Correlates of Caesarean Section Deliveries: Evidence from Indonesia

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Abstract

The data for this study comes from the seventh round of the IDHS conducted in 2012 by Statistics Indonesia (*Badan Pusat Statistik* – BPS) in collaboration with the National Population and Family Planning Board (BKKBN) and the Indonesia Ministry of Health (MoH).

This study is a further analysis of a publicly available de-identified secondary data. We download the dataset from the DHS program website after obtaining permission. Hence, we deem that a further ethical review is unnecessary.

Running Title: Caesarean Section Deliveries in Indonesia

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Abstract

Despite the rising occurrence of caesarean section (CS) deliveries in Indonesia, the correlates of caesarean section are not well understood. Therefore, this study is aimed at addressing the spatial, maternal, and socio-demographic variables associated with CS delivery among Indonesian mothers. Data from the 2012 Indonesia Demographic and Health Survey (IDHS) was analysed using logit regression models (LRM). Average marginal effect (AME) and its 95 % confidence intervals (CI) were used as measures of association. It is observed that higher maternal age, parity, prenatal complication, higher number of prenatal care (PNC) visits, and delivery in a private health facility were significantly associated with higher probability of CS delivery. Moreover, maternal education was also found to have a positive and significant effect on the likelihood of CS delivery. Furthermore, having private health insurance coverage compared to none, and being in a higher wealth index quintile were found to be positively and significantly associated with the probability of CS delivery. Ten explanatory variables were found to be statistically associated with the probability of women having CS in their latest delivery. Further studies that update the trend CS deliveries and its determinants in Indonesia are recommended. This study is the most recent one that addresses the correlates of CS delivery in Indonesia. The results of this study enrich the existing knowledge of the factors associated with CS delivery in Indonesia and globally.

Keywords Caesarean section, logit regression model, prenatal care, maternal education, Indonesia

Abbreviations

AME: average marginal effect

CS: caesarean section

IDHS: Indonesia Demographic and Health Survey

LRM: logit regression models

PNC: prenatal care

Introduction

Caesarean section (henceforth CS), a surgical incision performed as a method of childbirth, is usually chosen based on medical indications (Mander, 2007). However, there are cases when CS demanded or elective (Mander, 2007). The World Health Organisation (WHO) suggest that the rate to CS should not exceed 10-15 % of all deliveries (WHO, 2015). Beyond such figures, there may be an indication of caesarean deliveries based on non-clinical grounds and may indicate its overuse (WHO, 2015), which has health and financial consequences. Medically unnecessary CS pose a higher risk of post-partum morbidity (Souza et al., 2010) and also a loss of economic resources which could be used for other more beneficial objectives (Gibbons et al., 2012).

There is an upward trend of CS deliveries in developing countries (Stanton & Holtz, 2006). In Indonesia, the trend is the in a similar direction. The study by Hatt et al. (2007) assessed the trends in rates of CS delivery in Indonesia from 1986 to 2002 by wealth quintile and found an increasing trend of CS delivery especially among wealthiest women. However, the authors of that study did not address other determinants as their objective was to evaluate the village midwife programme in Indonesia (Hatt et al., 2007). Hence, determinants of CS delivery are not well understood. Therefore, this study attempts to investigate spatial, obstetric, and sociodemographic correlates of caesarean section delivery in Indonesia. We do this by analysing the recent Indonesia Demographic and Health Survey 2012 (henceforth 2012 IDHS).

Materials and Methods

Data Source

The data for this study comes from the seventh round of the IDHS conducted in 2012 by Statistics Indonesia (*Badan Pusat Statistik*– BPS) in collaboration with the National Population and Family Planning Board (BKKBN) and the Indonesia Ministry of Health (MoH). The 2012 IDHS covered a nationally representative sample from households sampled using a multistage stratified cluster sampling design (Statistics Indonesia, BKKBN, MOH, & ICF International, 2013). Although previous studies have demonstrated the limitations of CS delivery data from DHS (Holtz & Stanton, 2007; Stanton, Dubourg, De Brouwere, Pujades, & Ronsmans, 2005), this is one of the most reliable sources of information of nationally representative CS rate in Indonesia.

Ethics Statement

This study is a further analysis of a publicly available de-identified secondary data. We download the dataset from the DHS program website <www.dhsprogram.com/Data> after obtaining permission. Hence, we deem that a further ethical review is unnecessary.

Study Population and Sample Size

We used a sample of 18,021 births that occurred during the five years preceding the survey. Following Khawaja et al. (2004), we restrict the analysis to the most recent births during the five years preceding the

survey to reduce recall bias. The initial sample size is 15,262 births (Statistics Indonesia et al., 2013). Births with missing information on the dependent and independent variables were excluded from the analysis (n = 383). As such, the final analytic sample included 14,879 most recent births (97.49% of the initial sample).

