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MATERNAL FACTORS ASSOCIATED WITH CESAREAN SECTION IN INDONESIA: EVIDENCE FROM IDHS 2017

Istiqomah Risa Wahyuningsih[1,5], Hartono Hartono[1,2], Vitri Widyaningsih[1,3], Sri Mulyani[1,4]

[1]Doctoral Program in Public Health, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Department of Physiology, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia
[3]Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia
[4]Departement of Nursing Anesthesia, School of Vocation, Universitas Sebelas Maret, Surakarta, Indonesia
[5]Department of Midwifery, Faculty of Health Science, Universitas 'Aisyiyah Surakarta, Indonesia

***** Corresponding email: *istiqomah86@aiska-university.ac.id*

ABSTRACT

Introduction: Increased the number of cesarean sections in Indonesia based on IDHS data in 2017 by 17.6%. This figure exceeds the recommendation of WHO, which is 10-15%. The impact of cesarean section related to maternal and infant health, health financing budgets, and public health policies. This research article analyzes the relationship between maternal factors and cesarean section in Indonesia. This is a novelty in this article.
Objective: This article aims to analyze the relationship of maternal factors with cesarean section in Indonesia.
Method: The design of this study is a cross-sectional study using data from the 2017 Indonesian Demographic and Health Survey (IDHS). The sampling design was stratified two-stage sampling, with a sample of 14,891 respondents. Data was analyzed using Stata 14.2. Data were analyzed using univariate analysis, bivariate analysis multivariate analysis.
Results: Women who experienced pregnancy complications had a 1.2 times greater risk of cesarean section (OR=1.2, CI=1.0-1.4). Women who had a

history of cesarean section had a 64.8 times greater risk of having a cesarean section (OR = 64.8, CI = 38.2-109.9). While the variables of labor complications, twins, and pregnancy spacing had no effect on cesarean section (OR<1).

Conclusion: Monitoring and evaluation of the increasing number of cesarean sections without medical indication and the severity of labor is necessary. The decision to undergo a cesarean section should be based on clear and solid reasons, supported by good medical data.

Keywords: *maternal factor, cesarean section, IDHS.*

INTRODUCTION

The number *of cesarean sections* is increasing in the world. The *cesarean section* rate in each country is about 22% in the United States, 25% in Brazil, 27% in Chile and about 17-40% in 19 Latin American countries, and about 20-25% of all deliveries in the United Kingdom (Azami-Aghdash et al., 2014; Norwitz & Schorge, 2010). The *cesarean section* rate in several countries in South and Southeast Asia, namely 39.07% in the Maldives, 23.64% in India, 21.82% in Bangladesh, 21.72% in Vietnam, and 17.75% in Pakistan (Verma et al., 2020). The *cesarean section* number in Indonesia based on data from the Indonesian Demographic and Health Survey (IDHS) from 1987 to 2017 shows a significant increase, the increase is more visible in IDHS data in 2002, 2007, 2012, and 2017. IDHS data in 2017 shows that the *cesarean section* rate reached 17%. The *cesarean section* in Indonesia in 2017 was dominated by the provinces of DKI Jakarta and Bali (Badan Pusat Statistik et al., 2013; Badan Pusat Statistik, 2008; BKKBN et al., 2018; BPS, 1987, 1994, 1997; BPS & ORC Macro, 2003; Indonesia. Central Bureau of et al., 1992).

The impact of *cesarean section* is in the form of short- and long-term impacts related to maternal and infant health, health finance budgets, and public health policies. The impact *of the cesarean section related to maternal and infant health, among others, is neonatal asphyxia, increasing maternal morbidity in* previous cesarean section history, and the risk of post-traumatic stress, disability, and even death. Another impact of the *cesarean section* is related to the field of health economics or finance. The Health Social Security Organizing Agency issued a document containing an increase in financing for the National Health Insurance Program-Healthy Indonesia Card (JKN-KIS) from year to year. Cesarean section delivery is one of the services that has experienced a significant increase in cases. In 2019, the *cesarean section* rate was 36% of normal delivery at the cost of JKN-KIS (Pinem, Iswari and Pardede, 2018; Sarmiento, 2018; BPJS, 2020; Yulinnas, 2020).

A combination of biological, demographic, socioeconomic, and institutional factors determine the rate of *cesarean section* delivery in any region. Rapid socioeconomic changes and views toward medical intervention

by women, families, and communities are increasingly leading to high rates *of cesarean sections* in many states and urban centers (Coates et al., 2020; Devi, 2015; Golandaj & Hallad, 2019; Mittal et al., 2014).

This study aims to determine the relationship between maternal factors and cesarean section in Indonesia based on IDHS data in 2017. The novelty of this study is the use of maternal factors in the study. Maternal factors used include pregnancy complications, childbirth complications, twins, cesarean section history, pregnancy spacing, and the number of ANC visits during pregnancy.

