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FACTORS ASSOCIATED WITH CESAREAN SECTION AT NGHE AN GENERAL FRIENDSHIP HOSPITAL IN 2024–2025

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ABSTRACT

Objective: To identify factors associated with cesarean section at Nghe An General Friendship Hospital during 2024-2025.

Methods: An analytical cross-sectional study was conducted on 201 women who delivered at Nghe An General Friendship Hospital from June 1, 2024 to June 1, 2025. Associations between cesarean section and selected factors were assessed using Chi-square tests, with a significance level of $p < 0,05$.

Results: The cesarean section rate was 41,8%. Factors significantly associated with cesarean section included maternal age ≥35 years (69,1% vs. 23,3%; $p < 0,001$), previous cesarean section (100% vs. 29,1%; $p < 0,001$), multiparity (49,5% vs. 33,3%; $p = 0,022$), non-cephalic fetal presentation (91,7% vs. 38,6%; $p < 0,001$), and conception via assisted reproductive technology (IVF) (90,0% vs. 39,3%; $p = 0,002$). No significant associations were found with residence, gestational age, history of miscarriage/stillbirth, or maternal comorbidities ($p > 0,05$).

Conclusion: Cesarean section was associated with several maternal and pregnancy-related factors, particularly previous cesarean section, abnormal fetal presentation, and IVF conception. These findings may help guide more appropriate use of cesarean section in clinical practice.

Keywords: Cesarean section, associated factors, obstetrics, pregnancy, Vietnam.

1. INTRODUCTION

Cesarean section is an essential obstetric intervention that can reduce maternal and neonatal morbidity and mortality when appropriately indicated. The World Health Organization (WHO) reports that the optimal cesarean section rate ranges from 10% to 15% (1). However, in recent years, cesarean section rates have increased substantially worldwide, exceeding recommended levels in many countries and regions. This upward trend has also been clearly observed in Asian countries, including Vietnam [2].

The rising rate of cesarean section does not solely reflect medical necessity but is influenced by multiple factors. Overuse of cesarean section may lead to adverse outcomes for both mothers and newborns, including an increased risk of intraoperative and postoperative complications, as well as long-term risks in subsequent pregnancies [1,3]. Recent recommendations have emphasized the need to limit unnecessary cesarean sections in order to ensure maternal and neonatal safety[1,4].

Previous research suggests that cesarean section is influenced by multiple maternal and pregnancy-related factors. These include maternal age, obstetric history, previous cesarean section, as well as characteristics of the current pregnancy such as fetal presentation, plurality, and mode of conception (5,6). Identifying and analyzing these factors is important for understanding the drivers of increasing cesarean section rates and for developing appropriate interventions.

At Nghe An General Friendship Hospital, studies examining factors associated with cesarean section remain limited, particularly in provincial general hospitals. Therefore, analyzing factors associated with cesarean section at a specific healthcare setting is important for providing practical evidence to support obstetric management and care. Based on these considerations, this study was conducted to identify factors associated with cesarean section at Nghe An General Friendship Hospital in 2024–2025.

2. METHODS

2.1. Study population

The study included all women who delivered at Nghe An General Friendship Hospital from June 1, 2024 to June 1, 2025.

- Inclusion criteria:

+ Gestational age ≥28 weeks

+ Complete medical records

- Exclusion criteria:

+ Stillbirth

+ Absence of first-trimester ultrasound for gestational age confirmation

2.2. Study design and variables

This study employed a cross-sectional design to identify factors associated with cesarean section. Collected variables included:

+ General characteristics: maternal age, residence, underlying medical conditions.

+ Obstetric history: parity, previous cesarean section.

+ Current pregnancy characteristics: number of fetuses, fetal presentation, mode of conception.

2.3. Data collection and analysis

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Statistical analysis was performed using SPSS version 27.0. Descriptive statistics were used to summarize baseline characteristics. The association between categorical variables and cesarean section was assessed using the Chi-square test. A p-value < 0.05 was considered statistically significant.

2.4. Ethical considerations

This study was conducted using retrospective medical records and did not involve any intervention on mothers or newborns. The study protocol was approved by the Scientific Committee of Nghe An General Friendship Hospital.