Variables

The outcome variable, CS delivery, is measured by a binary variable that takes the value of one if the delivery method for the latest pregnancy was a caesarean section, and zero otherwise. The independent variables in this study consist of socio-demographic and spatial characteristics. As socio-demographic characteristics, maternal age, parity, any complications during pregnancy, number of prenatal care (PNC) visits, delivery took place in a private health facility, mother's and father's years of formal schooling (in years), ownership of health insurance, and quintiles of wealth index have been included in the analysis. We use the provided wealth index that was created through three steps (Statistics Indonesia et al., 2013). Moreover, we also use two spatial characteristics, namely region (Java, Sumatera, Bali and Nusa Tenggara, Kalimantan, Sulawesi, and Maluku and Papua) and place of residence (urban/rural).

Statistical Analysis

We estimate bivariate and multivariate logit regressions, presenting average marginal effects (AMEs) and 95 % confidence intervals. All regressions were based on weighted data using sampling weights and sampling design of the 2012 IDHS. All hypotheses are tested using two-tailed p values <0.05. As for the descriptive analysis, we calculate and present descriptive statistics as percentages or means in Table 1. We conducted all of the analyses using Intercooled STATA version 13.1 (StataCorp LP, College Station, Texas).

Results

Sample Characteristics

Table 1 presents the characteristics of the sample by selected background variables. The proportion of women who had CS method for their latest delivery during the five years preceding the survey was 12.8 % (95 % CI: 11.89, 13.77). The descriptive statistics revealed that the women predominantly live in Java region with over half of the sample reside there. As for the place of residence, the sampled women are roughly equally distributed.

Table . Per cent distribution of caesarean section deliveries by selected background characteristics for all births during the five years preceding the survey, 2007-2012

Variables (N = 14,879)	**Variables (N = 14,879)**	**Variables (N = 14,879)**
Outcome variable	**Outcome variable**	**Outcome variable**
	Caesarean section delivery	Caesarean section delivery
Spatial Characteristics	**Spatial Characteristics**	**Spatial Characteristics**
	Region	Region
	Area of residence	Area of residence

Variables (N = 14,879)	**Variables (N = 14,879)**	**Variables (N = 14,879)**
Maternal Characteristics	**Maternal Characteristics**	**Maternal Characteristics**
	Maternal age at childbirth	Maternal age at childbirth
	Parity	Parity
	Any pregnancy complication	Any pregnancy complication
	Prenatal care visits	Prenatal care visits
	Delivery took place in a private facility	Delivery took place in a private facility
Sociodemographic Characteristics	**Sociodemographic Characteristics**	**Sociodemographic Characteristics**
	Mother's years of schooling	Mother's years of schooling
	Father's years of schooling	Father's years of schooling
	Health insurance ownership	Health insurance ownership
	Wealth index	Wealth index
Abbreviations:	*Abbreviations*:	Ref., Reference category; CS, Caesarean
Source :	*Source* :	Authors' calculation of the 2012 IDHS

Concerning maternal age, most of the mothers reported giving their latest birth when they were 25 to 29 years old. Regarding parity, every three in five women had given birth before their latest delivery but had no previous CS delivery. As for complication, almost nine in ten women reported having no complication during their pregnancy. In regards to PNC, every three in five women had, at least, eight PNC visits during their latest pregnancy. As for the place of delivery, the majority of women reported giving birth in a public health facility or at home. The average years of schooling for the mothers were 9.29 years while that of the fathers was slightly higher at 9.38 years. Regarding health insurance, almost two-thirds of the women reported having no insurance cover at all and social security was the highest source of health insurance. As for wealth index, the women are roughly equally distributed in each quintile.

Regression Analyses

The final multivariate LRM consists of ten explanatory variables. The model was statistically significant ($F_{(25,1782)} = 32.56$; $p< 0.001$). Table 2 presents the results of bivariate and multivariate regressions. We exclude father's schooling in the multivariate logit model due to its high correlation mother's schooling.