METHODS

This study analyze data from the 2017 Indonesian Demographic and Health Survey (IDHS), a cross sectional nationally representative multi-stage survey in Indonesia. The reason for using IDHS in 2017 was because the survey was the latest IDHS report that can be accessed through the DHS program.

The population in this study was all women who had been married, aged 15-49 years. The total population in IDHS in 2017 was 50730 women and complete interview data was obtained at 49627 (97.8%). The study sample was data on women in the 2017 IDHS who experienced childbirth. The criteria used in the sample selection were 1) women aged 15-49 years, 2) undergoing childbirth from 2012 to 2017, and 3) complete data (no missing data). The sampling design used is stratified two-stage sampling. There were missing data on several variables, and women with missing data were excluded from further analyses, as seen in Figure 1.

The data was analyzed using Stata 14.2, with univariate analysis (frequency distribution), bivariate analysis (proportion analysis, Chi-square, logistic regression), and multivariate analysis (multiple logistic regression).

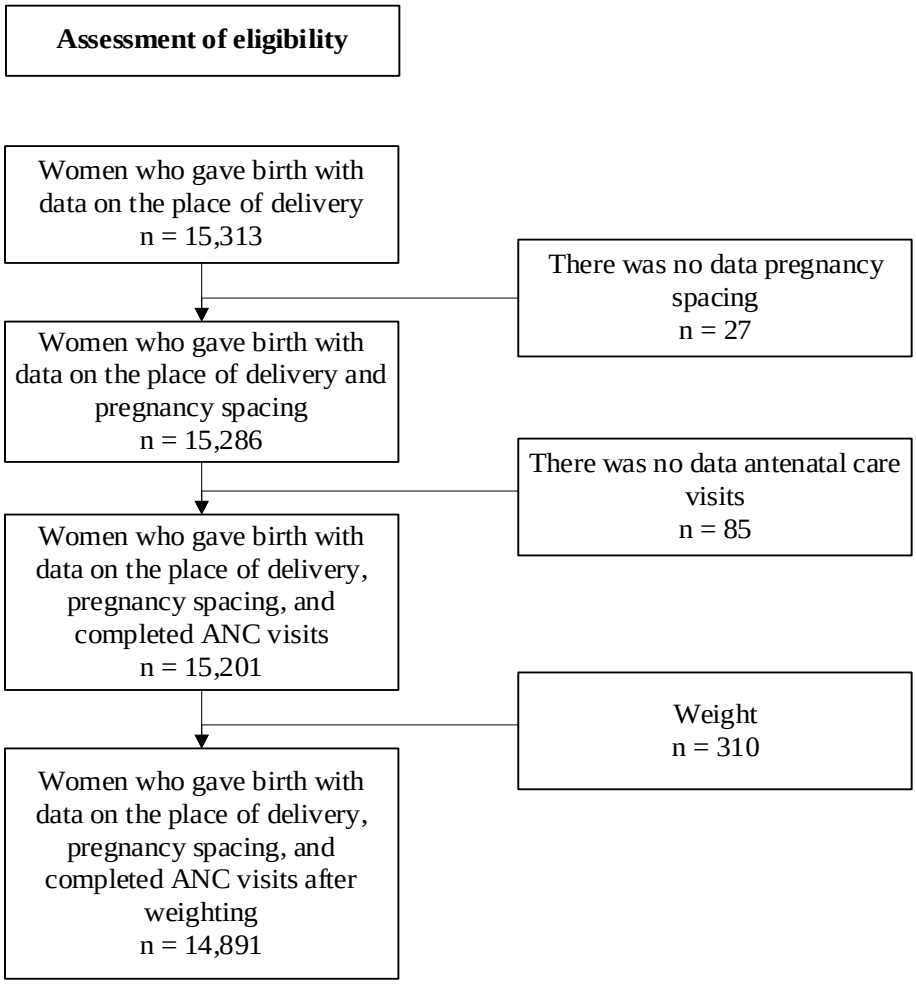

Figure 1. Assessment of eligibility

RESULTS AND DISCUSSION

Table 1. Univariate Analysis Results

	IDHS 2017	
	n	**%**
Total number of women	14891	100
Weighted number of women	15201	100
Last delivery with cesarean sections or not		
• No cesarean sections	12275	82.4
• Cesarean sections	2616	17.6
Pregnancy complications		
• No	2486	16.7
• Yes	12405	83.3