No additional costs were incurred by participants. All personal information was kept strictly confidential and used solely for research purposes.

3. RESULTS

From June 1, 2024 to June 1, 2025, a total of 201 women met the inclusion criteria and were included in the analysis.

Table 1. General characteristics of the study population (n = 201)

Maternal age	n	%
< 35	120	59,7%
≥ 35	71	40,3%
Total	201	100

Women aged < 35 years accounted for the highest proportion (59,7%), while those aged ≥35 years accounted for 40,3%. The study population mainly consisted of women in the common reproductive age group, although a considerable proportion were of advanced maternal age.

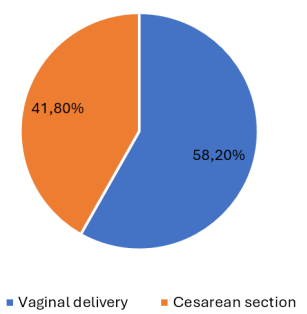


Figure 1. Rate of cesarean section (n=201)

Vaginal delivery accounted for 58,2%, which was higher than the cesarean section rate (41,8%). This indicates that vaginal delivery remained the predominant mode of delivery, although the cesarean section rate was still relatively high.

Table 2. Maternal age and cesarean section (n=201)

Maternal age	Vaginal delivery		Cesarean section		Total	%	p
	n	%	n	%			
< 35	92	76,7	28	23,3	120	59,7	< 0,001
≥ 35	25	30,9	56	69,1	81	40,3	
Total	117	58,2	84	41,8	201	100,0	

The cesarean section rate was markedly higher among women aged ≥35 years compared to those aged <35 years (69,1% vs. 23,3%). In contrast, vaginal delivery was more common in the <35 age group (76,7%). This difference was statistically significant (p < 0,001), indicating an association between maternal age and cesarean section.

Table 3. Residence and mode of delivery (n=201)

Residence	Vaginal delivery		Cesarean section		Total	%	p
	n	%	n	%			
Urban	36	60,0	24	40,0	60	29,9	0,737
Rural	81	57,4	60	42,6	141	70,1	
Total	117	51,5	84	48,5	201	100,0	

No significant difference in cesarean section rates was observed between women living in urban and rural areas (40,0% vs. 42,6%; p = 0,737), suggesting that residence was not associated with cesarean section in this study.

Table 4. Obstetric history and cesarean section (n=201)

Characteristic	Vaginal delivery		Cesarean section		Total	%	p
	n	%	n	%			
Previous cesarean section							
No	117	70,9	48	29,1	165	82,0	< 0,001
Yes	0	0	36	100	36	18,0	
Parity							
Nullipa-rous	64	66,7	32	33,3	96	47,8	0,022
Multipa-rous	53	50,5	52	49,5	105	52,2	
History of miscarriage/stillbirth							
No	93	58,1	67	41,9	160	79,6	0,961
Yes	24	58,5	17	41,5	41	20,4	
Maternal comorbidities							
No	92	60,1	61	39,9	153	76,1	0,324
Yes	25	52,1	23	47,9	48	23,9	
Total	117	51,5	84	48,5	201	100,0	

Previous cesarean section was the strongest factor associated with cesarean delivery, with all women with a prior cesarean undergoing repeat cesarean in the current pregnancy (p < 0,001). Parity was also associated with cesarean section (p = 0,022). No significant associations were found with a history of miscarriage/stillbirth or maternal comorbidities.

Table 5. Current pregnancy characteristics and cesarean section (n=201)

Characteristic	Vaginal delivery		Cesarean section		Total	%	p
	n	%	n	%			
Mode of conception							
Spontaneous	116	60,7	75	39,3	191	95,0	0,002
IVF	1	10,0	9	90,0	10	5,0	
Fetal presentation							
Cephalic	116	61,4	73	38,6	189	94,0	< 0,001
Non-cephalic	1	8,3	11	91,7	12	6,0	
Gestational age							
≥ 37 weeks	106	57,6	78	42,4	184	91,5	0,572
< 37 weeks	11	64,7	6	35,3	17	8,5	
Total	117	51,5	84	48,5	201	100,0	

Mode of conception and fetal presentation were significantly associated with cesarean section ($p < 0,05$), with higher rates observed in women who conceived via IVF and those with non-cephalic presentation. Gestational age was not significantly associated with cesarean section ($p > 0,05$).

