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The Influence of Maternal Factors on Caesarean Section at North Borneo Regional Hospital, Kalimantan, Indonesia

Rahmi Padlillah, Ika Yulianti, Nur Linda

Bachelor program in Midwifery, Faculty of Health, University of Borneo Tarakan, Kalimantan, Indonesia

ABSTRACT

Background: In this modern era, caesarean section (C-section) is sometimes an alternative choice for the desired childbirth. However, it should be understood that Caesarean section is a surgical procedure that must be performed based on medical indications and has risks. Knowing what factors can influence the selection of C-section procedures is important so that the SC is properly carried out on an emergency indication. This study aimed to analyze the factors that affect the delivery of caesarean section at the Tarakan General Hospital, Kalimantan, Indonesia.

Subjects and Method: A cross-sectional study was conducted at Tarakan General Hospital, North Kalimantan, Indonesia, in April 2024. The sample size was 748 post natal women. The dependent variable was type of birth delivery. The independent variables were cephalopelvic disproportion, preeclampsia, prolonged labor, premature rupture of membranes, maternal age, and parity. Data were obtained from medical records and analyzed using a multiple logistic regression.

Results: Premature rupture of membranes (aOR= 7.7; 95% CI= 6.99 to 8.02; p= 0.001) and prolonged labor (aOR= 1.9; 95% CI= 1.21 to 3.6; p= 0.029) increased the likelihood of cesarean section.

Conclusion: Premature rupture of membranes and prolonged labor increase the likelihood of cesarean section.
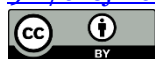
Keywords: caesarean section, parity, premature rupture membrane.

Correspondence:
Rahmi Padlillah. Universitas Borneo Tarakan. Jl. Amal Lama No. 1, Tarakan, North Kalimantan, Indonesia. Email: rahmipadlilah@gmail.com. Mobile: +62811538073.

BACKGROUND

In the 2021 Global Survey on Maternal and Perinatal Health, WHO reported that 46.1% of all births were performed by Caesarean section. The number of births with this method in Indonesia was 17.6% in 2021, according to RISKESDAS data. Transverse or breech fetal position (3.1%), bleeding (2.4%), eclampsia (0.2%), premature rupture of amniotic membranes (5.6%), long partus (4.3%), cord circumference (2.9%), placenta previa (0.7%), lagging placenta (0.8%), hypertension (2.7%), and other complications (4.6%) (Nuryanto, 2024; Novianti, 2020).

In general, the pattern of childbirth through SC surgery according to characteristics showed the highest proportion in the top possession index quantile of 18.9%, and those living in urban areas 13.8%, employees 20.9% and higher education/college graduates of 25.1%. The very high increase in caesarean section rates occurs due to various factors. Some of them are factors from the mother herself, the fetus and also health service factors that are increasingly able to perform SC, a number that is quite high for non-medical indications of SC childbirth, which is as much as 47%. Factors that cause maternal SC childbirth are preeclampsia, premature rupture of the membranes, narrowing of the pelvis, and blockage of the birth canal. The factors that cause sc childbirth in the fetus namely the size of the fetus is large, fetal severity, and fetal malformation and malpresentation are the medical reasons for caesarean section surgery (permatasari, 2022; Firdausi and Jayanti, 2023; Prihartini and Iryadi, 2019).

Caesarean section is an alternative method of delivery to save the mother and baby, but it should be understood that Caesarean section is a surgical procedure that must be performed based on medical indications and has the risk that it can even reportedly cause the risk of recurrence of SC in subsequent pregnancies. One of the most common and frequent complications in cesarean section patients is an infection in the surgical area that occurs in 3 – 15% of patients. Infection of the post-cesarean section area leads to a significant increase in morbidity in patients, increases the cost of medical care, prolongs the length of hospitalization and recovery of patients (Ashar and Kusrini, 2020; Supriyatin, 2025; Saeed, 2019).

In this Modern era, Caesarean section is sometimes an alternative choice for the desired childbirth. As time goes by, Caesarean section will become a common occurrence at birth, where caesarean section is performed at the request of the client. The increasing popularity of the act of childbirth by the Caesarean section method and the shift in public views on the method of delivery carried out have made the act of Caesarean section surgery a new phenomenon and no longer taboo to talk about and do in society (Sudirman, 2018; Indiawati et al., 2024).

Knowing what factors affect the SC's decision is important to do considering the many non-emergency factors that lead to SC elections. Based on a preliminary study conducted by researchers at the Tarakan City General Hospital, which is one of the referral center hospitals in Tarakan City and also a hospital that facilitates cesarean sectional births, it was found that the incidence of cesarean section of births was 336 out of 404 total deliveries in 2022 (45.4%), 289 out of 460 total deliveries in 2023 (62.8%). From the data obtained during the preliminary study, it can be concluded that the rate of cesarean delivery continues to increase every year due to medical indication factors both in terms of mother and fetus. In this study, the author focuses on finding out the factors that affect the delivery of Sectio Caesaria at the Tarakan City General Hospital. Based on the above background, the researcher is interested in researching the factors that affect the delivery of Sectio Caesaria at the Tarakan City General Hospital in 2024.

