



Determinants of Cesarean Section Delivery: A Case-Control Study on Interpregnancy interval, Previous Cesarean Section, and Obstetric Complications

Dian Irawati^{*1}, Endah Heri Kusmianingsih^{*2}, Fitria Edi Wari^{*3}, Sari Priyanti^{*4}, Agustin Dwi Syalfina^{*5}, Wiwit Sulistyawati^{*6}

^{1,2,3,4,5,6}Sekolah Tinggi Ilmu Kesehatan Majapahit; dian.irawati80@gmail.com

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ABSTRACT

Cesarean section (CS) is a surgical procedure in which a baby is delivered through incisions in the abdominal wall and uterus when vaginal delivery is not feasible or poses a risk to the mother or fetus. Cesarean delivery rates continue to increase in many countries, including Indonesia. This study aimed to analyze factors associated with cesarean delivery. An analytic correlational study with a case-control design was conducted using medical record data from Reksa Waluya Hospital in 2025. The sample comprised 118 women, including 59 cases (cesarean deliveries) and 59 controls (vaginal deliveries), selected through simple random sampling. The variables examined were previous cesarean delivery, interpregnancy interval, and history of obstetric complications. Data were analyzed using logistic regression at a significance level of $\alpha = 0.05$. Bivariate and multivariate analyses showed that previous cesarean delivery (OR = 16.674) and a history of obstetric complications (OR = 121.250) were significantly associated with cesarean delivery, whereas interpregnancy interval was not. These findings indicate that healthcare professionals should strengthen maternal education and routine antenatal monitoring to enable early identification of risk factors and reduce cesarean deliveries without medical indications.

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Corresponding Author: (Yang bertanggung jawab komunikasi dengan Editor)

Dian Irawati

Sekolah Tinggi Ilmu Kesehatan Majapahit; dian.irawati80@gmail.com

INTRODUCTION

Cesarean section (CS) is a mode of delivery performed surgically through incisions in the abdominal wall and uterus to deliver the fetus. This procedure is indicated when vaginal delivery is not feasible or may pose a greater risk to the mother or fetus [1][2].

The high rate of cesarean delivery may lead to various consequences, including an increased risk of postpartum complications such as infection, hemorrhage, postoperative pain, and complications in subsequent pregnancies and deliveries. In addition, cesarean delivery is associated with higher healthcare costs and longer maternal hospital stays. [3] [4].

The World Health Organization (WHO) states that the ideal cesarean section rate ranges from 10% to 15% of all deliveries. However, many countries have reported CS rates exceeding this recommendation. Globally, the prevalence of cesarean delivery increased from approximately 7% in 1990 to more than 21% in recent years.[2]

Data from the Indonesian Basic Health Research (Riskesdas) indicate that the proportion of cesarean deliveries has continued to increase. The 2018 Riskesdas reported a CS rate of 17.6%, with variations across regions and healthcare facilities. This figure shows that the cesarean delivery rate in Indonesia has exceeded the ideal level recommended by the WHO.[5]

Obstetric history is an important aspect that reflects a woman's previous pregnancy and childbirth conditions and experiences. In this study, obstetric history focused on three main variables: a history of previous cesarean delivery, interpregnancy interval, and a history of obstetric complications. Clinically, these three variables are known to be associated with an increased risk of cesarean delivery in subsequent pregnancies.[6]

A history of previous cesarean delivery is one of the risk factors most frequently associated with repeat cesarean section. Women with a history of CS are more likely to undergo another cesarean delivery in a subsequent pregnancy. This is related to the presence of a uterine scar, which may increase the risk of uterine rupture during vaginal birth, particularly when maternal and fetal clinical conditions do not meet the criteria for a trial of labor. Therefore, a previous CS is often a major consideration when determining the mode of delivery [1].

In addition to a previous CS, interpregnancy interval is another component of obstetric history that may play an important role in cesarean delivery. A short interpregnancy interval, particularly less than two years, may not allow the uterus to recover fully from the previous pregnancy and delivery.[7], [8], [9] Among women with a history of CS, a short interval may further increase the risk of complications such as uterine rupture and abnormal placental implantation; therefore, cesarean delivery is often selected as the safer alternative [3].

A history of previous obstetric complications may also contribute to an increased likelihood of cesarean delivery. Complications such as preeclampsia, eclampsia, antepartum hemorrhage, premature rupture of membranes, dystocia, and fetal malpresentation in a previous pregnancy may recur in subsequent pregnancies. These

conditions can endanger the mother and fetus if vaginal delivery is attempted; consequently, cesarean section is often selected as part of delivery management [2].

