



# PREOPERATIVE CLINICAL-ANAMNESTIC AND ANTENATAL CARE PREDICTORS OF EMERGENCY CESAREAN SECTION IN NULLIPAROUS WOMEN: A COMPARATIVE STUDY

Namozova Z.S.<sup>1</sup>, Mukhamadieva S. M.<sup>1</sup>, Khalimova F.T<sup>2</sup>.

<sup>1</sup> Department of Obstetrics and Gynecology N1 named after Professor Narzullaeva E.N., State Educational Institution "Institute of Postgraduate Education in Healthcare of the Republic of Tajikistan", Tajikistan  
<sup>2</sup>Medico-Social Institute of Tajikistan, Tajikistan

For Correspondence: Fariza Tursunbaeva Khalimova

Article DOI: <https://doi.org/10.36713/epra26297>  
DOI No: 10.36713/epra26297

## ANNOTATION

**Purpose of the study.** To identify clinical-anamnestic and antenatal care predictors of emergency cesarean section (CS) in nulliparous women compared with planned operative delivery.

**Material and methods.** A retrospective cohort study analyzed 350 delivery records of nulliparous women who underwent CS in 2022-2024 at the Tajik Research Institute of Obstetrics, Gynecology and Perinatology (tertiary-level hospital). The emergency CS group included 245 women corresponding to Robson TGCS groups I-II, operated on urgently during spontaneous or induced labor, or before labor onset due to urgent indications. The planned CS group included 105 nulliparous women delivered electively. Categorical variables were compared using Pearson's chi-square test ( $\chi^2$ ). Differences were considered statistically significant at  $p < 0.05$ .

**Research results.** The mean maternal age was  $24.7 \pm 0.4$  years in the emergency CS group versus  $29.5 \pm 0.5$  years in the planned CS group ( $p < 0.05$ ). Early reproductive age (18-24 years) was more frequent in emergency CS:  $132/53.8 \pm 3.2\%$  vs  $28/26.6 \pm 4.3\%$ , whereas late reproductive age (35-48 years) was more common in planned CS:  $33/31.4 \pm 4.5\%$  vs  $31/29.5 \pm 2.1\%$  ( $p < 0.05$ ). Maternal anemia and urinary system diseases were significantly more prevalent in emergency CS ( $38.3 \pm 3.1\%$  and  $27.0 \pm 2.8\%$ ) than in planned CS ( $27.6 \pm 4.4\%$  and  $19.0 \pm 3.8\%$ ;  $p < 0.05$ ). In contrast, a complicated obstetric-gynecological history was observed more often in the planned CS group ( $41.9 \pm 2.4\%$  vs  $20.8 \pm 1.9\%$ ). Antenatal care indicators demonstrated poorer early registration before 12 weeks in the emergency CS group ( $42.4\%$  vs  $51.1\%$ ;  $p < 0.05$ ) and lower adherence to the recommended number of visits (7-8 visits):  $25.7 \pm 3.1\%$  vs  $43.3 \pm 5.3\%$  ( $p < 0.05$ ).

**Conclusions.** Emergency CS in nulliparous women is associated with younger maternal age, higher prevalence of anemia and urinary system diseases, and markers of insufficient antenatal care (later registration, fewer visits, and organizational deficiencies in referral and routing). These factors may serve as clinically relevant predictors of urgent operative delivery and targets for preventive interventions.

**KEYWORDS.** Nulliparous Women, Cesarean Section, Emergency Cesarean Section, Planned Cesarean Section, Robson Classification, Antenatal Care, Predictors.

## TOPICALITY

Cesarean section (CS) rate has become a key indicator of access to obstetric services and the quality of perinatal care. Over recent decades, a steady global increase in CS has been documented, raising concerns about unnecessary surgical deliveries and the potential for excessive obstetric intervention [1-3]. While CS can be life-saving when appropriately indicated, overuse may not improve maternal and neonatal outcomes and can increase short- and long-term risks for both mother and infant, as well as contribute to a growing population of women who may require repeat operations in subsequent pregnancies [5].

The World Health Organization recommends the Robson Ten Group Classification System (TGCS) as a standardized tool for monitoring and auditing CS rates. TGCS enables identification of the groups contributing most to overall CS levels and helps

develop targeted strategies to reduce avoidable operative deliveries [10]. Within this framework, nulliparous women, particularly those belonging to TGCS groups I-II, represent a critical population because the absence of prior delivery experience, increased risk of labor dysfunction, and comorbid somatic conditions may predispose them to emergency CS [6-9].