SUBJECTS AND METHOD
1. Study Design
The design of this study uses descriptive analytics with the approach model used is

cross-sectional. The researcher will assess several maternal risk factors from the medical records of patients undergoing caesarean section and non-caesarean section (vaginal) surgery despite various additional measures such as induction or forcep. The research was conducted at the Tarakan City General Hospital, North Kalimantan in April 2024.

2. Population and Sample

The population in this study was 748 patients who gave birth from January to December 2023 at the Tarakan City General Hospital. This study uses a total sampling technique, so that the sample of this study is the same as the population, which is 748 maternal mothers.

3. Study Variables

The independent variables in this study were cephalopelvic disproportion, pre-eclampsia, long partus, premature rupture of the membranes, maternal age, and parity. Dependent variables are actions performed in fetal removal or delivery methods that are divided into Caesarean section and vaginal categories.

4. Operational Definition of Variables

Cephalopelvic Disproportion is a condition in which the size of the mother's pelvic circumference does not match the size of the head circumference of the fetus that can give birth naturally.

Parity is the number of births that the mother has experienced as a whole without looking at the living/dead fetus and the number of fetuses born.

The age of the mother is the amount of time that a woman (mother-to-be) has spent from birth to the data collection.

Pre-eclampsia is a condition in which there is an increase in blood pressure ≥ 140/90 mmhg, proteinuria and edema arising due to pregnancy.

Long partus is a labor term that lasts more than 24 hours in primi and more than 18 hours in multi.

Premature rupture of amniotic membrane is the rupture of the amniotic membrane before there are signs of labor.

5. Study Instruments

The research instrument used in this study is in the form of patient medical records that have complete data according to the data needed in the research. All the data obtained will be collected in the master table to further make the following encoding: Cephalopelvic Disproportion with codes: 1= CPD and 2= No CPD. Parity with codes: 1= Primipara, 2= Multipara, 3= Grandemultipara. Caesarean section with codes: 1= Caesarean section, 2= Vaginal. Age with code: 1= Risky (< 20 or > 35 years old), 2= Not at risk (20-35 years old). Old Partus : 1= Old partus, 2= No partus. Preeclampsia: 1= Preeclampsia, 2= Non-preeclampsia. Premature Rupture of the Amniotic Membrane (KPD) : 1= KPD, 2= No KPD.

6. Data analysis

The statistical test was conducted using Chi square with a 95% confidence level to see whether or not the relationship between the free variable and the variable is bound to the meaning limit of $\alpha=0.05$ with the understanding that if the p-value <0.05, then the relationship is meaningful, and vice versa.

7. Research Ethics

Research ethical issues including informed consent, anonymity, and confidentiality, were addressed carefully during the study process. The research ethical clearance approval letter was obtained from the Research Ethics Committee at North Kalimantan general Hospital, Indonesia, No. 04/KEH/-RSUKT/2024, on March 21, 2024.

1. Respondent Characteristics

The characteristics of the respondents in this study included age, education level, employment status, number of pregnancies (parity), family function, and income. The distribution of respondents based on these characteristics is shown in Table 1.

Table 1 shows that most respondents were aged 20-35 years old (70.8%), had a higher level of education (45.8%), worked as housewives (45.8%), and were multigravida (62.5%). Most respondents had a very functional family (85.4%) and a family income ≥ UMR (56.3%). Most respondents (72.9%) had a good level of knowledge about obstetrics danger signs.

In the Cephalopelvic Disporpotion variable divided into 2 categories, namely CPD and non-CPD, during 2023 57 cases of CPD were found (7.6%). As for the variable of childbirth history, it is divided into 2 categories, namely vaginal and caesarean section, where the dominant respondents are included in the category of cesarean section as many as 473 people (63.5%). Then, the maternal age variable is divided into 3 categories based on healthy reproductive age, namely under 20 years, 20 to 35 years and more than 35 years with the dominant respondents being included in the healthy reproductive category, namely 20 to 35 years as many as 586 people (78.3%). However, there are still mothers over 35 years old who give birth, namely sebnayak (16.3%).

