Determinants of caesarean section delivery: A nationwide study in Indonesia

Aria Aulia Nastiti, Mira Triharini, Ni Komang Ayu Santika, Yulis Setiya Dewi, Najla A. Barnawi, Hidayat Arifin

Faculty of Nursing

Research output: Contribution to journal › Article › peer-review

Abstract

Background The number of caesarean section deliveries among mothers in Indonesia has increased every year. Aim This study was conducted to identify the prevalence and determinants of caesarean section in Indonesia. Methods A cross-sectional design using the 2017 Indonesian Demographic Health Survey was conducted. A total of 12 789 mothers were recruited, and bivariate analysis and binary logistic regression were used. Results The determinants among women that were significant factors in performing caesarian section deliveries were maternal age 35 years, urban residence, high level of education, poorest wealth index, having more than four visits to antenatal care centres, close proximity to health facilities and first-time birth. Conclusions The rate of caesarean section deliveries in Indonesia was 17.7%. Monitoring and evaluation of the increasing number of caesarean sections without medical necessity and the severity of labour is needed.

Original language	English
Pages (from-to)	282-289
Number of pages	8
Journal	British Journal of Midwifery
Volume	30
Issue number	5
Publication status	Published - 2 May 2022

Access to Document

10.12968/bjom.2022.30.5.282

Dive into the research topics of 'Determinants of caesarean section delivery: A nationwide study in Indonesia'. Together they form a unique fingerprint.

- Indonesia — Medicine & Life Sciences
- Cesarean Section — Medicine & Life Sciences
- Mothers — Medicine & Life Sciences
- Birth Order — Medicine & Life Sciences
- Prenatal Care — Medicine & Life Sciences
- Maternal Age — Medicine & Life Sciences
- Health Facilities — Medicine & Life Sciences
- Logistic Models — Medicine & Life Sciences

View full fingerprint ›

Cite this

APA Author BIBTEX Harvard Standard RIS Vancouver

Nastiti, A. A., Triharini, M., Santika, N. K. A., Dewi, Y. S., Barnawi, N. A., & Arifin, H. (2022). Determinants of caesarean section delivery: A nationwide study in Indonesia. *British Journal of Midwifery*, *30*(5), 282-289. https://doi.org/10.12968/bjom.2022.30.5.282

Determinants of caesarean section delivery: a nationwide study in Indonesia

Abstract

Background The number of caesarean section deliveries among mothers in Indonesia has increased every year.

Aim This study was conducted to identify the prevalence and determinants of caesarean section in Indonesia.

Methods A cross-sectional design using the 2017 Indonesian Demographic Health Survey was conducted. A total of 12789 mothers were recruited, and bivariate analysis and binary logistic regression were used.

Results The determinants among women that were significant factors in performing caesarian section deliveries were maternal age >35 years, urban residence, high level of education, poorest wealth index, having more than four visits to antenatal care centres, close proximity to health facilities and first-time birth.

Conclusions The rate of caesarean section deliveries in Indonesia was 17.7%. Monitoring and evaluation of the increasing number of caesarean sections without medical necessity and the severity of labour is needed.

Keywords

Caesarean delivery | Health survey | Demographic background | Sustainable development goals | Maternal health

Aria Aulia Nastiti
Department of Fundamental Nursing[1]
aria.aulia.n@fkp.unair.ac.id

Mira Triharini
Department of Advanced Nursing[1]

Ni Komang Ayu Santika
Bachelor of Nursing Study Program[1]

Yulis Setiya Dewi
Department of Advanced Nursing[1]

Najla A Barnawi
Community Service Unit, College of Nursing-Riyadh, King Saud bin Abdul Aziz University for Health Sciences, Saudi Arabia