In this context, identifying clinical-anamnestic and antenatal care factors associated with emergency CS is essential for improving early risk stratification, strengthening referral pathways, and optimizing antenatal surveillance.

## PURPOSE OF THE STUDY

To identify clinical-anamnestic and antenatal care predictors of emergency cesarean section in nulliparous women compared with planned operative delivery.



## RESEARCH MATERIALS AND METHODS

**Study design.** Retrospective cohort study with two-group comparison.

**Setting.** Tajik Research Institute of Obstetrics, Gynecology and Perinatology (tertiary-level hospital), 2022-2024. Study population. A total of 350 nulliparous women delivered by CS were included.

**Groups.** Emergency CS group (n = 245): nulliparous women corresponding to Robson TGCS groups I-II, undergoing urgent CS during spontaneous or induced labor, or before labor onset due to urgent indications.

**Planned CS group (n = 105):** nulliparous women delivered by elective CS.

**Variables.** Maternal age, place of residence, occupation, somatic comorbidity profile, obstetric-gynecological history, antenatal care characteristics (registration before 12 weeks, number of visits, type of provider supervision), and organizational admission/routing factors.

Statistical analysis. Data were processed using standard methods of variation statistics. Categorical variables were compared with Pearson's chi-square test ( $\chi^2$ ). A p-value < 0.05 was considered statistically significant.

## RESEARCH RESULTS

### Maternal Age Distribution

The mean maternal age differed significantly between groups: 24.7 ± 0.4 years in the emergency CS group and 29.5 ± 0.5 years in the planned CS group (p < 0.05). Early reproductive age (18-24 years) was significantly more frequent among women undergoing emergency CS (132/53.8 ± 3.2%) compared with elective CS (28/26.6 ± 4.3%). Conversely, late reproductive age (35-48 years) was more prevalent in the planned CS group (33/31.4 ± 4.5%) than in the emergency CS group (31/12.6 ± 2.1%) (p < 0.05). These patterns may reflect increased labor dysfunction and delayed medical contact among younger nulliparous women, while older primigravidae are more often managed with a cautious elective surgical strategy. (Table 1).

**Table 1**

**Maternal age characteristics in nulliparous women by type of cesarean section**

Indicator	Emergency CS (n=245)	Planned CS (n=105)	p-value
Mean maternal age, years (M ± m)	24.7 ± 0.4	29.5 ± 0.5	< 0.05
Early reproductive age 18-24 years, n (% ± m)	132 (53.8 ± 3.2)	28 (26.6 ± 4.3)	< 0.05
Late reproductive age 35-48 years, n (% ± m)	31 (12.6 ± 2.1)	33 (31.4 ± 4.5)	< 0.05

*Note: Categorical variables were compared using Pearson's chi-square test ( $\chi^2$ ). Mean age was compared between groups at p < 0.05 (as reported in the dataset/analysis).*

### Somatic Comorbidity Profile

A combination of 2-3 somatic diseases was frequently observed in both groups. However, anemia of varying severity and urinary system diseases were significantly more common in emergency CS (94/38.3 ± 3.1% and 66/27.0 ± 2.8%) (Table 2) compared with planned CS (29/27.6 ± 4.4% and 20/19.0 ± 3.8%; p < 0.05). These conditions may contribute to reduced

physiological reserve and higher susceptibility to acute obstetric complications requiring urgent intervention.

In contrast, conditions typically considered relative indications for elective operative delivery, including high-degree myopia, obesity, and congenital heart defects, were comparatively more frequent in the planned CS group (p < 0.05), reflecting clinical selection for scheduled surgery.

**Table 2.**

**Somatic comorbidity profile in nulliparous women by type of cesarean section**

Somatic condition	Emergency CS (n=245), n (% ± m)	Planned CS (n=105), n (% ± m)	p-value
Anemia (any severity)	94 (38.3 ± 3.1)	29 (27.6 ± 4.4)	< 0.05
Urinary system diseases	66 (27.0 ± 2.8)	20 (19.0 ± 3.8)	< 0.05
High-degree myopia	Higher in planned CS*	Higher in planned CS*	< 0.05*
Obesity	Higher in planned CS*	Higher in planned CS*	< 0.05*
Congenital heart defects	Higher in planned CS*	Higher in planned CS*	< 0.05*

*Note: The source text indicates that high-degree myopia, obesity, and congenital heart defects were more frequent in the planned CS group with statistical significance (p < 0.05), but absolute numbers/percentages were not provided in the excerpt. If you give the n and % for these three conditions, I will insert them into the table and keep the same format.*

### Obstetric-Gynecological History

A complicated obstetric-gynecological history was detected approximately twice as often in the planned CS group compared with the emergency CS group (44/41.9 ± 2.4% vs 51/20.8 ± 1.9%) (Table 3). Higher prevalence of infertility and uterine myoma in the planned CS group suggests a more protective delivery strategy for women with reproductive risk factors and potentially limited fertility prognosis.