Table . Relationship of spatial, maternal, and sociodemographic variables with caesarean section deliveries

Variables	Variables	Variables
Spatial Characteristics	**Spatial Characteristics**	**Spatial Characteristics**
	Region	Region
	Area of residence	Area of residence
Maternal Characteristics	**Maternal Characteristics**	**Maternal Characteristics**
	Maternal age at childbirth (years)	Maternal age at childbirth (years)
	Parity	Parity
	Any pregnancy complication	Any pregnancy complication
Abbreviations	*Abbreviations*	: Ref., Reference category; N.A., Not applicable; CS, ca
Notes	*Notes*	: The multivariate model has been adjusted for samplin
Source	*Source*	: Authors' calculation of the 2012 IDHS

Table 2. (*Continued*)

Variables	Variables	Variables	Categories	Bivariate	Bivariate		Multivariate	Multivariate	Multivariate	Multivariate	Multivariate	Multivari
				β	β		β	**AME**	**AME**	**95% CI**	**95% CI**	**9 C**
Maternal Characteristics (*continued*)	**Maternal Characteristics (*continued*)**	**Maternal Characteristics (*continued*)**	**Maternal Characteristics (*continued*)**									
	Prenatal care visits	Prenatal care visits	None	Ref.				Ref.		Ref.		
			1-3 times	1.0673	**		0.6234	0.0333		-0.0099	–	0
			4-7 times	1.8499	***		0.9068	0.0582	*	0.0199	–	0

Variables	Variables	Variables	Categories	Bivariate	Bivariate		Multivariate	Multivariate	Multivariate	Multivariate	Multivari
			8 times or more	2.3414	***		1.1152	0.0768	*	0.0390	–
	Delivery took place in a private facility	Delivery took place in a private facility	No	Ref.				Ref.		Ref.	
			Yes	1.1283	***		1.2509	0.1218	***	0.0987	–
Sociodemographic Characteristics	**Sociodemographic Characteristics**	**Sociodemographic Characteristics**	**Sociodemographic Characteristics**	**Sociodemographic**							
	Mother's years of schooling (years)	Mother's years of schooling (years)	N.A.	0.1624	***		0.0565	0.0059	***	0.0036	–
	Father's years of schooling (years) §	Father's years of schooling (years) §	N.A.	0.1392	***		–	–		–	–
	Health insurance ownership	Health insurance ownership	No insurance	Ref.				Ref.		Ref.	
			From employer	0.8239	***		0.3007	0.0204		-0.0081	–
			Social security	0.1447			-0.0430	-0.0010		-0.0182	–
			Private	1.0234	***		0.3904	0.0389	**	0.0076	–
	Wealth index	Wealth index	Lowest	Ref.				Ref.		Ref.	
			Second	0.7966	***		0.3123	0.0324	**	0.0136	–
			Third	1.3296	***		0.5847	0.0481	***	0.0264	–
			Fourth	1.7088	***		0.7656	0.0682	***	0.0461	–
			Highest	2.1415	***		1.1169	0.1010	***	0.0750	–

Variables	**Variables**	**Variables**	**Categories**	**Bivariate**	**Bivariate**		**Multivariable**	**Multivariable**	**Multivariable**	**Multivariable**	**Multivariable**	**Multivari**
Abbreviations	*Abbreviations*	*Abbreviations*	:	:	:	:	:	:	:	:	:	:
		Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	Ref., Reference category; N.A., Not applicable; CS, caesarean section.	R e c N A a C s

Variables	Variables	Variables	Categories	Bivariate	Bivariate		Multivariate	Multivariate	Multivariate	Multivariate	Multivariate	M
Notes	*Notes*	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	: §Father's years of schooling was excluded from the final multivariate model; Multivariate model has been adjusted for sampling design and weight; Constant is not shown; *p [?] 0.05. *p [?] 0.01, ***p [?] 0.001.	[illegible]
Source	*Source*	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	: Authors' calculation of the 2012 IDHS	[illegible]

Spatial Characteristics

Overall, the region of residence was found to be statistically significantly associated with CS delivery in the simple regression. However, not all categories are statistically different from the reference category. The probability of CS in three regions (Kalimantan, Sulawesi, and Maluku and Papua) were statistically different from that in the reference region (Java). In the multivariate regression, this significance of this relationship holds. However, only Sumatera region that has statistically different CS from Java region. As for the place of residence, the simple association between residing in an urban area was a positive and statistically significant one. This association, however, became attenuated and no longer statistically in the final multivariate model.

Maternal Characteristics

The first maternal characteristic variable is maternal age. It is found that maternal age is statistically associated with the outcome with all categories statistically different from the reference category (20-24 years old). This relationship holds when other covariates are included in the final model.

The second maternal variable was parity. This was found to be statistically associated with the outcome. Multiparous women with previous CS delivery have a higher probability of having CS for their latest delivery compared to referent women. In contrast, multiparous women with no previous CS delivery have a lower probability of having CS for their latest delivery compared to nulliparous women. Moreover, the third maternal variable was whether the women had any complications during their pregnancy. High-risk pregnancy was found to be positively associated with the probability of CS delivery. This relationship holds in the final multivariate model.