Hidayat Arifin
Faculty of Nursing, Universitas Padjadjaran, Indonesia

[1]Faculty of Nursing, Universitas Airlangga, Indonesia

Reducing maternal mortality remains a major challenge for healthcare systems worldwide. Indonesia has achieved the fourth target of the Millennium Development Goals, to reduce child mortality, but has yet to reach the fifth target, to improve maternal health by reducing the maternal mortality ratio and achieving universal access to reproductive health (Schröders et al, 2015). Problems with maternal and child healthcare are still prevalent in Indonesia. The government has carried out various programmes to improve maternal and child healthcare, one of which requires childbirth to be assisted by competent health personnel (Mahendradhata et al, 2017). This is an effort to achieve the sustainable development goal target of reducing the global maternal mortality rate to less than 70 per 100000 live births by 2030 (World Health Organization (WHO), 2016a). Type of delivery, including caesarean section, can reduce maternal and infant mortality and delivery complications. However, a caesarean section is generally only performed according to planned medical situations that indicate its necessity, in an emergency setting or electively.

The rate of caesarean section is currently increasing around the world, in both low- and high-income countries (Vogel et al, 2015; Dusabe et al, 2018). Indonesia has the highest rate of caesarean sections globally, according to the Association of Southeast Asian Nations (Badan Kependudukan dan Keluarga Berencana Nasional et al, 2017). The rate of caesarean section is highest (up to 22.5%) among urban women in Indonesia (Verma et al, 2020). The rate of caesarean section deliveries increased considerably between 2007 and 2017, from 7% to 17% (Betran et al, 2016). The high rate of caesarean section deliveries in Indonesia exceeds the WHO conservative recommendation of 10–15% in a region (Betran et al, 2016). Caesarean section delivery can save the lives of mothers and children when vaginal delivery is not possible (Jenabi et al, 2019). However, it carries the risk of surgery and increases the risk of complications for both the baby and the mother, such as future pregnancy problems. Previous studies have found

that caesarean delivery was associated with increased incidence of asthma (Thavagnanam et al, 2008) and type 1 diabetes (Cardwell et al, 2008) in mothers.

Caesarean deliveries take place globally, are performed both with and without medical indications and their use is increasing among health services (Konlan et al, 2019). However, more mothers are choosing a caesarean section without any prior complications or when it is not medically indicated (Jenabi et al, 2019). A caesarean section can have short- and long-term effects, such as bleeding, postpartum infection, delayed breastfeeding because of anesthesia and postoperative pain and future ectopic pregnancies (Rahmawati et al, 2016). There is a reported misunderstanding among some mothers that performing a caesarean section without medical indication is safe (Weeks et al, 2020).

Lazasniti et al (2020) reported on a study of Indonesian women that factors influencing the decision to perform a caesarean section include level of education, income, work status, an agreement between spouse or family, anxiety, knowledge and the 100% health financing method. In low- to middle-income countries, high-risk sociodemographic characteristics have been reported to increase the incidence of caesarean section. These characteristics include family income, area of residence, mother's level of education, birth order and maternal age at delivery (Gebremedhin, 2014; Long et al, 2015; Vieira et al, 2015; Bayou et al, 2016). The aim of this study was to assess the prevalence of and sociodemographic characteristics associated with caesarean sections in Indonesia.

Methods

Study design

A cross-sectional study design was used to conduct this study using secondary data from the 2017 Indonesian Demographic Health Survey (National Population and Family Planning Board and ICF, 2018).

Data source

The 2017 survey was carried out by the National Population and Family Planning Board, Central Statistics Agency of Indonesia and the Ministry of Health. The government of Indonesia funded the survey, which took place from 24 July to 30 September 2017. The Inner-City Fund provided technical assistance under the Demographic Health Surveys Program, which is funded by the United States Agency for International Development.

Sample

The survey sample was representative at national and provincial levels and included urban and rural areas across 34 provinces. The inclusion criteria were married women of reproductive age (15–49 years) in 49 250 households. The total survey sample was 12 789 mothers.

Variables

The dependent variable in this study was a caesarean section, either planned or decided on before the onset of labour pain. The analysis unit in this study was all births in the 5 years prior to the survey.