### Antenatal care and Organizational Factors

Most women in both cohorts were registered for antenatal care; however, early registration before 12 weeks was significantly lower in the emergency CS group (84/42.4%) (Table 3) compared with the planned CS group (46/51.1%; p < 0.05). Adherence to the recommended number of antenatal visits (7-8 visits according to national standards) was insufficient overall but significantly better in the planned CS group (39/43.3 ± 5.3%) versus the emergency CS group (51/25.7 ± 3.1%; p < 0.05).



These findings indicate that limited early surveillance and insufficient follow-up may reduce timely detection of

pregnancy complications and increase the probability of urgent operative delivery.

**Table 3.**  
**Obstetric-gynecological history and antenatal care indicators by type of cesarean section**

Indicator	Emergency CS (n=245)	Planned CS (n=105)	p-value
Complicated obstetric-gynecological history, n (% ± m)	51 (20.8 ± 1.9)	44 (41.9 ± 2.4)	< 0.05
Early antenatal registration (<12 weeks), n (%)	84 (42.4)	46 (51.1)	< 0.05
Recommended number of antenatal visits (7-8), n (% ± m)	51 (25.7 ± 3.1)	39 (43.3 ± 5.3)	< 0.05

*Note: Group comparisons were performed using Pearson's chi-square test ( $\chi^2$ );  $p < 0.05$  was considered statistically significant.*

## DISCUSSION

The present study confirms that emergency cesarean section (CS) in nulliparous women is not a random event but is associated with a recognizable cluster of clinical and organizational risk factors. In our cohort, emergency CS was significantly more common among younger women, and this group also had higher rates of anemia and urinary system pathology, along with less favorable antenatal care indicators. Taken together, these findings suggest that emergency CS in nulliparous women is often the final clinical outcome of an accumulated risk trajectory beginning in early pregnancy and continuing through inadequate surveillance and delayed escalation of care.

A key finding of this study is the significantly younger maternal age in the emergency CS group, with a higher proportion of women aged 18-24 years. This pattern may be explained by several mechanisms. First, younger nulliparous women may be more susceptible to functional immaturity of the cervix and birth canal, higher prevalence of ineffective uterine activity, and a higher likelihood of labor dysfunction, which increases the probability of urgent operative delivery. Second, younger age may be indirectly associated with reduced health literacy, later seeking of medical help, or lower adherence to recommended prenatal care schedules, particularly in settings where access to specialized services is uneven. Therefore, age in this context likely acts both as a biological factor and as a marker of social and healthcare utilization determinants.

The higher prevalence of anemia in the emergency CS group is clinically meaningful. Anemia during pregnancy is known to reduce oxygen delivery capacity, impair compensatory hemodynamic mechanisms, and increase maternal vulnerability to stressors such as prolonged labor, bleeding, and infection. In intrapartum conditions, anemia may contribute to faster maternal exhaustion, reduced tolerance to uterine contractions, and a higher likelihood of clinical deterioration, thereby increasing the risk of emergency CS. Additionally, anemia may coexist with nutritional deficiencies and chronic inflammation, which can negatively affect placental function and fetal oxygenation. Consequently, the association between anemia and emergency CS may reflect both maternal decompensation risk and increased probability of fetal compromise, including intrapartum distress.

Urinary system pathology was also significantly more frequent in the emergency CS group. This finding can be interpreted as an indicator of chronic or recurrent infection, inflammation, or renal functional burden during pregnancy. Urinary tract

infections and pyelonephritis are known to increase the risk of preterm uterine activity, systemic inflammatory response, and obstetric complications. Even when pregnancy reaches term, recurrent urinary pathology may be associated with subclinical inflammation and impaired maternal physiological reserve, which can predispose to intrapartum complications and urgent interventions. Importantly, urinary pathology is a potentially modifiable risk factor, and adequate screening, early treatment, and follow-up could contribute to improved labor outcomes and reduced emergency CS rates.