Furthermore, the penultimate maternal variable was the number of PNC visits consisting of four categories with null visits as the reference category. All the categories of PNC visits are statistically different from the reference category with increasing probabilities as the visits increase. This association weakened but still highly significant when other covariates were included in the final multivariate model.

The last maternal variable, place of delivery, was found to be statistically related to the outcome variable. Women who gave birth in a private facility was a higher probability of having CS method than those who gave birth in public facilities or at home. This association barely changed in the final multivariate model.

Socio-Demographic Characteristics

The first socio-demographic variable was women's years of schooling. The simple relationship between this variable and CS delivery was a positive and statistically significant one. In the final multivariate model, this relationship holds, although the coefficient weakened. Moreover, the second socio-demographic variable, father's years of education, was found to be statistically and positively associated with CS in the simple regression. However, this variable was omitted in the final multivariate model due to its high correlation with mother's years of education.

The second socio-demographic variable, health insurance cover, was found to be associated with CS delivery, with women having cover from the employer and private institutions were more likely to undergo CS for their latest delivery. When other covariates were included, the overall relationship is still significant. Furthermore, in terms of household wealth, quintiles of wealth index were found to be statistically significant in the simple regression with the coefficients getting larger as the quintile goes up. A similar pattern, albeit attenuated, was observed in the final multivariate model.

Discussion

This study addresses the spatial, maternal, and socio-demographic variables associated with the probability of Indonesian women having CS method for their latest delivery.

Spatial Variables

Many studies have demonstrated spatial inequalities of CS deliveries across regions within a country, such as in Egypt (Khawaja, Kabakian-Khasholian, & Jurdi, 2004), rural China (Klemetti et al., 2010), Bangladesh (Kamal, 2013), and Nepal (Prakash & Neupane, 2014). Higher CS rate in urban areas has also been shown in previous studies (Arrieta, 2011; Collin, Anwar, & Ronsmans, 2007; Kamal, 2013; Magadi, Agwanda, Obare, & Taffa, 2007; Prakash & Neupane, 2014; Ronsmans, Holtz, & Stanton, 2006). Contrary to previous literature, however, the present study does not indicate significant spatial inequalities in CS delivery both across regions and between urban and rural areas. In terms of region, Java region was chosen as the reference category due to its large population size (Statistics Indonesia, 2010). Women residing in the residing in Sumatera region have a higher probability of CS delivery compared to those living in Java region. It is observed that CS deliveries in other regions were not statistically different from that in the reference region. In terms of place of residence, the probability of CS in urban women is not significantly higher than that in rural women.

Maternal Variables

Maternal Age

In terms of maternal age, previous literature finds that maternal age is positively associated with likelihood of having CS as method of delivery (Arrieta, 2011; Bragg et al., 2010; Hsu, Liao, & Hwang, 2008; Khawaja et al., 2004; Klemetti et al., 2010; Liu, Chen, Tsai, & Lin, 2007; Ma, Norton, & Lee, 2010; Magadi et al., 2007; Maharlouei, Moalaee, Ajdari, Zarei, & Lankarani, 2013; Neuman et al., 2014; Nilsen, Ostbye, Daltveit, Mmbaga, & Sandoy, 2014; Prakash & Neupane, 2014; Ribeiro et al., 2007). In this study, maternal age was classified into five categories with women aged 20 to 24 years was used as the reference group (Bragg et al., 2010). It is observed that teenage birthing (<20 years of age) is associated with lower probability of CS delivery compared to their reference counterpart. This is consistent with the previous finding (Bragg et al., 2010).

Moreover, women who gave birth at the age between 25 and 29 have a higher probability of CS delivery compared to those in the reference category. Women who gave birth at the age between 30 and 34 also have a higher probability of CS delivery compared to those who gave birth at the age between 20 to 24 years. Lastly, women who were aged 35 years and over when giving birth have a higher probability of CS delivery compared to women in the reference category. These are coherent with what previous studies suggest (Arrieta, 2011; Klemetti et al., 2010; Liu et al., 2007).

Parity

In this study, parity was operationalised in a three-category variable following that of Bragg and others' study in 2010 (Bragg et al., 2010) where women who had no children prior to their latest delivery acts as the reference category. Bragg et al. (2010) demonstrated that multiparous women with (no) history of CS delivery have higher (lower) odds of undergoing CS procedure than nulliparous women. Similarly, this study observed that multiparous women with (no) history of CS delivery have a higher (lower) probability of CS delivery compared to reference women. These findings are consistent with that of previous studies as it has been shown that women with previous CS delivery are more likely to have another one (Liu et al., 2007; Ma et al., 2010).