4. DISCUSSION

The cesarean section (CS) rate in this study was 41,8%, which is higher than the World Health Organization (WHO) recommended rate of 10-15% [1]. This reflects the increasing trend of cesarean delivery observed globally and in Vietnam in recent years [2,5,7]. The relatively high rate suggests the need for careful evaluation of clinical indications and optimization of obstetric decision-making.

Advanced maternal age (≥35 years) was significantly associated with cesarean section. This may be explained by the higher prevalence of pregnancy-related complications in older women, such as hypertension and gestational diabetes, as well as reduced tolerance to labor, leading to a higher likelihood of cesarean delivery. These findings are consistent with previous studies, which have identified maternal age as an important determinant of delivery mode [5].

Previous cesarean section was the strongest factor associated with CS in this study. All women with a history of cesarean section underwent repeat cesarean delivery (100%), compared to only 29,1% among those without such history ($p < 0,001$). This finding underscores the decisive role of previous CS in determining the mode of delivery, in line with current clinical practice and international recommendations [4]. The preference for repeat cesarean is often driven by concerns about uterine rupture during labor, particularly in settings where labor monitoring may be suboptimal. In addition, previous CS has been associated with long-term complications such as placenta previa and placenta accreta spectrum disorders in subsequent pregnancies, thereby contributing to the continued increase in CS rates [3]. Therefore, previous CS is not only an associated factor but also a key driver of the rising CS trend.

Parity was also associated with CS, with a higher rate observed among multiparous women compared to nulliparous women (49,5% vs. 33,3%; $p = 0,022$). This association may be indirectly influenced by prior cesarean section, as multiparous women are more likely to have undergone a previous CS, thereby increasing the likelihood of repeat cesarean in the current pregnancy. In contrast, no significant associations were found between CS and a history of miscarriage/stillbirth or maternal comorbidities ($p > 0,05$), suggesting that these factors may play a limited role in determining CS indications in this study.

Among factors related to the current pregnancy, fetal presentation and mode of conception showed strong associations with CS. Women with non-cephalic presentation had a substantially higher CS rate compared to those with cephalic presentation (91,7% vs. 38,6%; $p < 0,001$). This is consistent with obstetric practice, where abnormal fetal presentation is a common indication for cesarean delivery to ensure maternal and fetal safety. This finding is also in line with the WHO Global Survey on Maternal and Perinatal Health, which identified fetal presentation as one of the most important clinical factors influencing mode of delivery [2].

Women who conceived via assisted reproductive technology had a markedly higher likelihood of cesarean section. This may reflect both clinical caution and patient preference, as IVF pregnancies are often considered high-risk and are managed more conservatively to minimize adverse outcomes [6].

When compared with domestic studies, our findings demonstrate similar trends. The study by Phuong Nguyen Thi Minh (2022) reported a CS rate of 47.9% and identified maternal age ≥35 as a factor associated with cesarean section [8]. Similarly, in our study, women aged ≥35 had a significantly higher CS rate compared to younger women. That study also highlighted the role of fetal factors, including abnormal presentation, which is consistent with our findings. However, differences in study populations-restricted to term nulliparous women in the previous study versus a broader population in our study-may explain variations in CS rates and the magnitude of associations.

Our results are also consistent with those of Le Hoai Chuong et al. (2018) at the National Hospital of Obstetrics and Gynecology, which reported a high CS rate (54,4%) and identified previous cesarean section and assisted reproductive technology as significant factors associated with CS ($p < 0,001$) [9]. Although the CS rate in our study was lower, the key associated factors were similar, particularly previous CS and IVF conception. Differences in CS rates between studies may be attributed to variations in study settings and patient populations, as tertiary referral hospitals typically manage more high-risk pregnancies.

Gestational age was not significantly associated with CS in this study ($p = 0,570$). This may be explained by the fact that the majority of cases were term pregnancies (≥ 37 weeks), resulting in limited variability between groups. Similarly, residence (urban vs. rural) was not associated with CS ($p = 0,737$), suggesting relatively equal access to healthcare services among the study population.

