective of broader systemic issues in modern obstetric care, including the medicalization of childbirth, defensive medicine, and patient expectations regarding safety and convenience [25,26]. This has been shown clearly in Figure 2.

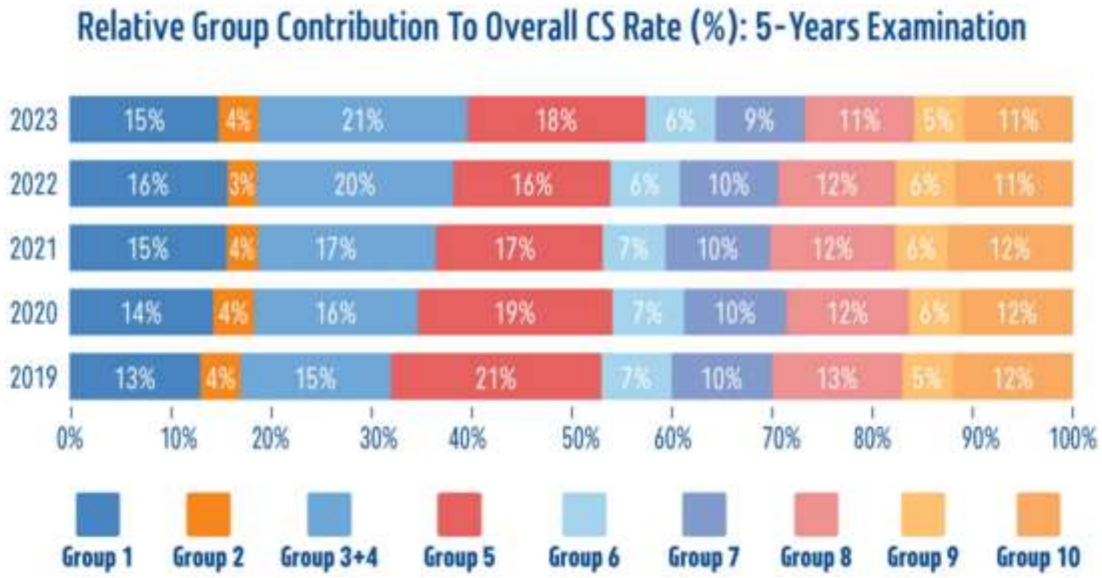

Figure 2: Relative contribution to CS rates across RTGCS groups[20]

Group 2: The Second Major Contributor

Following Group 5, Robson Group 2 is another major and consistent driver of high CS rates across the reviewed literature. This group encompasses first-time mothers who either undergo an induction of labour or have a CS before the onset of spontaneous labour. In the Peshawar study by Fatima and colleagues [21], Group 2 was the second-largest contributor, accounting for 19.2% of CS with an intra-group rate of 38.5%. The Ethiopian study by Abubeker and colleagues [22] reported Group 2 as the second most significant, contributing 19.5% of CS with a rate of 39.2%.

Adu-Bonsaffoh and Seffah [27] conducted a pre- and post-intervention study in Ghana using RTGCS to analyse CS rates. Their baseline data, derived from 2,450 deliveries, showed that Group 2 was the second-largest contributor to overall CS, accounting for 21.3% of all CS with an intra-group rate of 41.6% [27]. The authors noted that induction of labour for post-dates pregnancy, hypertensive disorders, and suspected fetal compromise were the most common indications leading to CS in this group.

Adam and colleagues [28] conducted a one-year retrospective study in Ghana, analysing 3,210 deliveries. Their findings confirmed that Group 5 and Group 2 were the top two contributors, together accounting for over half of all CS performed. Group 2 contributed 18.7% of CS with an intra-group rate of 36.4% [28]. The high CS rate in this group was linked to challenges in managing induced labours, including a higher incidence of failed inductions, diagnoses of labour dystocia (failure to progress), and non-reassuring fetal heart rate patterns.

The consistent identification of Group 2 as a major contributor across multiple studies points to a critical area for intervention. Improved protocols for labour induction, better intrapartum monitoring, and enhanced training in managing prolonged or difficult labours in nulliparous women are essential strategies to address the high CS rates in this population [29,30].

Indian Perspectives on RTGCS Application

The data from India further corroborates these global trends. Arunadevi and colleagues [31] conducted a cross-sectional study at a tertiary care centre in Tamil Nadu, analysing 3,456 deliveries over one year. Their findings revealed that Group 5 was the largest contributor, accounting for 38.2% of all CS, followed by Group 2 at 18.5% and Group 1 at 12.7%. The overall CS rate in their institution was 34.2% [31]. The authors emphasized that addressing the high CS rate in Group 5 through promoting TOLAC and improving the management of Group 2 through better induction protocols were priority areas for intervention.

Mehta and colleagues [32] from Western India conducted a cross-sectional study at a tertiary care hospital, analysing 4,200 deliveries over 18 months. Their results showed that Group 5 contributed 37.6% of CS, while Group 2 contributed 18.9%. The overall CS rate was 36.8% [32]. The authors highlighted that the high contribution of Group 5 was largely due to the practice of elective repeat CS without adequate trial of labour, often driven by patient preference and provider convenience rather than medical necessity.

Rajput and colleagues [33] from Mumbai conducted a study analysing CS births at a tertiary care hospital using RTGCS. They found that the top three groups contributing to CS were Group 5 (35.2%), Group 2 (17.8%), and Group 1 (14.5%), which together constituted a significant majority of their CS caseload. The overall CS rate was 39.1% [33]. The authors noted that the tertiary care nature of their institution, which received high-risk referrals from surrounding areas, contributed to the high overall rate, but the RTGCS analysis helped identify specific groups where targeted interventions could be most effective.

This remarkable consistency across different regions of India—from Tamil Nadu in the south to Maharashtra in the west—underscores the universality of the pressures driving CS rates upward in these two specific obstetric populations. It suggests that the underlying causes are reflective of broader systemic issues in Indian obstetric care, including the increasing medicalization of childbirth, defensive medicine practices, and patient expectations regarding scheduled deliveries [34,35].

Other Contributing Groups

While Groups 5 and 2 are the primary drivers, other groups also contribute meaningfully to the overall CS rate, and their analysis provides additional insights into local clinical practices. Robson Group 1 (nulliparous, singleton, cephalic, ≥37 weeks, spontaneous labour) often shows a relatively high CS rate, reflecting the inherent challenges of managing a first labour without any prior obstetric history. In the studies reviewed, the CS rate in Group 1 ranged from 20% to 30%, indicating a significant number of CS performed for indications like labour arrest or fetal distress even in spontaneous labours [21,22,31].

Akoijam and colleagues [36] from Manipur, India, conducted a study at a tertiary care teaching hospital, analysing 3,800 deliveries over two years. Their findings showed that Group 5 contributed 34.5% of CS, Group 2 contributed 16.8%, and Group 1 contributed 13.2%. The overall CS rate was 32.5% [36]. The authors noted that their institution served as a referral centre for high-risk pregnancies from the surrounding region, which contributed to the higher proportion of women in Groups 6, 7, 8, and 10 compared to primary care settings.

Singh and Malhotra [37] from Jhansi, Uttar Pradesh, conducted a cross-sectional study analysing factors influencing CS rates. Their findings showed that Group 5 contributed 33.8% of CS, Group 2 contributed 17.2%, and Group 1 contributed 14.6%. The overall CS rate was 31.9% [37]. The authors emphasized that tertiary care hospitals inherently have higher CS rates due to the complexity of their patient population, and RTGCS provides the necessary case-mix adjustment to allow fair comparisons with other facilities.

Group 6 (all nulliparous breech) and Group 7 (all multiparous breech) are almost universally delivered by CS in modern practice due to the results of the Term Breech Trial, which demonstrated higher risks for planned vaginal breech delivery [38]. Consequently, these groups, while not large in absolute numbers, have CS rates approaching 100%. Their contribution to the total CS rate is therefore directly proportional to the local incidence of term breech presentation. In the reviewed studies, Groups 6 and 7 together contributed approximately 5-8% of total CS [21,22,31].

Group 8 (all women with multiple pregnancy) and Group 10 (all women with a single cephalic preterm pregnancy) also contribute variably to overall CS rates depending on the institutional referral patterns. In tertiary care centres that serve as referral hubs for high-risk pregnancies, these groups tend to be larger and contribute more significantly to CS rates [22,33].

Tertiary Care Considerations

The application of the RTGCS in tertiary care hospitals, which often serve as referral centers for high-risk pregnancies, adds another layer of complexity. These institutions naturally receive a higher proportion of patients who fall into groups with an inherently higher risk of requiring a CS, such as those with previous uterine surgery (Group 5), malpresentations (Groups 6, 7, 9), or multiple gestations (Group 8) [36,37].

Karalasingam and colleagues [39] conducted a large-scale study using data from the Malaysian National Obstetrics Registry over five years, analysing 1,24,567 deliveries across multiple tertiary hospitals. They found that while Group 5 was the largest contributor overall, there was significant variation in its contribution between different hospitals, ranging from 23.5% to 45.2% [39]. This inter-hospital variability strongly suggests that local policies, clinician preferences, and hospital culture play a decisive role in determining CS rates, independent of the underlying patient population.

Ayele and colleagues [40] from North West Amhara, Ethiopia, conducted a cross-sectional study in 2022, analysing 2,850 deliveries across four referral hospitals. Their findings showed that Group 5 contributed 34.2% of CS, Group 2 contributed 18.5%, and Group 1 contributed 12.8%. The overall CS rate was 33.7% [40]. The authors noted that the high CS rate in their setting was partly attributable to the tertiary care nature of the hospitals, which received complicated referrals from primary and secondary facilities.

Pourshirazi and colleagues [41] conducted a population-based analysis in Iran using RTGCS, analysing data from the Iranian Maternal and Neonatal Network. Their findings revealed an alarmingly high national CS rate of 53% in 2014, with private sector rates being even higher. Group 5 contributed 38.5% of CS, while Group 2 contributed 16.8% [41]. The authors pointed to socioeconomic factors, the high proportion of private sector deliveries, and systemic drivers of overuse as key contributors to the exceptionally high CS rates in Iran.