Midwives have a strategic role in healthcare services, particularly in midwifery practice, in efforts to reduce unnecessary cesarean deliveries. They are responsible for early screening of risk factors during pregnancy through a comprehensive assessment of obstetric history, including previous cesarean delivery, interpregnancy interval, and previous obstetric complications. The results of this assessment can serve as a basis for providing continuous midwifery care focused on complication prevention. Other field-based measures include improving the quality of counseling and education for pregnant women and their families regarding the birth process, the benefits and risks of vaginal and cesarean delivery, and the importance of well-prepared birth planning. Adequate education is expected to improve maternal knowledge and readiness and thereby reduce requests for cesarean delivery without clear medical indications.

The year-to-year increase in cesarean deliveries is influenced by several factors. This trend provided the rationale for investigating the factors associated with cesarean delivery. The urgency of this study is based on the fact that cesarean delivery carries a greater risk of complications than vaginal delivery. This study was conducted at Reksa Waluya Hospital, Mojokerto City, to identify factors affecting cesarean delivery. The findings are expected to provide strong scientific evidence regarding the obstetric factors most strongly associated with cesarean delivery and to serve as a basis for midwifery care planning, clinical decision-making, and efforts to reduce cesarean deliveries without appropriate medical indications, particularly at Reksa Waluya Hospital, Mojokerto City.

METHOD

This study was an observational analytic study using a case-control design. The independent variables were interpregnancy interval, history of cesarean section, and history of obstetric complications, while the dependent variable was cesarean delivery. The study population comprised 402 women who gave birth at Reksa Waluya Hospital, Mojokerto City, during 2025. A total of 118 participants were selected using simple random sampling. The sample was divided equally at a 1:1 ratio into case and control groups. Secondary data were collected from hospital medical records using a checklist. The collected data were processed through editing, coding, scoring, and cleaning. Univariate analysis was performed using relative frequency distributions, bivariate analysis using the chi-square test, and multivariate analysis using logistic regression with an alpha level of 0.05.

RESULT AND DISCUSSION

Result

Respondent Characteristics

Table 1. Frequency Distribution of Age and Parity

No.	Category	Frequency	Percentage (%)
1.	Age		
	20–35 years	105	89
	≥ 35 years	13	11
	Total	118	100
2.	Parity		
	Multipara	118	100
	Grandemultipara	0	0
	Total	100	100

The analysis of respondent characteristics showed that almost all participants were 20–35 years old and all were multiparous.

Univariate Analysis of Study Variables

Table 2. Frequency Distribution of Study Variables

No.	Category	Frequency	Percentage (%)
1.	History of CS		
	No	79	66,9
	Yes	39	33,1
	Total	118	100
2.	Interpregnancy interval		
	≥ 2 years	61	51,7
	< 2 years	57	48,3
	Total	118	100
3.	History of obstetric complications		
	None	49	41,5
	Present	69	58,5
	Total	118	100
4.	Cesarean delivery		
	No	59	50
	Yes	59	50
	Total	118	100

Descriptive analysis of the study variables showed that most participants had no history of cesarean delivery, most had a interpregnancy interval of at least two years, and most had a history of obstetric complications.

Analysis of Determinants of Cesarean Delivery

Table 3. Bivariate Analysis of Determinants of Cesarean Delivery

Category	Delivery						p-value
	Vaginal		SC		Total		
	N	Percentage (%)	N	Percentage (%)	N	Percentage (%)	
History of CS							
No	54	68,4	25	31,6	79	100	0,001
Yes	5	12,8	34	87,1	39	100	
Interpregnancy interval							
≥ 2 years	34	55,7	27	44,3	61	100	0,197
< 2 years	25	43,9	32	56,1	57	100	
History of obstetric complications							
None	47	95,9	2	4,1	49	100	0,001
Present	12	17,4	57	82,6	69	100	

The results in Table 3 show that, among 39 women with a history of cesarean delivery, 34 underwent cesarean delivery in the current pregnancy. Of the 69 women with a history of obstetric complications, 57 underwent cesarean delivery. Bivariate analysis indicated that a history of cesarean delivery and a history of obstetric complications were significantly associated with cesarean delivery, whereas interpregnancy interval was not significantly associated with cesarean delivery.