Table 1. Characteristics of 748 maternity mothers

Characteristics	Category	Frequency (n)	Percentage (%)
Caesarea Section	Yes (Caesarean section)	473	63.2
	No (Vaginal)	275	36.8
Cephalopelvic Disproportion (CPD)	CPD	57	7.6
	No CPD	691	92.4
Mother's Age	< 20 years old	40	5.4
	20 − 35 years old	586	78.3
	> 35 years old	122	16.3
Pre Eclampsia	Pre eclampsia	54	7.2
	No Pre eclampsia	672	89.8
Premature Rupture of Amniotic Membrane (KPD)	KPD	76	10.2
	Not KPD	672	89.8
Old Partus	Old Partus	24	3.2
	Not Partus Long	724	96.8
Parity	Primipara	231	30.9
	Multipara	413	55.2
	Largemultipara	104	13.9

2. Bivariate Analysis

Based on Table 2, the results of the analysis, it can be seen that the influencing factors include parity. The incidence of caesarean section is more common in primipara and multipara mothers, the significance value of the statistical test shows a p value of <0.001 so that it can be concluded that lower parity affects the decision-making of caesarean sectionn actions. In addition, the long partus or the duration of the elongated latent phase 1 also has a significant influence on the decision of the caesarean section with a p value of 0.012, showing that there is a

significant relationship between the long partus and the increase in SC decisions.

Premature rupture of the membranes is one of the turmoil in the delivery process that cannot be predicted so that it can be one of the factors that affect and increase caesarean sectionn decision-making. Based on the results of chi square analysis, a p value of 0.013 was obtained, which interpreted that the occurrence of ruptured amniotic membranes had a significant effect on the occurrence of caesarean section.

Table 2. Maternal Factors that Influence Caesarean section

| Maternal Factors | Caesarea Section | | | | p |
| | Yes | | No | | |
	N	%	N	%	
Cephalopelvic Disproportion					
Yes	15	2.0	42	5.7	0.089
No	431	57.6	260	34.7	
Mother's Age					
< 20 years old	15	2.0	25	3.3	
20 − 35 years old	217	30.0	369	49.3	0.929
> 35 years old	43	5.6	79	10.5	
Pre-Eclampsia					
Yes	18	2.4	36	4.6	0.587
No	257	34.4	437	58.4	
Premature Rupture of Amniotic Membrane					
Yes	18	2.4	58	7.7	0.013
No	257	53.4	415	55.5	
Old Partus					
Yes	3	0.4	21	2.8	0.012
No	272	36.4	452	60.4	
Parity					
Primipara	61	8.2	170	22.8	
Multipara	177	23.7	236	31.5	0.001
large multipara	37	4.9	67	8.9	

3. Multivariate Analysis

Based on Table 3, the results of multivariate analysis in the form of logistic regression, it is known that the variables that significantly affect the incidence of cesarean section are premature rupture of the membranes (aOR= 7.7; 95% CI= 6.99 to 8.02; p= 0.001) and old partus (aOR = 1.9; 95% CI = 1.21 to 3.6; p= 0.029).

Table 3. The Influence of Maternal Factors on Caesarean Section at North Borneo Regional Hospital

| Variables | AOR | 95% CI | | p |
		Lower limit	Upper limit	
Cephalopelvic Disproportion	0.51	0.18	1.47	0.215
Age (25-30 years)	-1.7	0.03	-1.86	0.058
Premature Rupture of Amniotic Membrane	7.7	6.99	8.02	0.001
Pre eclampsia	1.8	0.45	2.38	0.161

Variables	AOR	95% CI		p
		Lower limit	Upper limit	
Old Partus	1.9	1.21	3.6	0.029
Parity	1.05	0.41	2.69	0.913
N observations = 748				
Nagelkerke R2= 63 %				

DISCUSSION

1. Cephalopelvic Disproportion and Caesarean section

This study found that there is no relationship between Cephalopelvic Disproportion with caesarean section. These results are not in line with several studies such as those conducted by those that reported that there was a significant relationship between cephalopelvic disproportion (CPD) and the incidence of Caesarean section (SC) in primiparous. According to the researcher, this difference in results is greatly influenced by CPD examinations that have not been thoroughly carried out by health workers at the research site, so that many SC patients are not diagnosed with CPD. (Hayati, 2023)

Indications in CPD can be categorized as absolute or relative indications for the occurrence of caesarean section. Any circumstance that makes birth through the birth canal impossible is an absolute indication for the SC to do. Among them are very severe pelvic narrowness or CPD and neoplasms that block the birth canal. On relative indications, vaginal birth can be carried out in such a way that birth with SC will be safer for both mother and baby (Sandall et al., 2018; Lathifah et al., 2018).

2. Maternal Age and Caesarean section

This study found that there is no relationship between the mother's age and Caesarean section. Mothers aged 20 – 35 years are not at risk and ideal for planning a healthy and safe pregnancy and delivery, because in addition to the well-developed reproductive organs, the stamina factor or maternal energy is still in an excellent state to push the baby out through the uterine canal during the delivery process, so that delivery can be carried out vaginally without going through caesarean section section. However, it is not uncommon for mothers of age not to be at risk of experiencing a caesarean section delivery procedure. This is often caused by complications in childbirth that can cause pain or death in the mother and baby. Complications that occur during pregnancy also affect the course of labor so that the act of caesarean section is considered the best way in the delivery proces (Wulandari and Fatmasari, 2023).