Arata and colleagues [42] conducted a cross-sectional study in Sierra Leone, a low-resource setting, using RTGCS to audit CS at a tertiary hospital. Their analysis of 1,650 deliveries found that the most common indications for CS were obstructed labour and fetal distress, reflecting a context where CS is often a life-saving intervention for conditions that might be managed differently in high-resource settings. Group 1 contributed 22.5% of CS, Group 5 contributed 21.8%, and Group 2 contributed 18.2% [42]. This demonstrates the dual nature of the CS rate as a global health indicator: it signals overuse in some contexts and underuse or delayed access in others.

Geographic Variations and Local Factors

The literature reveals interesting variations and specific local factors that influence CS rates across different regions. Singh and colleagues [43] from Mangalore, India, conducted a retrospective study comparing CS rates over a five-year period (2014-2018) using RTGCS. Their analysis of 8,450 deliveries showed a gradual increase in overall CS rate from 28.5% to 34.2% over the study period. The contribution of Group 5 increased from 32.5% to 38.2%, while Group 2 remained stable around 18-19% [43]. The authors noted that the increasing contribution of Group 5 was concerning and suggested that efforts to promote TOLAC were not keeping pace with the rising number of primary CS.

In the Ethiopian study by Ayele and colleagues [40], the authors noted that while Group 5 was the largest contributor, there was significant variation between the four referral hospitals studied. One hospital had a Group 5 contribution of 42.3%, while another had only 28.1%. This variation persisted even after adjusting for case-mix, suggesting that institutional factors, including the availability of TOLAC protocols, the presence of dedicated counselling services, and the attitudes of attending obstetricians, played a significant role. In turkey, the CS rates over five-year period is shown in Figure 3 as explained by Duzguner S [44]. The figure illustrates the trend in overall caesarean section (CS) rates in Turkey over the period 2018 to 2025, showing a generally increasing trajectory with minor fluctuations. The CS rate rose from 44.33% in 2018 to 45.57% in 2019, followed by a noticeable decline to 43.78% in 2020. After this dip, there was a consistent upward trend, with rates increasing to 45.99% in 2021, 46.54% in 2022, and peaking at 47.27% in 2023. A slight reduction was observed in 2024 (46.89%), but the rate again increased to 47.10% in 2025. Overall, the figure demonstrates a gradual rise in CS rates over time, indicating a sustained high prevalence of caesarean deliveries in Turkey, with only minor year-to-year variations rather than any substantial decline.

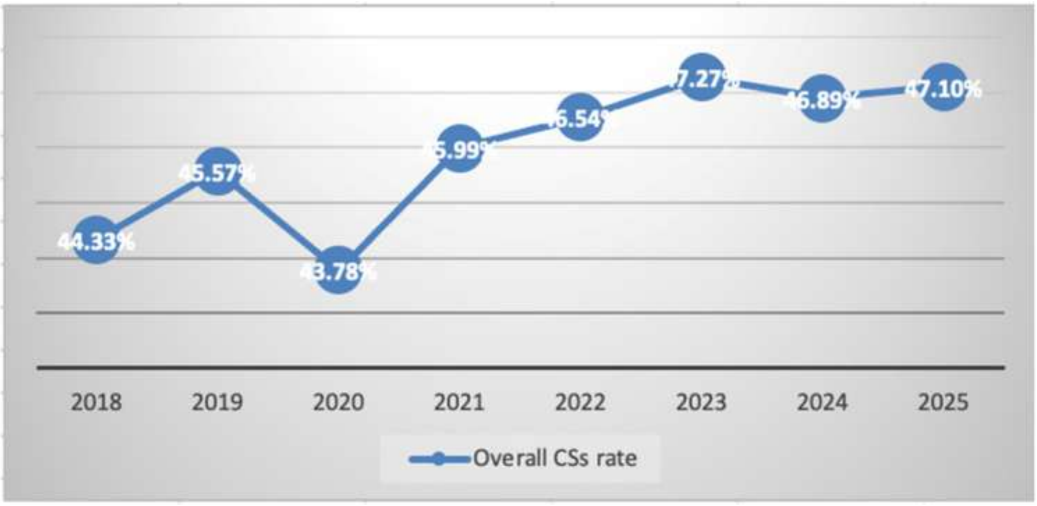

Figure 3: Trend of Caesarean section rates from 2018 to 2025 [44]

The pre- and post-intervention study design, as seen in the Ghanaian study by Adu-Bonsaffoh and Seffah [27], is particularly valuable for moving from mere description to active quality improvement. Their baseline RTGCS data identified Groups 5 and 2 as the primary contributors to CS. Following the implementation of targeted interventions—including TOLAC promotion, improved induction protocols, and enhanced training in labour management—the follow-up analysis showed a modest but significant reduction in overall CS rate from 32.5% to 29.8%, with the greatest reduction seen in Groups 5 and 2 [27].

METHODOLOGY

Study Design

The present study will be conducted as a cross-sectional observational study to analyse caesarean section rates using Robson's Ten Group Classification System (RTGCS) at a tertiary care hospital. A cross-sectional design is appropriate for this research objective as it allows for the assessment of caesarean section patterns over a defined period, providing a snapshot of obstetric practices and enabling the identification of which Robson groups contribute most significantly to the overall CS rate [1,2]. This design is well-suited for descriptive and analytical purposes, as it facilitates the calculation of group sizes, group-specific CS rates, and relative contributions to overall CS without requiring longitudinal follow-up [3].

The cross-sectional approach has been widely employed in similar studies evaluating CS rates using RTGCS across various settings, including studies from Ethiopia, Pakistan, Ghana, and multiple centres in India [4-7]. This design enables the collection of data on all deliveries occurring during the study period, ensuring comprehensive coverage and minimizing selection bias [8].

Study Setting

The study will be conducted in the Department of Obstetrics and Gynaecology at Sree Balaji Medical College and Hospital, Chromepet, Chennai. This institution is a tertiary care teaching hospital affiliated with the Bharat Institute of Higher Education and Research (BIHER). The department serves as a referral centre for high-risk pregnancies from Chennai and surrounding districts, managing approximately 3,000 to 4,000 deliveries annually. The hospital is equipped with comprehensive obstetric facilities, including dedicated labour wards, operation theatres, a neonatal intensive care unit (NICU), and round-the-clock emergency obstetric services [9].

The choice of a tertiary care setting is significant because such institutions typically manage a higher proportion of high-risk pregnancies and complex obstetric cases, which may influence CS rates [10]. Conducting the study in this setting will provide insights into CS patterns that reflect the referral nature of the institution, allowing for appropriate case-mix adjustment when interpreting results [11].

Study Duration
The study will be carried out over a period of 18 months, from July 2024 to December 2025. This duration has been selected to ensure adequate sample size recruitment and to account for seasonal variations in delivery patterns that may influence CS rates. An 18-month period allows for the inclusion of deliveries across different seasons, reducing the potential impact of temporal variations on the study findings [12].

Study Population
The study population will comprise all pregnant women who deliver at Sree Balaji Medical College and Hospital during the study period and meet the inclusion criteria. The source population includes women from diverse socio-demographic backgrounds, including both booked and referred cases, reflecting the typical caseload of a tertiary care referral centre in urban South India [13].

Sample Size Determination
The sample size for the present study was determined based on the total number of deliveries conducted during the study period at the tertiary care hospital. The study was carried out over a duration of 15 months, during which all eligible deliveries were included.
On average, the institution conducts approximately 50–60 deliveries per month. Based on this delivery load, the expected number of deliveries during the study period was estimated to be between 750 and 900 cases. Thus, the final sample size for the study was 900 pregnant women, reflecting all deliveries conducted during the defined study period.

Sampling Technique
Consecutive sampling will be employed for participant recruitment. All eligible women who deliver at the institution during the study period and provide informed consent will be included consecutively until the target sample size of 900 is achieved. This approach minimizes selection bias and ensures that the sample is representative of the overall delivery population at the institution during the study period [16].

Inclusion Criteria
Women will be included in the study if they meet all of the following criteria:
1.Pregnant women who deliver at Sree Balaji Medical College and Hospital during the study period
2.Gestational age of 24 weeks or more (viable pregnancy)
3.Provide written informed consent to participate in the study
4.Deliver a live fetus (stillbirths will be included as they represent delivery outcomes)
The inclusion of deliveries from 24 weeks gestation ensures that all viable pregnancies are captured, consistent with the WHO definition of periviable and viable deliveries [17].

Exclusion Criteria
Women will be excluded from the study if they meet any of the following criteria:
1.Women who decline to provide informed consent
2.Deliveries occurring before 24 weeks of gestation (considered pre-viable)
These exclusion criteria ensure that the study focuses specifically on deliveries, which is the primary outcome of interest for CS rate analysis [18].

Ethical Considerations
Institutional Ethics Committee Approval
Prior approval will be obtained from the Institutional Ethics Committee of Sree Balaji Medical College and Hospital before commencing the study. The study will be conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and the ICMR National Ethical Guidelines for Biomedical and Health Research involving Human Participants [32].

Informed Consent
All potential participants will receive detailed information about the study purpose, procedures, and their rights. Written informed consent will be obtained from each participant before enrolment. The consent form will be available in both English and Tamil languages.

Confidentiality
All participant data will be kept strictly confidential. Data will be anonymized during analysis, with each participant assigned a unique study identification number. Personal identifiers will not be used in any publication or presentation arising from the study.

Voluntary Participation
Participation in the study is entirely voluntary. Participants are free to withdraw from the study at any time without providing any reason, and such withdrawal will not affect their medical care or their relationship with the hospital.