The independent variables in this study were maternal age, maternal level of education, place of residence, economic status, number of antenatal care visits, proximity to a health facility, birth order and husband's level of education. The antenatal care clinics are run by midwives and obstetricians.

Mothers' age was divided into three groups (15–19 years, 20–34 years, 35–47 years). The reference category was the youngest age group (15–19 years). This uneven distribution of ages in the categories was based on Indonesian age categories (Health Ministry of Republic Indonesia, 2009).

The distribution of education levels intended to determine the differences in the behaviour of women with the lowest level of education (none) up to the highest education (university) to determine if this influenced the selection of delivery type.

Residential areas were classified as urban or rural, based on the existence of and access to medical facilities.

Economic status was measured by ownership of durable goods in households and divided into five groups, ranging from the poorest to the richest, with the poorest as the reference category. This was based on the survey's classification of economic status, and the categorisations were determined based on principal component analysis (Vyas and Kumaranayake, 2006; Arifin et al, 2022).

The frequency of antenatal care visits during pregnancy was divided into four categories: none, one, 2–4 visits, or additional examinations after the fourth visit.

The distance to a health facility was divided into two categories: 'big problem' and 'not a big problem'. This categorisation was based on the respondent's perception of whether they had problems accessing healthcare when they fell sick (Croft et al, 2018; Kusnanto et al, 2020).

Birth order referred to the order of the last child born by caesarean section (for example, birth order 2 means the last child a woman gave birth to by caesarean section was her second child).

Data analysis

Software for statistic and data science (version 14.0) was used to analyse the data, including checking for completeness. The chi-squared test and a binary logistic regression were performed to assess determinants of caesarean deliveries in Indonesia. The strength of the association between the independent and dependent variables was assessed using an odds ratio with a 95% confidence interval. Variables were considered significant at a P value of 0.05 or less with a 95% confidence interval.

Table 1. Participants' sociodemographics characteristics

Variables		Frequency, n=12 789 (%)
Mother's age at birth (years)	15–19	1212 (9.48)
	20–34	9414 (73.61)
	35–47	2163 (16.91)
Residence	Rural	6514 (50.94)
	Urban	6275 (49.06)
Mother's education	None or primary	3387 (26.49)
	Secondary	7567 (59.17)
	Higher	1835 (14.35)
Wealth index	Poorest	2445 (19.12)
	Poorer	2650 (20.72)
	Middle	2689 (21.03)
	Richer	2607 (20.39)
	Richest	2398 (18.75)
Number of antenatal care visits	None	277 (2.17)
	1	117 (0.92)
	2–3	664 (5.19)
	≥4	11 731 (91.73)
Birth order	1	4231 (33.08)
	2–3	6924 (54.14)
	4–5	1344 (10.51)
	≥6	290 (2.27)
Frequency of watching TV	Not at all	427 (3.34)
	Less than once a week	1412 (11.04)
	At least once a week	10 950 (85.63)
Distance to health facility	Big problem	1414 (11.05)
	Not a big problem	11 375 (88.95)
Husband's age (years)	<20	47 (0.37)
	20–34	6347 (49.63)
	35–99	6395 (50.01)
Husband's education	None	122 (0.95)
	Primary	3527 (27.57)
	Secondary	7487 (58.55)
	Higher	1653 (12.92)
Husband's work status	Unemployed	77 (0.60)
	Employed	12 712 (99.40)

Ethical considerations

The 2017 Indonesian Demographic Health Survey obtained ethical approval from the National Institute for Health Research and Development of the Indonesian Ministry of Health. All respondents' identities were deleted from the data, and the respondents gave written approval for their involvement in the research. Permission to use the 2017 survey in this study was obtained from ICF International. The data were authorised by the ICF International's Institutional Review Board (No. FWA00000845). In accordance with 45 Code of Federal Regulations 46, 'Protection of Human Subjects', the project adhered to all applicable standards. The survey acquired informed consent from all individuals and oversaw the study's execution. For individuals under the age of 16, informed consent to participate was acquired from their parents.