Prenatal Complication

Existing studies agree that women with prenatal complications are at higher risk of CS delivery (Bragg et al., 2010; Ma et al., 2010). The result of this study is in line as it is observed that women who reported having any complications during their pregnancy have a higher probability of CS delivery than those who reported having none.

Prenatal Care Visits

The number of PNC visits was classified into four categories with none as the reference category. It is claimed that more PNC visits are associated with higher likelihood of CS delivery among women (Khawaja et al., 2004; Neuman et al., 2014). It is observed that women who reported having PNC visits for 1 to 3 times have a higher probability of CS delivery compared to those who reported having none. But it is not statistically significant at all conventional levels of significance ($p = 0.149$). Moreover, women who reported having PNC visits for 4 to 7 times have a higher probability of CS delivery compared to those who reported having none. Lastly, women who reported having PNC visits for 8 times or more have a higher probability of CS delivery compared to those who reported having none.

Private Health Facility Delivery

The last maternal variable in this study was birthing in private facility. It is claimed in previous literature that women who gave birth in a private health facility are more likely to have CS as their method of delivery than women who gave birth in a public health facility or at home (Ma et al., 2010; Mendoza-Sassi, Cesar, Silva, Denardin, & Rodrigues, 2010; Neuman et al., 2014; Ribeiro et al., 2007). In this study, it is found that women giving birth in a private health facility were of a higher probability of undergoing CS for their last delivery compared to those who gave birth in public health facility or at home. This is consistent with the findings of previous studies.

Sociodemographic Variables

Maternal Education

Most previous studies found a positive association between education and likelihood of having CS as a mode of delivery (Collin et al., 2007; Klemetti et al., 2010; Magadi et al., 2007; Mendoza-Sassi et al., 2010). However, other studies have suggested the opposite, namely that low-educated women are at higher risk of CS delivery (Hsu et al., 2008; Nilsen et al., 2014); or found no association (Kottwitz, 2014) when access to hospital care is taken into account. In this study, it is observed that education of mother is significantly and positively associated with the probability of CS delivery. For every one year increase in formal education of mother, the probability of getting CS for her latest delivery increases.

Health Insurance

It is observed that women with private health insurance cover have a higher probability of CS compared to those with no cover. This is fairly consistent with previous literature. A study on CS in rural China has shown indication of the positive and significant effect of health insurance cover on the probability of CS delivery (Long et al., 2012). Studies of CS in Taiwan also found a positive relationship, albeit statistically not significant, between health insurance cover and CS delivery (Hsu et al., 2008; Liu et al., 2007).

Household Wealth

In general, the association between wealth and CS delivery in the literature is positive (Arrieta, 2011; Collin et al., 2007; Cresswell, Assarag, Meski, Filippi, & Ronsmans, 2015; Kamal, 2013; Prakash & Neupane, 2014; Ronsmans et al., 2006). The results of the present study confirm previous studies, where being in higher wealth quintiles (second, third, fourth, and highest quintiles) corresponds to the higher probability of CS delivery compared to being in the lowest wealth quintile. A previous study on CS delivery in Indonesia suggests that wealth index is not only associated with the likelihood of CS delivery but also on the trends in rates of CS in women in the wealthiest quintile (Hatt et al., 2007).

Strengths and Limitations of the Study

This study has several strengths. First, the data used is nationally representative. Second, the questionnaire in the survey is internationally standardised and hence comparable to multiple countries. Third, the large sample size of IDHS means larger statistical power. However, this study was not free from limitations. One of which is the cross-sectional form of IDHS. Another limitation is that information sourced from IDHS are mostly retrospective and self-reported. Moreover, elective CS cannot be separated from emergency CS. Given these limitations, causal inference is not warranted.

Conclusion

This study investigated the associates of CS deliveries in Indonesia. It is observed that mother's age at childbirth, parity, complications during pregnancy, the number of PNC visits, and delivery in a private health facility were significantly and positively associated with the probability of CS delivery. Women with a history of CS have a substantially higher probability of undergoing another CS. Moreover, it is also found years of schooling of women was associated with higher likelihood of CS delivery. Furthermore, having private health insurance cover compared to none, and being in a higher wealth index quintile were found to be positively associated with the probability of CS delivery. These findings are coherent with that of existing literature and thus enrich the existing knowledge of the factors associated with CS delivery in Indonesia. Nevertheless, further studies that update the trend of CS deliveries and its determinants in Indonesia are recommended.

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Conflict of Interest

The authors declared no potential conflict of interest.

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