Data Collection Procedure
Pre-Delivery Data Collection
Upon admission to the labour ward or antenatal ward for delivery, eligible women will be approached for participation in the study. The purpose, procedures, risks, and benefits of the study will be explained in detail in a language understood by the participant (English or Tamil). Written informed consent will be obtained using the approved consent form.
Following consent, a detailed clinical history will be obtained using a structured proforma. The following information will be collected:
- **Socio-demographic data:** Age, residence (urban/rural), educational status, occupation, and annual family income
- **Obstetric history:** Parity, gravidity, number of previous deliveries, number of previous caesarean sections, history of previous uterine surgery

●**Medical history:** History of hypertension, diabetes mellitus, thyroid disorders, cardiac disease, and other medical conditions
●**Current pregnancy details:** Gestational age (confirmed by last menstrual period and first trimester ultrasound), antenatal care status, number of antenatal visits
●**Presentation:** Fetal presentation (cephalic, breech, transverse, oblique) confirmed by clinical examination and ultrasound
●**Number of fetuses:** Singleton or multiple gestation

Intrapartum Data Collection

During labour and delivery, the following information will be recorded:
● Onset of labour: Spontaneous, induced, or prelabour caesarean section (no labour)
● Induction details: Indication for induction, method of induction (if applicable)
● Labour progress: Duration of labour, augmentation with oxytocin if required
● Fetal monitoring: Cardiotocography findings if performed

Post-Delivery Data Collection

Following delivery, the following outcomes will be documented:
● Mode of delivery: Spontaneous vaginal delivery, instrumental delivery (forceps or vacuum), or caesarean section
● Caesarean section details: Indication for caesarean section (primary indication), urgency category (elective/planned or emergency)
● Neonatal outcomes: Birth weight, Apgar scores at 1 and 5 minutes, NICU admission, neonatal resuscitation required, perinatal death
● Maternal outcomes: Postpartum haemorrhage, need for blood transfusion, surgical site infection, duration of hospital stay

Classification Using Robson's Ten Group Classification System

All women included in the study will be classified into one of ten mutually exclusive groups based on the Robson classification system. The classification will be performed using the five core obstetric characteristics: parity, previous uterine scar, gestational age, fetal presentation, number of fetuses, and onset of labour [19,20].
Group 1: Nulliparous, single cephalic term pregnancy, spontaneous labour
Group 2A: Nulliparous, single cephalic term pregnancy, induced labour
Group 2B: Nulliparous, single cephalic term pregnancy, planned prelabour caesarean section
Group 3: Multiparous without uterine scar, single cephalic term pregnancy, spontaneous labour
Group 4A: Multiparous without uterine scar, single cephalic term pregnancy, induced labour
Group 4B: Multiparous without uterine scar, single cephalic term pregnancy, planned prelabour caesarean section
Group 5: Multiparous with previous caesarean section, single cephalic term pregnancy
Group 6: All nulliparous women with single breech pregnancy
Group 7: All multiparous women with single breech pregnancy
Group 8: All women with multiple pregnancy
Group 9: All women with a single oblique or transverse pregnancy
Group 10: All women with a single cephalic preterm pregnancy (<37 weeks)
For the purpose of this study, term pregnancy is defined as gestational age ≥37 weeks, and preterm pregnancy is defined as gestational age <37 weeks [21]. For women with uncertain gestational age, birth weight ≥2500 grams will be used as a proxy for term pregnancy [22].

Study Variables

Independent Variables

The primary independent variable is the Robson group classification (Groups 1 through 10). Secondary independent variables include socio-demographic characteristics (age, parity, education, occupation), obstetric history (previous CS, previous vaginal deliveries), and clinical factors (presentation, number of fetuses, onset of labour).

Dependent Variables

The primary dependent variable is the mode of delivery (caesarean section versus vaginal delivery). Secondary dependent variables include group-specific CS rates, relative contribution of each group to overall CS rate, and absolute contribution of each group to overall CS rate.

Operational Definitions

Caesarean Section: Delivery of a viable fetus through an incision made in the maternal abdominal wall and uterine wall [23].
Nulliparous: Women who have never given birth to a viable fetus (≥24 weeks gestation) [24].
Multiparous: Women who have given birth to at least one viable fetus (≥24 weeks gestation) [24].
Term Pregnancy: Gestational age of 37 completed weeks (259 days) or more, up to 42 weeks [21].
Preterm Pregnancy: Gestational age of less than 37 completed weeks [21].
Spontaneous Labour: Onset of regular painful uterine contractions leading to progressive cervical effacement and dilatation, occurring without medical intervention [25].
Induced Labour: Initiation of uterine contractions by mechanical or pharmacological means before the spontaneous onset of labour, with the intention of achieving vaginal delivery [26].
Prelabour Caesarean Section: Caesarean section performed before the onset of labour, either electively or for medical indications [27].
Previous Caesarean Section: History of at least one prior caesarean delivery in a previous pregnancy [28].
Cephalic Presentation: Fetal head is the presenting part at the pelvic inlet [29].
Breech Presentation: Fetal buttocks or feet are the presenting part [30].
Multiple Pregnancy: Presence of two or more fetuses in the same uterus [31].

Data Management

All data will be entered into a Microsoft Excel spreadsheet. Double data entry will be performed for 10% of the randomly selected records to verify accuracy. Any discrepancies will be resolved by referring back to the original proformas.

Statistical Analysis
Data analysis will be performed using appropriate statistical software (SPSS version 25 or later). The following analyses will be conducted:

Descriptive Statistics
●Continuous variables (maternal age, gestational age, birth weight) will be presented as mean ± standard deviation
●Categorical variables (parity, presentation, mode of delivery) will be presented as frequencies and percentages
●For each Robson group, the following parameters will be calculated:
oGroup size: Number of women in the group / Total number of women delivered × 100
oGroup CS rate: Number of CS / Total number of women × 100
oRelative contribution: Number of CS in the group / Total number of CS × 100
oAbsolute contribution: Number of CS in the group / Total number of women delivered × 100

Inferential Statistics
●Chi-square test will be used to compare proportions between groups where applicable
●Student's t-test will be used to compare continuous variables between groups
●A p-value < 0.05 will be considered statistically significant

Identification of Major Contributors
Groups will be ranked based on their relative contribution to overall CS rate. Groups contributing more than 10% of the total CS will be identified as major contributors, consistent with methodology used in previous studies [7,15].

Quality Control
To ensure data quality and consistency:
1.Supervision: The principal investigator will be supervised by the guide (Associate Professor) and the Head of Department
2.Periodic Review: Data was reviewed periodically by the guide to identify and address any issues in data collection or classification
3.Validation: A random sample of 10% of records will be independently reviewed by a senior resident to verify accuracy of classification and data entry

RESULTS

Table 2: Distribution of Study Participants by Age Group (n = 900)

Age Group (years)	n	%
< 20	75	8.3
21–25	230	25.6
26–30	282	31.3
31–35	200	22.2
> 35	113	12.6

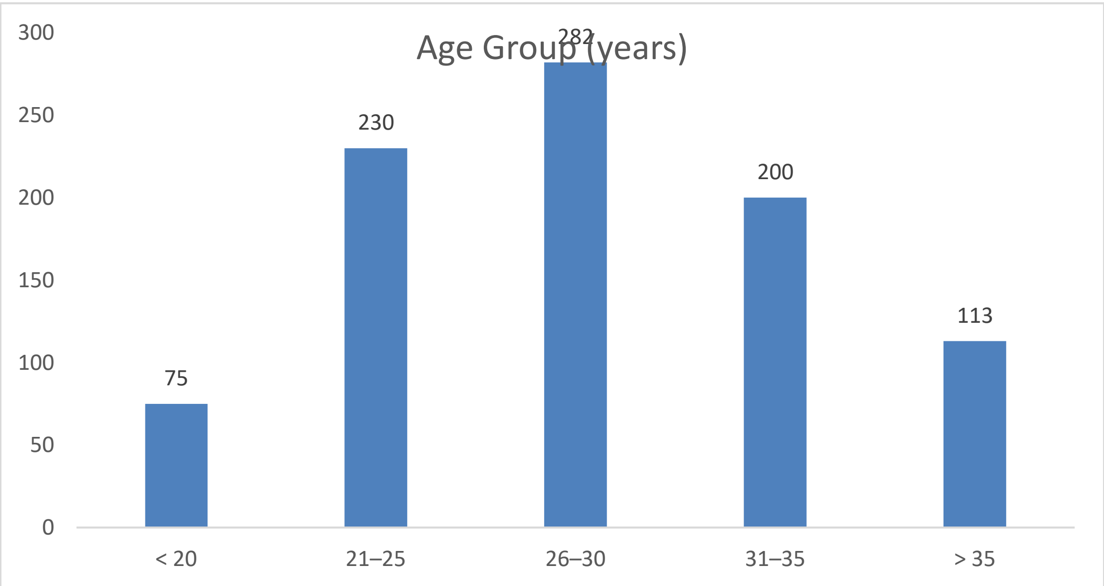

Figure 4: Distribution of Study Participants by Age Group

Among the 900 participants, the majority belonged to the 26–30 years age group (282, 31.3%), followed by 21–25 years (230, 25.6%) and 31–35 years (200, 22.2%). Women aged <20 years constituted 75 (8.3%), while those >35 years were 113 (12.6%). This indicates that most women were within the optimal reproductive age group. (Table 2 and Figure 4)

Table 3: Distribution of Study Participants by Educational Status (n = 900)

Education Level	n	%
No formal education	86	9.6
Primary	173	19.2
Secondary	328	36.4
Higher Secondary	187	20.8
Graduate & above	126	14.0

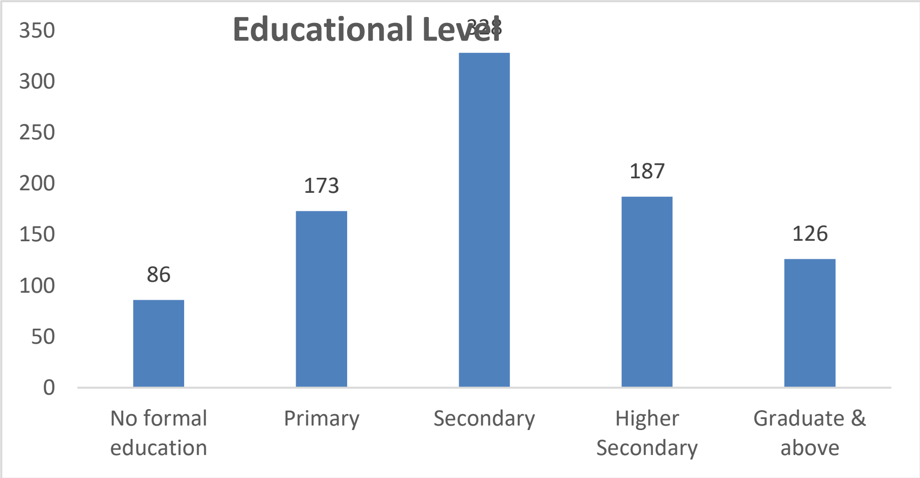

Figure 5: Distribution of Study Participants by Educational Status (n = 900)

Table 3 and Figure 5 shows that most participants had secondary education (328, 36.4%), followed by higher secondary (187, 20.8%) and primary education (173, 19.2%). A smaller proportion were graduates (126, 14.0%), while 86 (9.6%) had no formal education, indicating a predominantly moderately educated population.