3. Pre-Eclampsia and Caesarean section

This study found that there is no relationship between preekalmpsia and Caesarean section. These results are in line with a study conducted by Siagian (2023), which reported that there was no significant relationship between preeclampsia and caesarean section birth delivery at Yadika Kebayoran Lama Hospital.

Preeclampsia is a condition in which there is an increase in systolic blood pressure above 160 mmHg and diastolic pressure above 110 mmHg, followed by proteinuria of more than 5 grams within 24 hours. However, with the advancement of early detection and the improvement of health services, pre-eclampsia conditions are known and treated early, so that many

patients are able to give birth normally or vaginally because blood pressure can be controlled during childbirth.

4. Premature Rupture of Amniotic and Caesarean section

Early rupture of the membranes is one of the factors that increase caesarean sectionn decision-making. Based on the results of chi square analysis, a p value of 0.013 was obtained, which interpreted that the occurrence of ruptured amniotic membranes had a significant effect on the occurrence of caesarean section. These results are in line with the research conducted by those who reported that there was a relationship between premature rupture of amniotic and cesarean delivery, with bivariate analysis of the results of the chi-square test obtained a P value (<0.001) (Setiana, 2019).

The cause of KPD is often due to premature opening of the cervix, necrosis, and membrane desacularization that causes spontaneous rupture of the connective tissue that supports the amniotic membrane. This condition can cause various complications such as premature delivery, hypoxia due to pressure on the umbilical cord, and deformities in the fetus. KPD can also increase the risk of infections during childbirth, including intrapartum infections, puerperalis, peritonitis, and septicemia. All of these factors trigger the risk of failure of normal labor and increase the likelihood of caesarean section as the appropriate treatment measure (Yuhana, 2022).

Premature rupture of the membranes is an important obstetric problem related to the risk of premature delivery as well as the presence of infections in the chorion and amniotic layers (known as chorioamnionitis). Infections in the postpartum period can occur due to lesions in the postpartum birth canal and can develop into sepsis that causes damage to organs and blood vessels, and if not treated promptly, can lead to

multiple organ dysfunction syndrome and death (Sagita, 2016).

5. The Old Partus and the Caesarean section

Long partus or the duration of phase 1 of the latent phase that is elongated also has a significant influence on the decision of caesarean section with a p value of 0.012, showing that there is a significant relationship between the long partus and the increase in SC decisions. These results are in line with studies that report that there is a significant association between the old partus and the incidence of caesarean section p value of 0.002 (Hayati, 2023).

The act of caesarean section with the indication of a long partus is an artificial labor that is highly recommended, where the fetus is born through the abdominal wall and uterine wall because there is no progress in cervical dilatation, or a decrease in the part that enters during active labor. Giving birth for too long will not only be draining, but also dangerous for the condition of the mother and fetus. The jammed delivery process will cause the mother to be exhausted and an increased risk of the baby experiencing fetal distress, injury, and infection. The condition of a long partus can also cause a reduced oxygen supply to the fetus so that it is at risk of causing fetal distress (Rahim, 2020; Monica, 2023).

6. Parity and Caesarean section

The incidence of caesarean section is more common in primipara and multipara mothers, the significance value of the statistical test shows a p value of <0.001 so that it can be concluded that lower parity affects the decision-making of caesarean sectionn actions. These results are in line with the study reported that there is a significant relationship between parity and caesarean sectionn delivery with a value of p = 0.031 < α = 0.05. At low parity, maternal unpreparedness in facing the first

childbirth is a factor causing the inability of pregnant women to handle complications that occur during pregnancy and childbirth. Midwives as frontline workers carry out intensive antenatal care supervision so that they can establish early possible complications in pregnancy that can have an impact on childbirth. In addition, nutritional fulfillment is very important for the health of pregnant women (Amir, 2020; Esta, 2017).

In the results of this study, it was found that more primipara and multipara mothers who experienced caesarean section, this is due to frequent pregnancies or a high level of parity having a low maternal health level compared to low parity mothers, thus there is a high probability that babies born to mothers with high parity have a greater risk of experiencing pain compared to babies who are   Born (Novia, 2024)

AUTHORS CONTRIBUTION
Rahmi Padlillah: Principal researcher, study design, data collection, data analysis, and manuscript writing.
Ika Yulianti: study concept, methodology, and manuscript review.
Nur Linda: study concept, and manuscript review.

CONFLICT OF INTEREST
There are no conflicts of interest.

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