Labor complications		
• No	4513	30.3
• Yes	10378	69.7
Twins		
• No	14808	99.4
• Yes	83	0.6
History of C-sections		
• No	14644	98.3
• Yes	247	1.7
Pregnancy spacing		
• No pregnancy spacing (primigravida)	4979	33.4
• < 2 years	792	5.3
• ≥ 2 years	9120	61.3
Number of ANC visits during pregnancy		
• No ANC	360	2.4
• ANC < 4 times	954	6.4
• ANC 4-8 times	5720	38.4
• ANC > 8 times	7857	52.8

Source: The IDHS data in 2017

The results of univariate analysis in Table 1 showed that the cesarean section rate was 2616 (17.6%), the majority experienced pregnancy complications of 12405 (83.3%), experienced childbirth complications of 10378 (69.7%), non-twin pregnancies of 14808 (99.4%), had no previous cesarean section history of 14644 (98.3%), pregnancy distance of ≥ 2 years of 9120 (61.3%), and number of ANC visits during pregnancy > 8 times of 7857 (52.8%).

Table 2. Bivariate Analysis Results

Variables	***No cesarean sections***	***Cesarean sections***	***OR (CI)***	***p-values***
	n (%)	***n (%)***		
Total	12275 (82.4)	2616 (17.6)		
Pregnancy complications				
• No	2101 (14.1)	385 (2.6)	Ref	0.002
• Yes	10174 (68.3)	2231 (15.0)	1.2 (1.0-1.4)	
Labor complications				
• No	3396 (22.8)	1117 (7.5)	Ref	<0.001
• Yes	8879 (59.6)	1499 (10.1)	0.5 (0.4-0.6)	
Twins				
• No	12223 (82.1)	2585 (17.4)	Ref	<0.001
• Yes	52 (0.3)	31 (0.2)	2.9 (1.7-4.8)	
History of C-sections				
• No	12250 (82.3)	2394 (16.1)	Ref	<0.001
• Yes	25 (0.2)	222 (1.5)	45.6 (28.4-73.3)	
Pregnancy spacing				
• No pregnancy spacing (primigravida)	4015 (27.0)	964 (6.5)	Ref	<0.001
• < 2 years	683 (4.6)	109 (0.7)	0.7 (0.5-0.8)	
• ≥ 2 years	7577 (50.9)	1542 (10.4)	0.8 (0.7-0.9)	
Number of ANC visits during pregnancy				
• No ANC	355 (2.4)	6 (0.1)	Ref	<0.001
• ANC < 4 times	875 (5.9)	79 (0.5)	5.6 (2.5-12.7)	

• ANC 4-8 times	4932 (33.1)	788 (5.3)	9.9 (4.5-21.6)
• ANC > 8 times	6113 (41.1)	1743 (11.7)	17.7 (8.1-38.6)

Source: The IDHS data in 2017

The results of bivariate analysis in Table 2 show that the variables pregnancy complication, labor complication, twins, history of cesarean sections, pregnancy spacing, and number of ANC visits during pregnancy are associated with the incidence of cesarean sections (p-value<0.05). When viewed from the OR value, those who have the risk of experiencing cesarean section are only in the variables of pregnancy complication, twins, history of cesarean section, and number of ANC visits during pregnancy.

The multivariate analysis was performed by ensuring that there was no multicollinearity in each variable. When the multicollinearity test was carried out, it was found that the number of ANC visits during pregnancy had a value of VIF>10, so these variables were not involved in the analysis process.

Table 3. Multivariable analyses of factors related to C-section in IDHS 2017

Variables	***OR (CI)***
Pregnancy complications	
• No	Ref
• Yes	1.2 (1.0-1.4)
Labor complications	
• No	Ref
• Yes	0.5 (0.4-0.6)
Twins	
• No	Ref
• Yes	0.6 (0.4-0.9)
History of C-sections	
• No	Ref
• Yes	64.8 (38.2-109.9)
Pregnancy spacing	
• No pregnancy spacing (primigravida)	Ref
• < 2 years	0.3 (0.2-0.5)
• ≥ 2 years	0.7 (0.6-0.8)

Source: The IDHS data in 2017

The results of the multivariate analysis in Table 3 showed that women who had pregnancy complications had a risk of undergoing cesarean section 1.2 times than women who did not have pregnancy complications. Women who have a history of cesarean section are 64.8 times more likely to have cesarean section than women who do not have a history of cesarean section. While the variables labor complication, twins, and pregnancy spacing do not affect cesarean section.

The results of univariate analysis in Table 1 showed that the cesarean section rate was 2616 (17.6%). Tingkat cesarean section di Indonesia sebesar 17.6% (Nastiti et al., 2022). The World Health Organization (WHO) recommends that cesarean section rates should not exceed 15% anywhere.