Table 4: Distribution of Study Participants by Occupation (n = 900)

Occupation	n	%
Homemaker	500	55.6
Unskilled worker	148	16.4
Skilled worker	115	12.8
Professional	83	9.2
Student	54	6.0

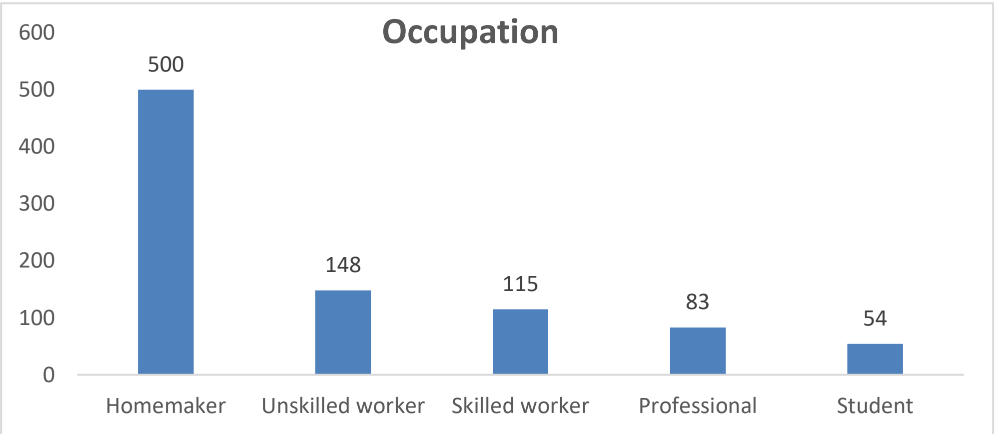

Figure 6: Distribution of Study Participants by Occupation (n = 900)

Table 4 and Figure 6 shows that more than half of the participants were homemakers (500, 55.6%). Among working women, 148 (16.4%) were unskilled workers and 115 (12.8%) were skilled workers, while 83 (9.2%) were professionals. Students accounted for 54 (6.0%), indicating that most women were either non-employed or engaged in informal occupations.

Table 5: Distribution of Study Participants by Parity (n = 900)

Parity	n	%
Primi	418	46.4
Multi	482	53.6

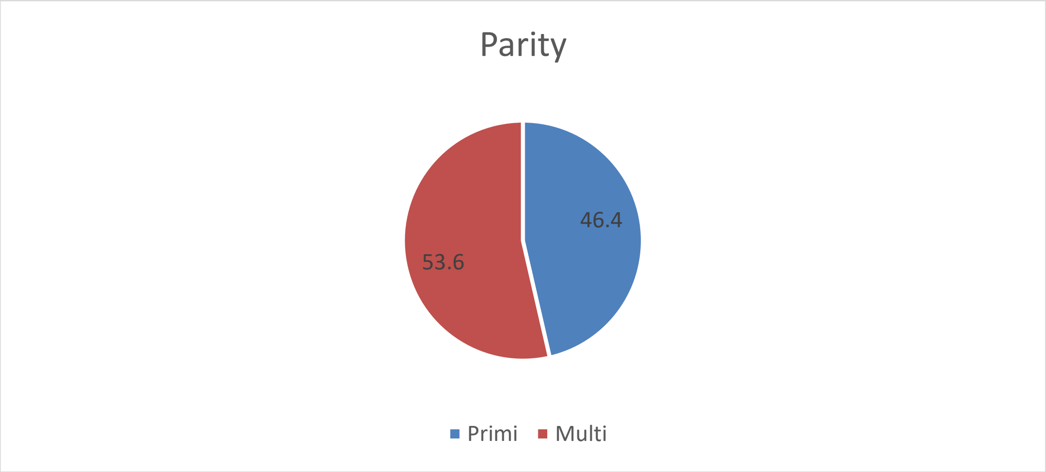

Figure 7: Distribution of Study Participants by Parity (n = 500)

Table 5 and Figure 7 show the distribution of study participants by Parity. Multiparous women constituted 482 (53.6%) of the study population, while primigravida accounted for 418 (46.4%), showing a slight predominance of multiparity.

Table 6: Distribution of Study Participants by Gestational Age (n = 900)

Gestation	n	%
Term	707	78.6
Preterm	193	21.4

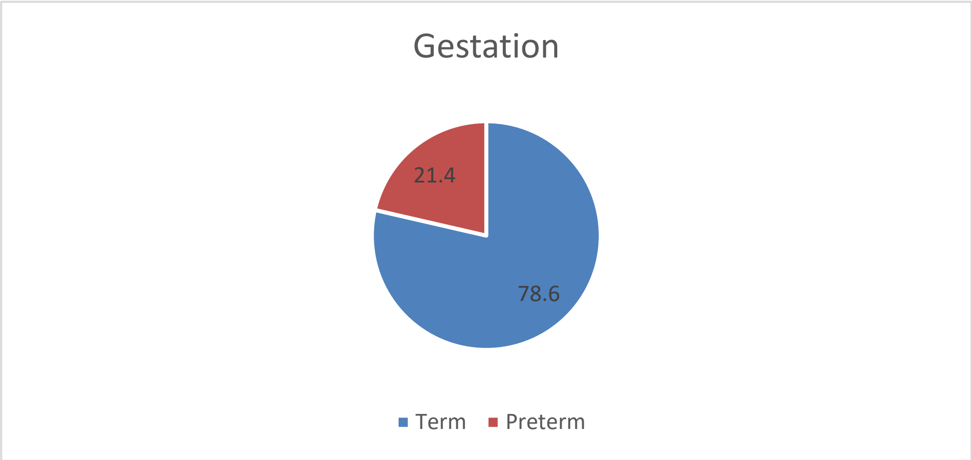

Figure 8: Distribution of Study Participants by Gestational Age (n = 900)

Table 6 and Figure 8 show the distribution of study participants by Gestational Age. The majority of deliveries occurred at term (707, 78.6%), while preterm deliveries accounted for 193 (21.4%), reflecting a predominantly term population.

Table 7: Distribution of Study Participants by Presentation (n = 900)

Presentation	n	%
Cephalic	679	75.4
Breech	133	14.8
Abnormal	88	9.8

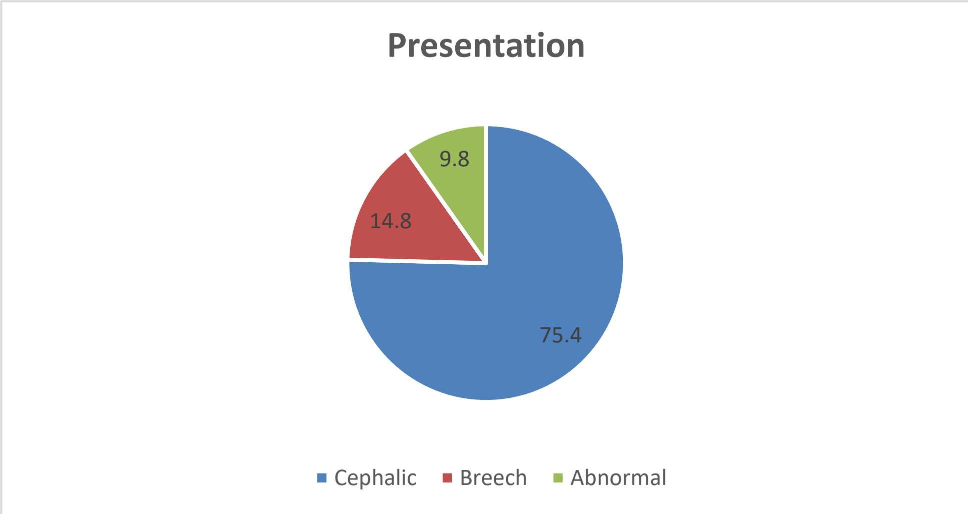

Figure 9: Distribution of Study Participants by Presentation (n = 900)

Table 7 and Figure 9 show the distribution of study participants by Presentation. Cephalic presentation was observed in 679 (75.4%) women, while breech and abnormal presentations accounted for 133 (14.8%) and 88 (9.8%) respectively, indicating that nearly one-fourth had malpresentation.

Table 8: Distribution of Study Participants by Previous Cesarean Section (n = 900)

Previous CS	n	%
Yes	261	29.0
No	639	71.0

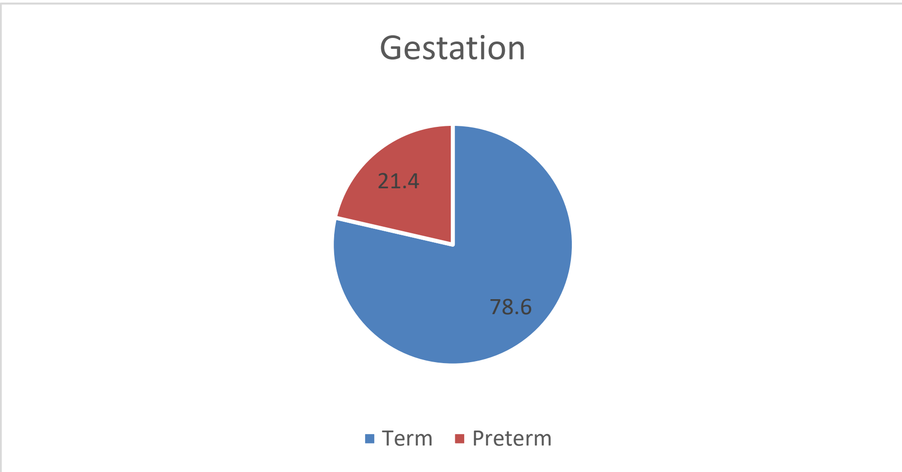

Figure 10: Distribution of Study Participants by Gestation(n = 900)

Table 8 and Figure 10 show the distribution of study participants by Presentation. A total of 261 (29.0%) women had a previous cesarean section, while 639 (71.0%) had no prior cesarean, indicating that nearly one-third of the population had a uterine scar.