Overall, the main factors associated with cesarean section in this study included maternal age ≥35, previous cesarean section, non-cephalic presentation, and IVF conception. Among these, previous CS, fetal presentation, and IVF showed the strongest associations. These findings contribute to a better

understanding of factors driving the increasing CS rate and suggest the need for careful consideration when indicating cesarean delivery, particularly in high-risk groups, in order to reduce unnecessary procedures.

This study has several limitations that should be considered. First, due to the cross-sectional design, causal relationships cannot be established. Second, the analysis was limited to univariate methods and did not account for potential confounding factors. In addition, the study was conducted at a single hospital with a relatively small sample size, which may limit the generalizability of the findings.

5. RECOMMENDATIONS

The cesarean section rate remains relatively high and should be carefully monitored. Greater attention should be given to controlling cesarean indications, particularly among high-risk groups such as women of advanced maternal age, those with a history of cesarean section, IVF pregnancies, and abnormal fetal presentation. Strengthening patient counseling and adherence to appropriate clinical guidelines may help reduce unnecessary cesarean sections. Future studies with larger sample sizes and multivariable analyses are recommended to further validate these findings.

REFERENCES

[1] WHO statement on caesarean section rates [Internet]. [cited 2026 Apr 19]. Available from: https://www.who.int/publications/i/item/WHO-RHR-15.02

[2] Lumbiganon P, Laopaiboon M, Gülmezoglu AM, Souza JP, Taneepanichskul S, Ruyan P, et al. Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007–08. The Lancet. 2010 Feb 6;375(9713):490–499. doi:10.1016/S0140-6736(09)61870-5 PubMed PMID: 20071021.

[3] Keag OE, Norman JE, Stock SJ. Long-term risks and benefits associated with cesarean delivery for mother, baby, and subsequent pregnancies: Systematic review and meta-analysis. PLOS Medicine. 2018 thg 1;15(1):e1002494. doi:10.1371/journal.pmed.1002494

[4] American College of Obstetricians and Gynecologists. Committee Opinion No. 765: Avoidance of Nonmedically Indicated Early-Term Deliveries and Associated Neonatal Morbidities. Obstet Gynecol. 2019 Feb;133(2):p:e156–e163. doi:10.1097/AOG.0000000000003076

[5] de Loenzien M, Schantz C, Luu BN, Dumont A. Magnitude and correlates of caesarean section in urban and rural areas: A multivariate study in Vietnam. PLoS One. 2019;14(7):e0213129. doi:10.1371/journal.pone.0213129 PubMed PMID: 31348791; PubMed Central PMCID: PMC6660069.

[6] Lodge-Tulloch NA, Elias FTS, Pudwell J, Gaudet L, Walker M, Smith GN, et al. Caesarean section in pregnancies conceived by assisted reproductive technology: a systematic review and meta-analysis. BMC Pregnancy Childbirth. 2021 Mar 22;21:244. doi:10.1186/s12884-021-03711-x PubMed PMID: 33752633; PubMed Central PMCID: PMC7986269.

[7] Betrán AP, Merialdi M, Lauer JA, Bing-Shun W, Thomas J, Van Look P, et al. Rates of caesarean section: analysis of global, regional and national estimates. Paediatr Perinat Epidemiol. 2007 Mar;21(2):98–113. doi:10.1111/j.1365-3016.2007.00786.x PubMed PMID: 17302638.

[8] Phuong NTM. Nhận xét tỉ lệ và chỉ định mổ lấy thai ở 192 sản phụ sinh con con so đủ tháng, tại Bệnh viện Quân y 354, năm 2022. Journal of Military Pharmaco-medicine. 2024 May 8;(369):369. doi:10.59459/1859-1655/JMM.433 [in Vietnamese]

[9] Chuong LH, Dung MT, Thang ND, Trang DTT. Nhận xét thực trạng mổ lấy thai tại bệnh viện Phụ sản Trung Ương năm 2017. Journal of Obstetrics and Gynecology. 2018 May 1;16(1):92–96. doi:10.46755/vjog.2018.1.707 [in Vietnamese]