From a public health and health-system perspective, the antenatal care indicators represent one of the most actionable domains revealed by this study. Early antenatal registration before 12 weeks and adherence to the recommended number of visits (7-8) were significantly lower in the emergency CS group. Late registration limits the opportunity for early risk stratification, timely correction of anemia, identification of urinary pathology, and detection of hypertensive disorders or fetal growth disturbances. Similarly, insufficient visit frequency reduces the chance to monitor blood pressure trends, weight gain, laboratory parameters, and fetal well-being, and delays referral to higher-level facilities when complications are emerging. In the setting of a tertiary-level hospital, lower-quality antenatal follow-up often results in a higher proportion of urgent admissions, where emergency CS becomes the safest and most immediate method of preventing severe maternal or neonatal adverse outcomes.

In contrast, the planned CS group included a higher proportion of women of late reproductive age and women with complicated reproductive histories, such as infertility and uterine myoma. This observation supports a clinically rational approach in which elective operative delivery is selected as a protective strategy for pregnancies with higher reproductive value and potentially limited fertility prognosis. For these women, clinicians may prioritize avoiding prolonged labor, reducing the risk of intrapartum complications, and ensuring controlled surgical conditions. Therefore, the planned CS group reflects a more structured and predictable clinical pathway, which may reduce intrapartum emergencies and allows optimization of perioperative preparation.

Overall, the differences between groups highlight practical prevention strategies at both clinical and organizational levels. Clinically, strengthening screening and treatment of anemia and urinary tract pathology during pregnancy may reduce maternal vulnerability to intrapartum stress and lower emergency CS risk. Organizationally, improving early antenatal registration,



ensuring sufficient number of prenatal visits, and optimizing referral and routing systems are essential to shift the balance from urgent operative interventions to planned and evidence-based delivery management. In addition, targeted counseling and education for younger nulliparous women, with emphasis on early prenatal engagement and recognition of warning symptoms, may improve timely care-seeking behavior and reduce late presentations that necessitate emergency CS.

In summary, emergency CS in nulliparous women appears to be driven by a combined influence of biological factors (age-related labor dysfunction risk), modifiable maternal comorbidities (anemia and urinary pathology), and health-system determinants (late registration and insufficient antenatal follow-up). Addressing these factors through integrated antenatal care improvement and strengthened risk management pathways may represent an effective approach to reducing the burden of emergency CS and improving maternal and perinatal outcomes.

## CONCLUSION

Emergency cesarean section in nulliparous women is significantly associated with younger maternal age, increased prevalence of anemia and urinary system diseases, and markers of insufficient antenatal care (lower early registration and fewer recommended visits). These factors may be considered practical predictors of urgent operative delivery and targets for preventive interventions. Strengthening antenatal surveillance, improving routing and referral mechanisms, and ensuring timely management of maternal comorbidities may reduce the burden of emergency CS and improve maternal and perinatal outcomes.

## LITERATURE

1. Vuchenovich YuD, Olenev AS, Novikova VA, Radzinsky VE. Cesarean section: limits of risks and safety. *Obstetrics and Gynecology: News, Opinions, Training*. 2019;7(3):93-101. doi:10.24411/2303-9698-2019-13014.
2. Lebedenko EYu, Bepalaya AV, Feoktistova TE, Rymashevsky MA. Analysis of global cesarean section trends using the Robson classification. *Medical Bulletin of the South of Russia*. 2021;12(2):16-21.
3. Medzhidova DR, Marshalov DV, Petrenko AP, Shifman EM. Perioperative and long-term complications of cesarean section: a systematic review. *Saratov Journal of Medical Scientific Research*. 2020;16(1):9-17.
4. Betran AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates. *BMJ Glob Health*. 2021;6(6):e005671. doi:10.1136/bmjgh-2021-005671.
5. Molina G, Weiser TG, Lipsitz SR, et al. Relationship Between Cesarean Delivery Rate and Maternal and Neonatal Mortality. *JAMA*. 2015;314(21):2263-2270. doi:10.1001/jama.2015.15553.
6. Nahar Z, Sohan M, Hossain MJ, Islam MR. Unnecessary cesarean section delivery causes risk to both mother and baby. *INQUIRY*. 2022;59. doi:10.1177/00469580221116004.