Table 9: Distribution of Study Participants by Onset of Labour (n = 900)

Onset	n	%
Spontaneous	549	61.0
Induced	351	39.0

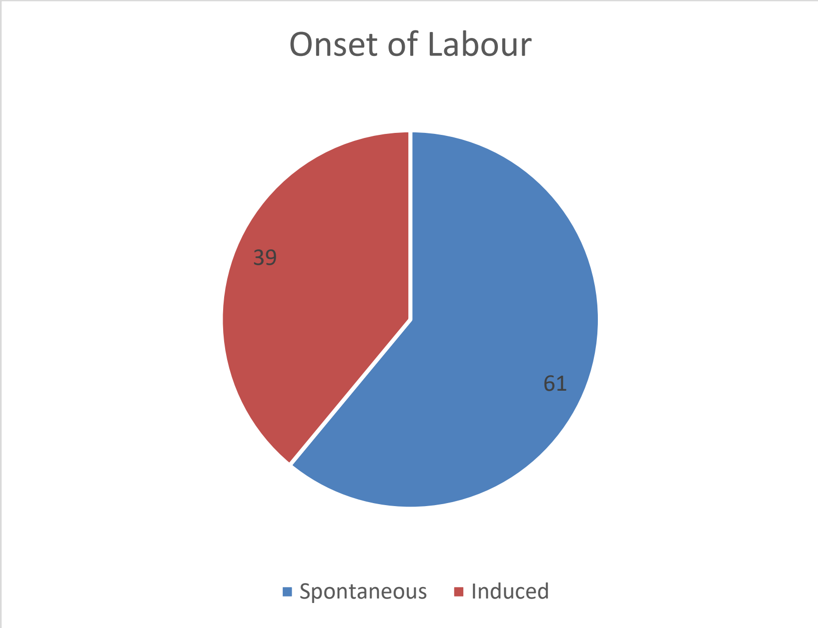

Figure 11: Distribution of Study Participants by Onset of Labour (n = 900)

Table 9 and Figure 11 show the distribution of study participants by Onset of Labour. Spontaneous labour occurred in 549 (61.0%) women, whereas 351 (39.0%) underwent induction of labour, indicating that a substantial proportion required intervention.

Table 10: Distribution of Study Participants by Mode of Delivery (n = 900)

Mode	**n**	**%**
Vaginal	544	60.4
CS	356	39.6

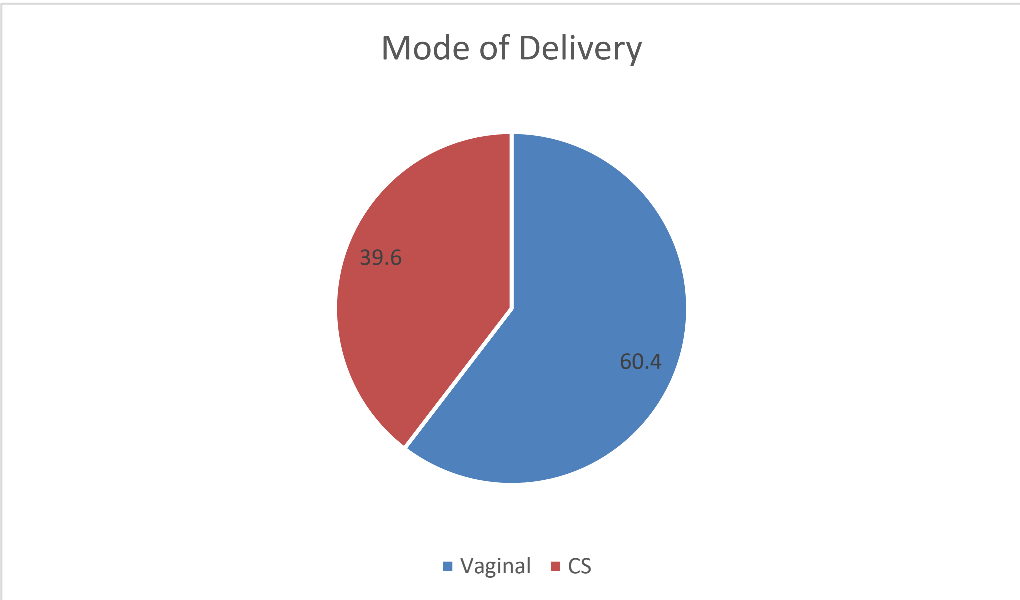

Figure 12: Distribution of Study Participants by Mode of Delivery (n = 900)

Table 10 and Figure 12 show the distribution of study participants by Mode of Delivery. Out of 900 deliveries, 544 (60.4%) were vaginal and 356 (39.6%) were cesarean sections, indicating a moderately elevated but clinically acceptable CS rate.

. Table 11: Association of Parity vs Mode of Delivery among the study participants (n=900)

Parity	CS n (%)	Vaginal n (%)	Total	χ^2	p-value
Primi	165 (39.5)	253 (60.5)	418	0.18	0.671
Multi	191 (39.6)	291 (60.4)	482		

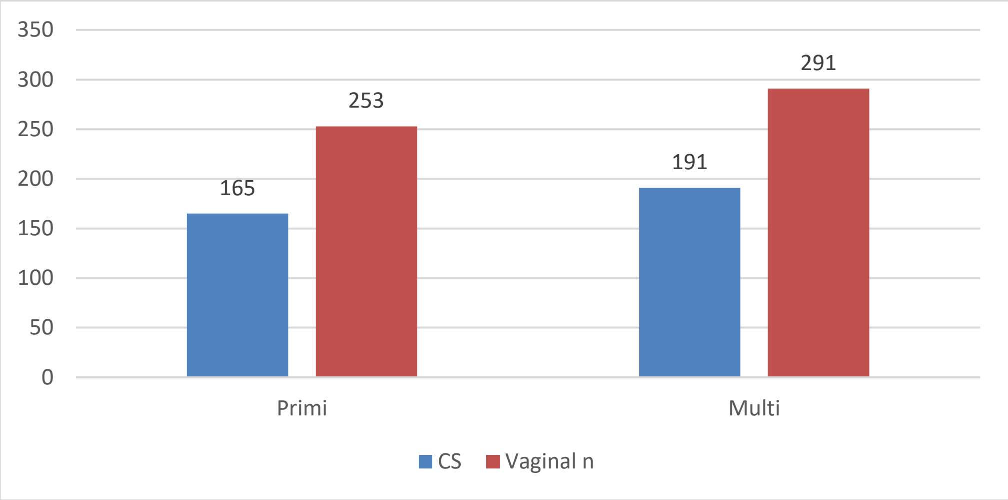

Figure 13: Association of Parity vs Mode of Delivery among the study participants (n=900)

Among primigravida women, 165 (39.5%) underwent cesarean section and 253 (60.5%) delivered vaginally, while among multiparous women, 191 (39.6%) had cesarean delivery and 291 (60.4%) delivered vaginally. The proportions were nearly identical between the two groups. Statistical analysis showed no significant association ($\chi^2 = 0.18$, $p = 0.671$). This indicates that parity did not influence the mode of delivery in the present study.

Table 12: Association of Presentation vs Mode of Delivery among the study participants (n=900)

Presentation	CS n (%)	Vaginal n (%)	Total	χ²	p-value
Cephalic	220 (32.4)	459 (67.6)	679	52.1	<0.001
Breech	90 (67.7)	43 (32.3)	133		
Abnormal	46 (52.3)	42 (47.7)	88		

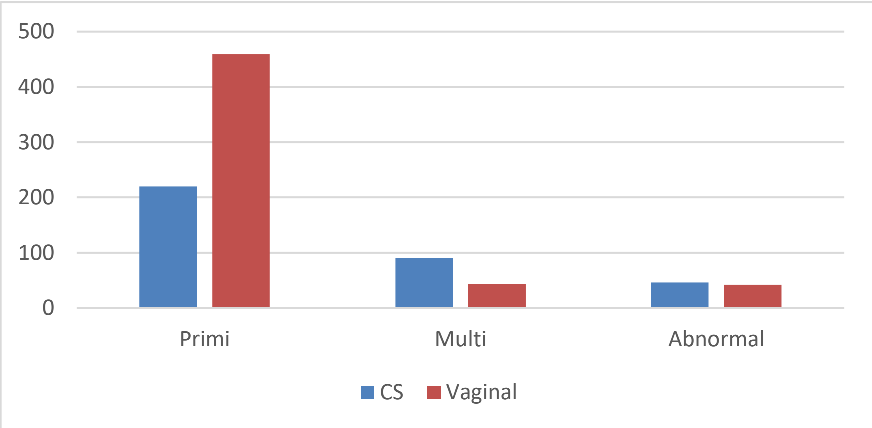

Figure 14: Association of Presentation vs Mode of Delivery among the study participants (n=900)

Cesarean section was performed in 220 (32.4%) of cephalic presentations, compared to significantly higher rates in breech (90, 67.7%) and abnormal presentations (46, 52.3%). Vaginal delivery predominated in cephalic cases (459, 67.6%), while it was markedly lower in malpresentations. The association between presentation and mode of delivery was highly significant ($\chi^2 = 52.1$, $p < 0.001$). Breech presentation showed the strongest association with cesarean delivery.

Table 13: Association of Previous CS vs Mode of Delivery among the study participants (n=900)

Previous CS	CS n (%)	Vaginal n (%)	Total	χ²	p-value
Yes	210 (80.5)	51 (19.5)	261	210.5	<0.001
No	146 (22.8)	493 (77.2)	639		

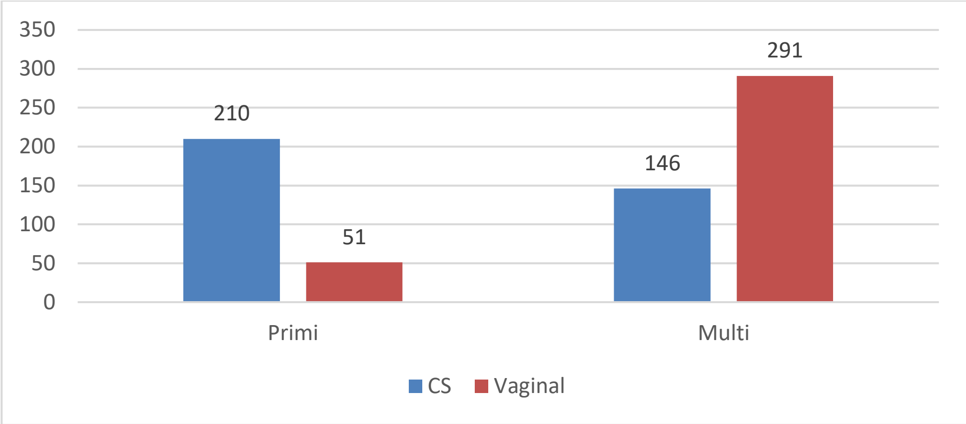

Figure 15: Association of Previous CS vs Mode of Delivery among the study participants (n=900)

Among women with a history of previous cesarean section, 210 (80.5%) underwent repeat cesarean, while only 51 (19.5%) delivered vaginally. In contrast, among those without previous CS, 146 (22.8%) had cesarean delivery and 493 (77.2%) had vaginal delivery. This difference was highly statistically significant ($\chi^2 = 210.5$, $p < 0.001$). Previous cesarean section emerged as the strongest determinant of mode of delivery.