Table 4. Multivariate Analysis of Determinants of Cesarean Delivery

Category	p-value	OR	CI
History of CS	0,002	16,674	2,857-97,325
Interpregnancy interval	0,239	0,458	0,125-1,678
History of obstetric complications	0,001	121, 250	20,732-709,117

Table 4 shows that interpregnancy interval was not significantly associated with cesarean delivery, indicating that it was not an independent determinant in the multivariate model. In contrast, a history of cesarean delivery was significantly associated with cesarean delivery (OR = 16.674). Similarly, a history of obstetric complications was significantly associated with cesarean delivery (OR = 121.250).

Discussion

The findings showed that a history of cesarean delivery and a history of obstetric complications were significantly associated with cesarean delivery, whereas interpregnancy interval had no statistically significant association.

Previous mode of delivery is an important factor that may influence the mode of delivery in a subsequent pregnancy. Women who have previously undergone cesarean delivery are at greater risk of requiring another operation in a subsequent pregnancy because the uterine scar may increase the risk of uterine rupture if vaginal birth is attempted without adequate monitoring.[1] Varney's Midwifery similarly explains that women with a history of cesarean delivery are more likely to undergo repeat cesarean section because scar tissue in the uterine wall may affect uterine

contractility during labor [10]. Fraser and Cooper (2020) also state that a history of cesarean surgery is an important consideration when determining the subsequent mode of delivery because of potential complications such as uterine rupture and hemorrhage when vaginal birth is attempted without optimal monitoring [11].

These findings are supported by previous studies. Betran et al. (2021) reported that a history of cesarean surgery is one of the strongest contributors to increasing repeat cesarean section rates in many countries [12]. Keag et al. (2020) also found that women with a history of cesarean delivery were more likely to undergo cesarean section in a subsequent pregnancy because of safety considerations for both mother and fetus.[13]. Rahmawati (2022) identified a significant association between previous mode of delivery and cesarean delivery in hospitals, with women who had a history of CS being at higher risk of undergoing repeat surgery in a subsequent pregnancy [14].

This study also found that five women (8.5%) with a history of CS successfully had a vaginal birth after cesarean (VBAC). This finding is consistent with evidence indicating that VBAC is a safe alternative under selected conditions. According to guidelines from the World Health Organization and International Federation of Gynecology and Obstetrics (FIGO), VBAC has an estimated success rate of approximately 60%–80%, particularly among women with one previous low-transverse cesarean incision, no obstetric contraindications, and access to appropriate healthcare supervision and facilities [15].

The successful VBAC cases in this study demonstrate that vaginal birth after cesarean remains possible when clinical eligibility criteria are met. VBAC success is also influenced by maternal age, fetal condition, interpregnancy interval, and the readiness of the healthcare facility.

A history of obstetric complications was the most influential factor associated with cesarean delivery, with an OR of 121.250. In this study, obstetric complications included premature rupture of membranes, preeclampsia, and dystocia. Cesarean section is frequently performed when obstetric complications may endanger the mother or fetus if vaginal delivery is attempted.[4] FIGO also states that most cesarean procedures are performed because of medical indications or obstetric complications that make vaginal delivery unsafe [15].

Boerma et al. (2021) also reported that rising cesarean delivery rates in many countries are largely related to pregnancy and childbirth complications. In the researchers' view, the significant association between obstetric complications and cesarean delivery in this study indicates that cesarean section is more frequently performed as a life-saving measure when high-risk conditions occur.[16] These findings are further supported by a study in Banyuwangi Regency, which found that a history of obstetric complications affected the likelihood of cesarean delivery[17].

Obstetric complications during pregnancy or labor may make vaginal delivery unsafe; therefore, healthcare professionals must make timely decisions regarding cesarean delivery to prevent maternal and neonatal morbidity and mortality.

CONCLUSION

This study concludes that a history of cesarean delivery and a history of obstetric complications were significantly associated with cesarean delivery. A history of obstetric complications was the most dominant predictor of cesarean delivery, whereas interpregnancy interval showed no statistically significant association. These findings emphasize the role of healthcare professionals in improving education for pregnant women regarding risk factors for cesarean delivery, particularly among women with a previous cesarean section or obstetric complications. They also highlight the need to improve the quality of antenatal care and strengthen childbirth data recording and reporting systems as a basis for evaluation and for reducing cesarean deliveries without medical indications.

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