Previous studies have also recommended cesarean section rates of 10-15% (Robson, 2018). Cesarean section is a method of giving birth through an open incision in the abdomen (laparotomy) and an incision in the uterus (hysterotomy). Despite the risk of immediate and long-term complications, for some women, a cesarean section may be the safest or even the only way to have a healthy baby (Sung & Mahdy, 2023). Cesarean section can be used as a safe and simple alternative for the birth of a baby although in some cases it is considered difficult and has an impact on the health of the mother and fetus (Ganeriwal et al., 2021; Visconti et al., 2020). Cesarean section without medical indication poses many problems for the family, personnel, and medical equipment causing few side effects in pregnant women and fetuses compared to normal delivery (Batieha et al., 2017; Moradi et al., 2019; Ushie et al., 2019)

The results in Table 1 showed that the majority experienced pregnancy complications of 12405 (83.3%). The pregnancy complications are the things experienced by mothers during pregnancy in the form of heartburn before 9 months (premature), bleeding, and seizures filled in the 2017 IDHS data. Pregnancy complications are health problems that occur during pregnancy. They can involve the health of the mother, the health of the baby, or both. Some women have health problems before they become pregnant that can lead to complications. Other problems arise during pregnancy. Whether complications are common or rare, there are ways to manage problems that arise during pregnancy (Anonim, 2022).

The results in Table 1 showed that the majority experienced childbirth complications of 10378 (69.7%). The labor complication is the things experienced by mothers during the alliance in the form of strong and regular heartburn for more than a day and night (long labor), bleeding, and amniotic discharge more than 6 hours before the child is born which is filled in the 2017 IDHS data. Labor and birth are usually easy, but sometimes complications arise that may require immediate attention. Complications can occur in any part of the labor process. Labor complications can include failure of progression, fetal distress, perinatal asphyxia, shoulder dystocia, excessive bleeding, malposition, placenta previa, cephalopelvic disproportion (CPD), uterine rupture, and rapid labor (Smith, 2018).

The results of Table 1 also show that the majority of women have non-twin pregnancies of 14808 (99.4%), had no previous cesarean section history of 14644 (98.3%), pregnancy distance of ≥ 2 years of 9120 (61.3%), and number of ANC visits during pregnancy > 8 times of 7857 (52.8%).

The results of bivariate analysis in Table 2 show that the variables pregnancy complication, labor complication, twins, history of cesarean sections, pregnancy spacing, and number of ANC visits during pregnancy are associated with the incidence of cesarean sections. Research conducted in the state of Telangana, India related to factors associated with cesarean section showed differences in these factors between multiparous and nulliparous women. Factors associated with cesarean section in multiparous women include

breech, problems with fetal heart rate, combined complications of pregnancy and childbirth, and obesity. In addition, a history of previous cesarean section, twins, hypertension, and pre-eclampsia is also associated with cesarean section. In nulliparous women, cesarean section can also be associated with pelvic cephalo disproportion (Gondwe et al., 2019; Leonard et al., 2019).

The results of the multivariate analysis in Table 3 show that women who experienced pregnancy complications had a risk of undergoing cesarean section 1.2 times compared to women who did not experience pregnancy complications. Previous research has shown that mothers at risk of pregnancy have a 2.3 times greater chance of having a cesarean section than mothers who do not have a risk of pregnancy (Abebe et al., 2015). Previous research suggests that women who have a high risk of pregnancy will be recommended to have more frequent and routine antenatal visits. Women who have a high risk of pregnancy also tend to be recommended to have a cesarean section if supported by good financial conditions (Abdel-Tawab et al., 2018; Islam et al., 2022; Lazasniti et al., 2020).

The results of the multivariate analysis in Table 3 show that women who have a history of cesarean section are 64.8 times more likely to have a cesarean section than women who do not have a history of cesarean section. Women who had a cesarean section in a previous delivery were very predictive of having subsequent cesarean sections. Women who start prenatal care in the second or third trimester or don't have prenatal care are at lower risk than women who start prenatal care in the first trimester (Guendelman et al., 2017).

The results of the multivariate analysis in Table 3 also show that the variables of labor complications, twins, and pregnancy spacing did not affect cesarean section. Cesarean section has not been shown to significantly reduce or increase the risk of fetal or neonatal death or serious neonatal morbidity in twin pregnancies. Cesarean section may be beneficial for overall perinatal outcomes in twin pregnancies beyond 36 weeks gestation (Tanigaki et al., 2020).

CONCLUSION

The maternal factors in IDHS data in 2017 are not all stated to be related to cesarean section in Indonesia based on the results of multivariate analysis. Maternal factors associated with cesarean section are women who experience pregnancy complications and have a history of previous cesarean section. Maternal factors that are not related to cesarean section are women who experience complications of childbirth, twins, and pregnancy spacing.

Monitoring and evaluation of the increasing number of cesarean sections without medical indications and the severity of labor is very necessary. The decision to have a cesarean section should be based on clear, compelling reasons, supported by good medical data.

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