Table 14: Association of Onset of Labour vs Mode of Delivery among the study participants (n=900)

Onset	**CS n (%)**	**Vaginal n (%)**	**Total**	**χ^2**	**p-value**
Induced	180 (51.3)	171 (48.7)	351	25.4	<0.001
Spontaneous	176 (32.1)	373 (67.9)	549		

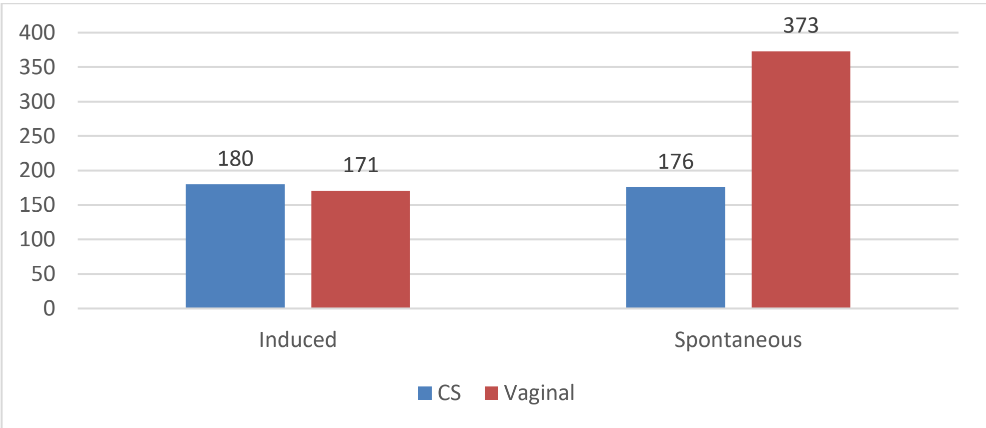

Figure 16: Association of Onset of Labour vs Mode of Delivery among the study participants (n=900)

Among induced labour cases, 180 (51.3%) resulted in cesarean section and 171 (48.7%) in vaginal delivery. In spontaneous labour, cesarean section occurred in 176 (32.1%), while 373 (67.9%) delivered vaginally. The difference between groups was statistically significant ($\chi^2 = 25.4$, $p < 0.001$). Induction of labour was associated with a higher likelihood of cesarean delivery.

Table 15: Association of Gestational Age vs Mode of Delivery among the study participants (n=900)

Gestation	**CS n (%)**	**Vaginal n (%)**	**Total**	**χ^2**	**p-value**
Term	285 (40.3)	422 (59.7)	707	0.89	0.345
Preterm	71 (36.8)	122 (63.2)	193		

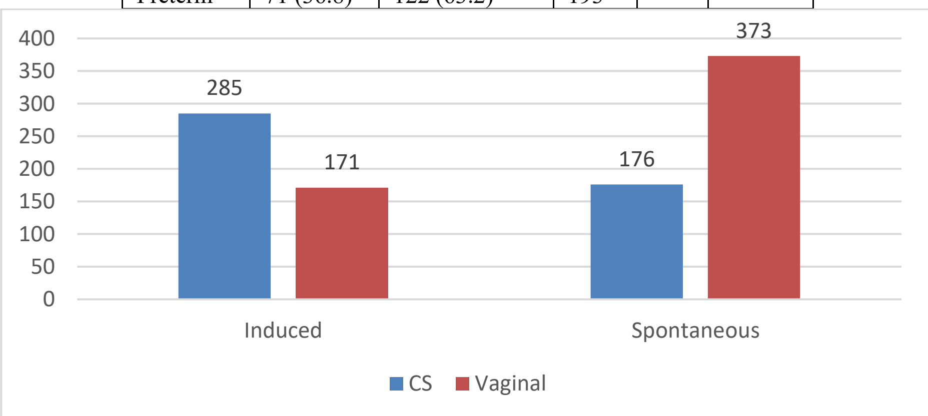

Figure 17: Association of Gestational Age vs Mode of Delivery among the study participants (n=900)

Cesarean section was observed in 285 (40.3%) of term deliveries and 71 (36.8%) of preterm deliveries. Vaginal delivery rates were comparable between term (422, 59.7%) and preterm (122, 63.2%) groups. The association was not statistically significant ($\chi^2 = 0.89$, $p = 0.345$). This indicates that gestational age did not significantly influence mode of delivery in this study.

Table 16: Association of Maternal Age vs Mode of Delivery among the study participants (n=900)

Mode	Mean ± SD	Total	t-value	p-value
CS	29.4 ± 6.0	356	1.2	>0.05
Vaginal	28.8 ± 6.3	544		

The mean maternal age among women undergoing cesarean section was 29.4 ± 6.0 years, compared to 28.8 ± 6.3 years among those delivering vaginally. The difference in mean age between the two groups was minimal. Statistical analysis showed no significant difference ($p > 0.05$). Thus, maternal age was not associated with mode of delivery in the present study.

Table 17: Association of Birth Weight vs Mode of Delivery among the study participants (n=900)

Mode	Mean ± SD	Total	t-value	p-value
CS	3.1 ± 0.5	356	2.8	<0.01
Vaginal	2.9 ± 0.5	544		

The mean birth weight among cesarean deliveries was 3.1 ± 0.5 kg, compared to 2.9 ± 0.5 kg among vaginal deliveries. The difference in birth weight between the two groups was statistically significant ($p < 0.01$). Higher birth weight was associated with an increased likelihood of cesarean section. This suggests that fetal size may influence delivery decisions.

Table 18: Indications for Cesarean Section Among Study Participants (n = 356)

Indication	n	%
Previous Cesarean Section	165	46.3
Non-progression of labour	30	8.4
Fetal distress	55	15.4
Hypertensive disorders of pregnancy	40	11.2
PROM	20	5.6
Failed induction	15	4.2
Cephalopelvic disproportion (CPD)	10	2.8
Breech presentation	8	2.2
Oligohydramnios with IUGR	5	1.4
Multiple pregnancy	3	0.8
Meconium stained liquor (MSL)	2	0.6
Placenta previa	1	0.3
Abruptio placentae	1	0.3
Transverse lie	1	0.3
RHD with MS	0	0.0
Total	356	100%

Among the 356 cesarean sections, the most common indication was previous cesarean section, accounting for 165 cases (46.3%). This was followed by fetal distress (55, 15.4%) and hypertensive disorders of pregnancy (40, 11.2%). Non-progression of labour contributed to 30 cases (8.4%), while PROM and failed induction accounted for 20 (5.6%) and 15 (4.2%) cases respectively. Other indications such as CPD, breech presentation, and oligohydramnios with IUGR were less frequent. Rare indications including placenta previa, abruptio placentae, transverse lie, and meconium-stained liquor each contributed less than 1% of cases.

Robson's Classification results:

Table 19: Distribution of Cesarean Sections According to Robson's Ten Group Classification System (n = 900)

Group	Description	Total Women (n)	CS (n)	Group Size (%)	Group CS Rate (%)	Absolute Contribution (%)	Relative Contribution (%)
1	Nulliparous, singleton, cephalic, ≥37 weeks, spontaneous labour	216	54	24.0	25.0	6.0	15.2
2	Nulliparous, singleton, cephalic, ≥37 weeks, induced/prelabour CS	144	72	16.0	50.0	8.0	20.2
3	Multiparous, singleton, cephalic, ≥37 weeks, spontaneous labour	198	36	22.0	18.2	4.0	10.1

4	Multiparous, singleton, cephalic, ≥37 weeks, induced/prelabour CS	108	45	12.0	41.7	5.0	12.6
5	Previous CS, singleton, cephalic, ≥37 weeks	126	90	14.0	71.4	10.0	25.3
6	Nulliparous breech	36	27	4.0	75.0	3.0	7.6
7	Multiparous breech	18	13	2.0	72.2	1.4	3.7
8	Multiple pregnancy	18	7	2.0	38.9	0.8	2.0
9	Abnormal lie	9	9	1.0	100	1.0	2.5
10	Singleton, cephalic, <37 weeks	27	13	3.0	48.1	1.4	3.7
Total	—	900	356	100%	39.6%	39.6%	100%

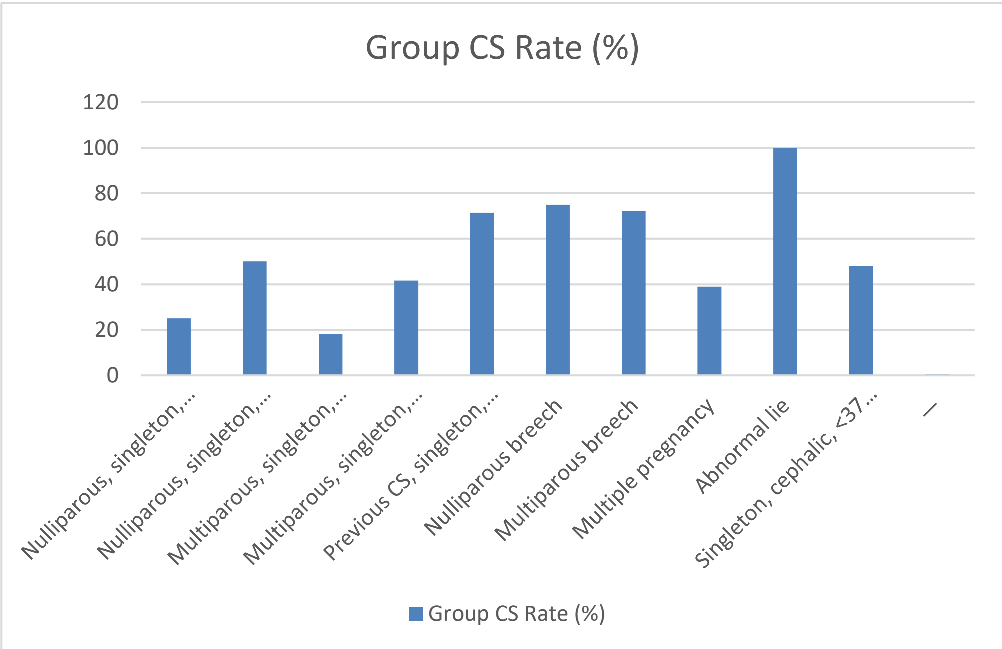

Figure 18: Distribution of Cesarean Sections According to Robson's Ten Group Classification System (n = 900)

Among the 900 women included in the study, the overall cesarean section rate was 39.6% (356/900). The largest group was Group 1 (216, 24.0%), followed by Group 3 (198, 22.0%). The highest group-specific cesarean rates were seen in Group 9 (100%), Group 6 (75.0%), and Group 5 (71.4%). Group 5 contributed the largest share to overall cesareans (90 cases, 25.3%), followed by Group 2 (20.2%) and Group 1 (15.2%). Together, Groups 1, 2, and 5 accounted for the majority of cesarean sections.