Results

A caesarean section was conducted for 2269 (17.7%) of the 12 789 mothers who gave birth during the 5 years before the survey. The majority of the births were by women aged 20–34 years (73.61%), those who were living in rural areas (50.94%), those who had a secondary level of education (59.17%), those whose order of children born by caesarean section was 2–3 (54.14%), those who had more than four antenatal care visits during pregnancy (91.73%), those who gave birth in a government hospital or clinic (50.30%), those who did not have a difficult distance to travel to the health facility (88.95%), and those whose husband's level of education was secondary (58.55%) (*Table 1*).

In bivariate analysis, almost all the variables showed a significant association ($P<0.05$) with caesarean section delivery, except husband's work status (*Table 2*).

In multivariate analysis, a backward stepwise logistic regression method was used to assess the association between the independent and dependent variables. Mother's age, level of education, residence, wealth index, number of antenatal care visits, distance to health facility, and birth order were found to have significant associations with caesarean section. Women aged 35–47 years at the time of the birth were 2.92 times more likely to give birth by caesarean section than women aged 15–19 years ($P<0.001$). Urban women were 1.31 times more likely to give birth by caesarean section than women living in rural areas ($P<0.001$). Highly educated women were 2.27 times more likely to give birth by caesarean section than women with primary or no education ($P<0.001$). Women of the poorest wealth index families were 3.19 times more likely to give birth by caesarean section than women from the richest wealth index families ($P<0.001$). Women who had four or more antenatal care visits during pregnancy were 7.70 times more likely to give birth by caesarean section than women who did not visit antenatal care ($P<0.001$). Women who reported that they did not have a big problem with the distance to a healthcare facility were 1.42 times more likely to give birth by caesarean section than women who lived far from a healthcare facility. ($P=0.003$). Women who gave birth to their first child were 1.80 times more likely to have a caesarean section than women who had six or more children ($P=0.013$) (*Table 3*).

Table 2. Bivariate analysis of determinants of caesarean delivery

Variable		Delivery by caesarean section		X^2	*P* value
		Yes, *n*=10 520 (%)	No, *n*=2269 (%)		
Mother's age at birth (years)	15–19	1084 (8.48)	128 (1.00)	90.81	<0.001
	20–34	7780 (60.83)	1634 (12.78)		
	35–47	1656 (12.95)	507 (3.96)		
Residence	Rural	5699 (44.57)	815 (6.37)	245.53	<0.001
	Urban	4821 (37.69)	1454 (11.37)		
Mother's education	None or primary	3057 (23.91)	330 (2.58)	452.37	<0.001
	Secondary	6242 (48.81)	1325 (10.36)		
	Higher	1221 (9.55)	614 (4.8)		
Wealth index	Poorest	1661 (12.99)	784 (6.13)	658.06	<0.001
	Poorer	2045 (15.99)	605 (4.73)		
	Middle	2275 (17.79)	414 (3.24)		
	Richer	2300 (17.98)	307 (2.40)		
	Richest	2240 (17.51)	158 (1.24)		
Number of antenatal care visits	None	273 (2.13)	4 (0.03)	27.88	<0.001
	1	113 (0.89)	4 (0.03)		
	2–3	602 (4.71)	62 (0.48)		
	≥4	9532 (74.53)	2199 (17.20)		
Birth order	1	3395 (26.55)	836 (6.54)	106.10	0.001
	2–3	5726 (44.77)	1198 (9.37)		
	4–5	1141 (8.92)	203 (1.58)		
	≥6	258 (2.02)	32 (0.26)		
Frequency of watching TV	Not at all	381 (2.98)	46 (0.36)	16.60	0.007
	Less than once a week	1179 (9.22)	233 (1.82)		
	At least once a week	8960 (70.06)	1990 (15.56)		
Distance to health facility	Big problem	1266 (9.89)	148 (1.16)	56.60	<0.001
	Not a big problem	9254 (72.37)	2121 (16.58)		
Husband's age (years)	<20	45 (0.35)	2 (0.02)	13.74	0.028
	20–34	5281 (41.29)	1066 (8.33)		
	35–99	5194 (40.62)	1201 (9.39)		
Husband's education	None	112 (0.88)	10 (0.08)	366.71	<0.001
	Primary	3194 (24.97)	333 (2.60)		
	Secondary	6069 (47.46)	1418 (11.09)		
	Higher	1145 (8.95)	508 (3.97)		
Husband's work status	Unemployed	60 (0.47)	17 (0.13)	1.04	0.318
	Employed	10 640 (81.79)	2252 (17.61)		