Table 20: Sub-classification of Robson Groups 2, 4 and 5 (n = 900)

Group	Subgroup	Description	Total (n)	CS (n)	CS Rate (%)
2	2a	Induced labour	117	50	42.7
2	2b	Pre-labour CS	27	22	81.5
4	4a	Induced labour	90	32	35.6
4	4b	Pre-labour CS	18	13	72.2
5	5a	One previous CS	90	58	64.4
5	5b	≥2 previous CS	36	32	88.9

Within Group 2, most women were in induced labour (2a: 117 cases), with a CS rate of 42.7%, while pre-labour cesarean (2b) showed a much higher rate (81.5%). A similar pattern was seen in Group 4, where induced labour had a lower CS rate compared to pre-labour cesarean. In Group 5, women with ≥2 previous cesareans (5b) had a markedly higher CS rate (88.9%) compared to those with one previous scar (64.4%). This reflects increasing likelihood of repeat cesarean with higher scar burden.

Table 21: Indications for Cesarean Section Across Robson Groups (n = 356)

Robson Group	Major Indication	n (%)
Group 1	Fetal distress	22 (40.7)
Group 2	Failed induction	26 (36.1)
Group 3	Fetal distress	14 (38.9)

Group 4	Failed induction	18 (40.0)
Group 5	Previous CS	90 (100)
Group 6	Breech presentation	21 (77.8)
Group 7	Breech presentation	11 (84.6)
Group 8	Multiple pregnancy	7 (100)
Group 9	Abnormal lie	9 (100)
Group 10	Fetal distress	6 (46.2)

The predominant indication for cesarean section varied across Robson groups. In Groups 1 and 3, fetal distress was the leading indication (~40%). In Groups 2 and 4, failed induction was most common (~36–40%). Group 5 was entirely driven by previous cesarean section (100%). Breech presentation dominated Groups 6 and 7, while abnormal lie and multiple pregnancy accounted for all cesareans in Groups 9 and 8 respectively. Group 10 showed mixed indications with fetal distress being most frequent.

Table 22: Interpretation of Robson Classification Data in the Present Study (n = 900)

Parameter	Standard (Robson/WHO)	Present Study	Interpretation
Total CS rate	10–15%	39.6%	Higher than recommended
Group 9 size	<1%	1.0%	Acceptable
CS rate in Group 9	~100%	100%	No misclassification
Group 1 + 2 size	35–42%	40.0%	Within expected range
Group 3 + 4 size	~30%	34.0%	Slightly higher
Group 5 contribution	~50% of CS	25.3%	Lower than expected
Group 6 + 7 size	3–4%	6.0%	Slightly higher
Group 8 size	1.5–2%	2.0%	Acceptable
Group 10 size	<5%	3.0%	Acceptable
Contribution of Groups 1,2,5	~66%	60.7%	Slightly lower

The overall cesarean section rate in the present study was 39.6%, which is higher than WHO recommendations. The size and CS rate of Group 9 were appropriate, indicating correct classification. The proportion of Groups 1 and 2 (40.0%) was within expected limits, while Groups 3 and 4 were slightly higher. Group 5 contributed 25.3% to total cesareans, which is lower than typical tertiary care patterns. The combined contribution of Groups 1, 2, and 5 accounted for 60.7% of all cesareans, suggesting that both primary and repeat cesareans remain major contributors.

DISCUSSION

The present cross-sectional study was undertaken to analyse caesarean section rates using Robson's Ten Group Classification System at a tertiary care hospital in Chennai, Tamil Nadu. A total of 900 women who delivered during the study period were included, and their demographic characteristics, obstetric history, and mode of delivery were systematically classified according to the RTGCS framework. The study findings reveal important insights into the pattern of CS deliveries in this tertiary care setting and provide a baseline for future quality improvement initiatives.

Overall Caesarean Section Rate

The overall CS rate in the present study was 39.6%, which is substantially higher than the WHO-recommended optimal range of 10–15% [1]. This rate is comparable to findings from other tertiary care centres across India. Arunadevi and colleagues from Tamil Nadu reported an overall CS rate of 34.2% in their institution [31], while Mehta and colleagues from Western India observed a rate of 36.8% [32]. Rajput and colleagues from Mumbai reported an even higher rate of 39.1% [33]. The CS rate in the present study is also consistent with the national trend showing an increase from 17.2% in 2016 to 21.5% in 2021, with private sector rates exceeding 49% [5]. The higher rate in tertiary care settings is expected given the referral nature of these institutions, which manage a higher proportion of high-risk pregnancies, multiple gestations, and obstetric complications [36,37].

Major Contributors to Caesarean Section Rate

The RTGCS analysis revealed that Groups 1, 2, and 5 together contributed 60.7% of all caesarean sections, which is consistent with global patterns where these groups typically account for approximately two-thirds of CS deliveries [4,7]. Group 5 (multiparous with previous caesarean section, singleton, cephalic, term pregnancy) was the largest contributor, accounting for 25.3% of all CS, with a group-specific CS rate of 71.4%. This finding aligns with studies from across the globe that consistently identify Group 5 as the dominant contributor to overall CS rates. Fatima and colleagues from Pakistan reported Group 5 contributed 42.6% of all CS with a CS rate of 95.8% [21], while Abubeker and colleagues from Ethiopia found Group 5 contributed 35.7% with a rate of 92.3% [22]. The lower contribution in the present study (25.3%) may reflect a relatively higher proportion of women opting for trial of labour after caesarean (TOLAC) in this institution compared to other settings, or may be due to differences in the proportion of women with previous CS in the study population.

The high CS rate in Group 5 (71.4%) is consistent with the expected range of 50–60% suggested by WHO reference standards [19], though it remains at the higher end of this range. This indicates that while some women are attempting TOLAC, a substantial proportion still undergo elective repeat caesarean section. The subgroup analysis revealed that women with two or more previous CS (Group 5b) had a CS rate of 88.9%, compared to 64.4% in those with one previous CS (Group 5a). This increasing trend with higher scar burden is consistent with clinical practice, where TOLAC is less frequently offered or attempted after multiple previous caesarean deliveries due to increased risks of uterine rupture [20,28].

Group 2 (nulliparous, singleton, cephalic, term pregnancy, induced or prelabour CS) was the second largest contributor, accounting for 20.2% of all CS, with a group-specific CS rate of 50.0%. This finding mirrors international literature where Group 2 is consistently identified as a major driver of CS rates. In the Ethiopian study by Abubeker and colleagues, Group 2 contributed 19.5% of CS with a rate of 39.2% [22], while in the Pakistani study, Group 2 contributed 19.2% with a rate of 38.5% [21]. The higher CS rate in Group 2 in the present study (50.0%) suggests that induction of labour in nulliparous women in this setting is associated with a particularly high likelihood of caesarean delivery. This may be due to multiple factors, including patient selection for induction, timing of induction, methods used, and management of failed induction or labour dystocia [10,26].

The subgroup analysis of Group 2 revealed a marked difference between induced labour (Group 2a) and prelabour CS (Group 2b). Induced labour had a CS rate of 42.7%, while prelabour CS (planned caesarean without labour) had a rate of 81.5%. This suggests that a significant proportion of nulliparous women are undergoing elective prelabour caesarean section without attempting labour, which represents an important area for potential intervention. Reducing primary CS in nulliparous women is critical, as each primary CS becomes a future Group 5 case, perpetuating the cycle of repeat caesarean deliveries [9].

Group 1 (nulliparous, singleton, cephalic, term pregnancy, spontaneous labour) was the third largest contributor, accounting for 15.2% of all CS, with a group-specific CS rate of 25.0%. This is higher than the WHO-recommended target of <10% for this low-risk group [4]. The finding that one in four low-risk nulliparous women with spontaneous labour ultimately undergo caesarean section is concerning and suggests potential overuse of CS for indications such as labour dystocia or fetal distress. Similar findings have been reported in other Indian studies, where Group 1 CS rates ranged from 20–30% [31,32]. The primary indication for CS in Group 1 was fetal distress (40.7%), which may reflect either genuine fetal compromise or a low threshold for intervention in this population.

Group 3 (multiparous without uterine scar, spontaneous labour) contributed 10.1% of CS with a group-specific rate of 18.2%, which is considerably higher than the expected rate of <3% [12]. This finding is concerning, as multiparous women with proven vaginal delivery capacity should have very low CS rates. High CS rates in this group may indicate issues with labour management, intrapartum monitoring, or inappropriate diagnoses of labour dystocia [14]. Group 4 (multiparous without uterine scar, induced labour) contributed 12.6% of CS with a rate of 41.7%, which exceeds the expected range of <15% [15]. The subgroup analysis showed that induced labour (Group 4a) had a CS rate of 35.6%, while prelabour CS (Group 4b) had a rate of 72.2%, again highlighting the impact of planned caesarean without labour on overall CS rates.

Breech and Multiple Pregnancy Groups

Groups 6 (nulliparous breech) and 7 (multiparous breech) had CS rates of 75.0% and 72.2%, respectively, which are consistent with modern obstetric practice following the Term Breech Trial [20]. These groups contributed 7.6% and 3.7% to the overall CS rate, respectively. The size of these groups (4.0% for Group 6 and 2.0% for Group 7) is slightly higher than the expected 3–4% combined proportion [22], which may reflect the tertiary care referral nature of the institution, where more breech presentations are managed. Efforts to reduce CS in these groups should focus on increasing the uptake of external cephalic version (ECV) in eligible women, which can convert breech to cephalic presentation and allow for vaginal delivery [24].