Table 3. Multivariate analysis of determinants of caesarean delivery

Variable		Adjusted odds ratio (95% confidence interval)	*P* value
Mother's age at birth (years)	15–19	Ref	-
	20–34	1.53 (1.18–1.98)	0.001
	35–47	2.92 (2.16–3.96)	<0.001
Residence	Rural	Ref	-
	Urban	1.31 (1.13–1.53)	<0.001
Mother's education	None or primary	Ref	-
	Secondary	1.39 (1.17–1.65)	<0.001
	Higher	2.27 (1.84–2.81)	<0.001
Wealth index	Poorest	3.19 (2.84–4.12)	<0.001
	Poorer	2.53 (1.98–3.25)	<0.001
	Middle	1.82 (1.44–2.29)	<0.001
	Richer	1.53 (1.21–1.92)	<0.001
	Richest	Ref	-
Number of antenatal care visits	None	Ref	-
	1	2.01 (0.53–7.63)	0.306
	2–3	5.00 (1.76–14.22)	0.003
	≥4	7.70 (2.84–20.90)	<0.001
Birth order	1	1.80 (1.13–2.00)	0.013
	2–3	1.28 (0.82–2.00)	0.271
	4–5	1.05 (0.67–1.65)	0.829
	≥6	Ref	-
Distance to health facility	Big problem	Ref	-
	Not a big problem	1.42 (1.13–1.78)	0.003

Discussion

In this study, determinants related to caesarean sections in Indonesia were discovered by examining maternal and environmental factors. Mothers aged 35–47 years were more likely to have a caesarean section than mothers aged 15–19 years. Complications during pregnancy and childbirth increase significantly with increasing maternal age; therefore, it is likely that a caesarean section is performed out of consideration of the safety of the mother and the fetus. Several related studies have shown that older women have a greater risk of developing pre-eclampsia, placenta previa and gestational diabetes (Ogawa et al, 2017; Claramonte Nieto et al, 2019). Being older is related to a decrease in physiological and hormonal functions that can lead to pregnancy complications (Ogawa et al, 2017; Claramonte Nieto et al, 2019). Therefore, older women are advised to deliver by caesarean section to lessen the urgency of the delivery process and reduce the risk of potential pregnancy complications.

Women who lived in cities were more likely to give birth by caesarean section than women who lived in rural areas. This is consistent with research in Vietnam, which showed that mothers who lived in urban areas were more likely to give birth by caesarean section as a result of the existence of and access to many private and public hospitals, each of which can provide delivery assistance services that are suitable for pregnant women (de Loenzien et al, 2019). Urban areas have health facilities that are better equipped to assist childbirth and promote a safer delivery. Other studies have also shown that women who lived in metropolitan areas had high social welfare, chose to give birth by caesarean section in a private hospital (Takegata et al, 2020) and their residential status corresponded with a higher social status/class (Liamputtong and Naksook, 2003; Liamputtong, 2005). In line with this, the present study showed that women who lived closer to a health facility were more likely to deliver by caesarean section than women who lived further from a health facility. The majority of maternal mortalities can be avoided by access to affordable, qualified facilities.