Group 8 (multiple pregnancy) contributed 2.0% of CS with a rate of 38.9%, which is within the expected range of 40–60% [25]. The relatively low CS rate for multiple pregnancies in this study compared to some other tertiary centres [26] may indicate a favourable approach to vaginal delivery for twins when the presenting twin is cephalic and appropriate facilities are available.

Group 9 (abnormal lie) had a CS rate of 100%, as expected, and contributed 2.5% to the overall CS rate. The size of this group (1.0%) is within the expected range of <1% [28].

Group 10 (singleton, cephalic, preterm pregnancy) contributed 3.7% of CS with a rate of 48.1%. This group is often larger in tertiary care referral centres that manage high-risk pregnancies [33]. The high CS rate in this group is expected, as preterm deliveries are frequently associated with maternal complications such as severe preeclampsia, placenta praevia, or fetal indications such as non-reassuring status or growth restriction [30,31].

Indications for Caesarean Section

The most common indication for CS overall was previous CS, accounting for 46.3% of all caesarean deliveries. This finding reinforces the dominant role of Group 5 in driving overall CS rates. Fetal distress was the second most common indication (15.4%), followed by hypertensive disorders of pregnancy (11.2%). The predominance of previous CS as an indication reflects the ongoing challenge of reducing repeat caesarean deliveries through successful TOLAC programs.

The variation in indications across Robson groups provides valuable insights for targeted interventions. In low-risk Groups 1 and 3, fetal distress was the leading indication (40.7% and 38.9%, respectively), suggesting that careful evaluation of fetal heart rate patterns and appropriate interpretation of cardiotocography may help reduce unnecessary CS in these groups [8]. In induced groups (Groups 2 and 4), failed induction was the most common indication (36.1% and 40.0%, respectively), highlighting the need for improved protocols for patient selection for induction, methods of induction, and management of the latent phase of labour [26].

Comparison with International Data

The findings of the present study align closely with the global literature on RTGCS application. A recent large-scale study from Israel by Shtainmetz and colleagues, analysing 1,061,786 live births over ten years, reported an overall CS rate of 18.2% [45]. While this is substantially lower than the 39.6% observed in the present study, it reflects differences in healthcare systems, population characteristics, and obstetric practices. Notably, the Israeli study identified Group 5 as the largest contributor (17.8% relative contribution), followed by Group 1 (14.2%) and Group 8 (13.6%) [45]. The present study similarly found Group 5 as the dominant contributor, though with a higher relative contribution (25.3%), reflecting the higher baseline CS rate in this setting.

A study from Turkey by Duzguner and colleagues reported an overall CS rate of 48.2% in a tertiary care centre, with Groups 5, 2, and 1 as the major contributors [44]. This pattern is consistent with the present study and further supports the universal finding that primary and repeat caesarean sections in nulliparous and multiparous women are the primary drivers of overall CS rates across diverse geographical settings.

The rising global trend of caesarean section rates has been well-documented, with Betran and colleagues reporting that the global CS rate increased from approximately 7% in 1990 to 21% in 2014, with projections suggesting that by 2030, nearly one in three women will deliver by caesarean section [46]. This global escalation has prompted efforts to establish evidence-based benchmarks for CS rates, leading to the development of the Robson classification-based C-Model by Souza and colleagues, which provides a global reference for evaluating whether CS rates in a given setting are higher or lower than expected based on the distribution of obstetric populations [47]. The utility of RTGCS as a tool for driving quality improvement has been demonstrated in multiple settings. In Brazil, the "Project Appropriate Birth" (PPA) implemented a multifaceted strategy that included organisational restructuring, women's education, and continuous monitoring of Robson groups, achieving a significant reduction in overall CS rates, particularly in low-risk Groups 1–4 [48]. Similarly, a quality improvement initiative targeting Robson Groups 1 and 3 in a private Brazilian hospital, which incorporated midwife-obstetrician collaborative care, dedicated medical coordination, daily supervisory rounds, and updated labour protocols, achieved a notable relative reduction in CS rates among women cared for by the in-house team [49]. Factors associated with CS in nulliparous women, as identified by Panda and colleagues in a multicentre prospective cohort study, include maternal age, induction of labour, and institutional practices, highlighting the modifiability of CS rates in Groups 1 and 2 [50]. In France, audit and feedback using RTGCS within a perinatal network led to significant changes in CS rates, demonstrating that systematic implementation of the classification system coupled with regular feedback can drive sustained improvements in obstetric practice [51]. These international experiences underscore that the RTGCS is not merely a monitoring tool but a practical framework for driving targeted, data-driven interventions. The findings of the present study, which identify Groups 1, 2, and 5 as major contributors to CS rates, align with these global patterns and suggest that targeted interventions modelled on successful international initiatives could be effectively adapted to the South Indian tertiary care context.

Strengths of the Study

The present study has several methodological strengths. First, the prospective cross-sectional design with consecutive sampling minimized selection bias and ensured representativeness of the delivery population. Second, the use of the standardised RTGCS framework allows for meaningful comparison with national and international studies. Third, the inclusion of detailed demographic, obstetric, and neonatal data enabled comprehensive characterisation of the study population. Fourth, the subgroup analysis of Groups 2, 4, and 5 provided deeper insights into the specific drivers within these major contributing groups. Fifth, the analysis of indications for CS across Robson groups provides actionable information for targeted quality improvement initiatives. Sixth, the sample size of 900 was an adequate amount of sample to power the study. Seventh, the study was conducted in a tertiary care teaching hospital, which serves as a referral centre for high-risk pregnancies, making the findings relevant to similar settings in South India.

Limitations of the Study

Few limitations of this study should be acknowledged. First, the study was conducted at a single tertiary care centre, which may limit the generalisability of findings to primary or secondary care settings or to other geographical regions. Second, the cross-sectional design provides a snapshot of CS rates over a defined period but cannot establish causality or track changes over time. Third, the study did not include maternal and neonatal outcomes such as maternal morbidity, neonatal Apgar scores, NICU admission rates, or perinatal mortality, which would provide a more comprehensive assessment of the appropriateness of CS decisions. Fourth, the study did not assess the appropriateness of indications for CS, particularly in groups with high CS rates such as Groups 1 and 2, where some CS may have been performed without clear medical indication. Fifth, the study did not evaluate the success rates of TOLAC or factors influencing the decision for elective repeat CS in Group 5. The study did not incorporate patient-reported outcomes or preferences, which may influence CS decision-making and the absence of external validation or comparison with other institutions limits the ability to benchmark performance.

Implications for Clinical Practice

The findings of this study have several important implications for clinical practice. First, the high contribution of Group 5 to overall CS rates highlights the need for robust TOLAC programs with dedicated counselling services, clear protocols, and continuous monitoring of outcomes. Second, the high CS rate in Group 2 suggests that induction of labour in nulliparous women requires careful patient selection, adherence to evidence-based protocols, and enhanced training in managing induced labour. Third, the high CS rate in low-risk Group 1 indicates a need for improved intrapartum monitoring and management of spontaneous labour in first-time mothers, including appropriate use of partograms and labour support. Fourth, the high CS rate in multiparous women without uterine scar (Groups 3 and 4) warrants investigation into labour management practices and may indicate areas for quality improvement. Fifth, the subgroup analysis of prelabour CS in Groups 2 and 4 suggests that elective primary CS without medical indication is an important target for intervention.

Future Directions

Future research should focus on implementing and evaluating targeted interventions aimed at reducing CS rates in the major contributing groups identified in this study. Longitudinal studies with repeated RTGCS audits would enable tracking of trends over time and assessment of the impact of quality improvement initiatives. Incorporation of maternal and neonatal outcomes into RTGCS analysis would provide a more comprehensive assessment of the appropriateness of CS decisions. Qualitative studies exploring patient and provider perspectives on CS decision-making would provide valuable insights into the factors driving high CS rates. Multicentre studies across different types of healthcare facilities would enable benchmarking and identification of best practices.

Summary:

- The study evaluated caesarean section (CS) rates using Robson's Ten Group Classification System in a tertiary care hospital.
- A total of 900 deliveries were analyzed, representing a high-volume referral setting.
- The overall CS rate was 39.6%, higher than WHO recommendations.
- Most women were in the optimal reproductive age group, multiparous, and delivered at term.
- Cephalic presentation was most common, though malpresentation contributed to higher CS rates.
- Induction of labour was frequently associated with an increased likelihood of CS.
- Previous caesarean section was the strongest determinant of repeat CS.
- Fetal presentation, previous CS, induction, and birth weight showed significant association with mode of delivery.
- Major indications for CS included previous CS, fetal distress, and hypertensive disorders of pregnancy.
- The study highlights the need to reduce primary CS and promote TOLAC to control rising CS rates.

CONCLUSION

This cross-sectional study of 900 deliveries at a tertiary care hospital in Chennai demonstrates that the overall caesarean section rate is 39.6%, substantially higher than WHO-recommended levels. Robson's Ten Group Classification System identified Groups 5 (previous CS), 2 (nulliparous induced/prelabour), and 1 (nulliparous spontaneous labour) as the major contributors, together accounting for 60.7% of all caesarean sections. Group 5 alone contributed 25.3% of CS, with a CS rate of 71.4%, while Group 2 contributed 20.2% with a rate of 50.0%, and Group 1 contributed 15.2% with a rate of 25.0%. Subgroup analysis revealed that women with multiple previous CS (Group 5b) had a CS rate of 88.9%, while prelabour CS in nulliparous women (Group 2b) had a rate of 81.5%.

The findings highlight that, although repeat cesarean sections remain an important contributor, primary cesarean sections in nulliparous women (Groups 1 and 2) are key drivers of the overall CS rate in this setting. This underscores the need for targeted interventions aimed at optimizing labour management, reducing unnecessary inductions, and limiting elective prelabour cesarean sections. At the same time, efforts should be made to promote safe trial of labour after cesarean (TOLAC) in appropriately selected women.

Implementation of Robson's Ten Group Classification System as a routine audit tool can facilitate continuous monitoring, enable identification of target groups, and support evidence-based quality improvement initiatives to optimize cesarean section rates while ensuring maternal and neonatal safety. This study establishes a robust baseline for future audits at this institution and contributes to the growing body of evidence on cesarean section patterns in tertiary care settings in South India.

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