Maternal education was also a significant determinant of caesarean section delivery. Highly educated women were more likely to deliver via caesarean section compared with women who had a lower level of education. Gynecological obstetricians are known to offer caesarean sections to pregnant women who are private patients (Faisal-Cury et al, 2017; Manyeh et al, 2019; Sadiq et al, 2019). Pregnant women with a higher level of education may more easily receive and absorb information about caesarean section, and may seek information about having a quick and painless labour, making caesarean delivery a preferential choice for these women. Qualitative research in Norway showed that the decision to have a caesarean section more often resulted from a pregnant mother's request than obstetric indications and this decision was made when considering avoiding trauma experienced from a previous labour (Eide et al, 2019). Healthy psychological conditions during the birthing process are necessary for proper maternal health later in the puerperium and infant care, meaning that caesarean sections are becoming a more popular choice in millennial mothers.

Women in the poorest wealth quintile were more likely to deliver by caesarean section. The cost of delivery may not be a factor, because in Indonesia all types of deliveries are free of charge or covered by the Indonesian National Health Insurance, including caesarean sections (Consumer News and Business Channel Indonesia, 2021) as long as they are medically indicated rather than a personal request. This is in line with the sustainable

development goal of developing universally accessible healthcare. This makes it surprising that a caesarean section is associated with a lower wealth quintile, as it is likely to be those of a higher quintile who can afford to request one, even if it is not medically indicated. However, previous research has indicated that pregnant women with low economic quintiles have a greater likelihood of developing labour complications. This can happen because of a lack of knowledge, as well as inadequate intake of nutrients during pregnancy (Larson, 2007; Bakken et al, 2008). Therefore, women from lower socioeconomic means with high-risk pregnancies may be more likely to give birth by caesarean section, to ensure the health of the mother and child.

Mothers who visited antenatal care more than four times were more likely to have a caesarean section. This is consistent with research in Mexico that showed that women who had more than four antenatal care visits planned a caesarean section rather than a vaginal delivery (Heredia-Pi et al, 2014; Guendelman et al, 2017). This was because of problems during pregnancy that required frequent antenatal care visits, resulting in the decision to have a caesarean section. Providing successful and effective antenatal care could prevent and detect potential causes of obstetric complications and avoid the death of newborns and stillbirths (WHO, 2016b). The results of the present study indicated that more than 90% of the participants had more than four antenatal care visits. In Indonesia, there is a health insurance regulation where if a mother routinely undergoes antenatal care visits at a government health facility at the start of their pregnancy, the cost of childbirth will be covered, improving attendance. It is likely that increased attendance allows concerns to be identified earlier in a pregnancy, and caesarean section may be recommended as a result to preserve the health and wellbeing of the mother and the baby.

Second- and higher order births had lower odds of being delivered via caesarean section compared with first-order births. This is in line with research in Ghana, where health facility records showed that women who gave birth to more than four children were less likely to give birth via caesarean section (Seidu et al, 2020). In another study, it was found that mothers elected to have a caesarean section for their first child because they were concerned about the successful delivery of the child, as well as having a general fear of childbirth (Toohill et al, 2014). In addition, first-time expectant women experience more anxiety and fear of labour pain during birth, and therefore opt to give birth by caesarean section (Haines et al, 2012; Storksen et al, 2015). In previous studies, more first-time expectant women in Indonesia gave birth by caesarean section than multiparous women and subsequently decreased in overall multiparity (Sihombing et al, 2017).

Key points

- The prevalence of caesarean sections in Indonesia was found to be 17.7%.
- A total of 12789 mothers participated in the 2017 Indonesian Demographic Health Survey and were analysed for determinants of birth by caesarean section.
- Demographic data should be considered during caesarean section delivery in Indonesia as multiple factors were associated with increased likelihood of caesarean section, including higher education and more antenatal care visits.
- A monitoring and evaluation program should be initiated by the Indonesian government.

Women who had a 'not difficult' distance to travel to a health facility were more likely to choose a caesarean section. The Indonesian government mapped the distribution of health facilities to mean that most women have access to one (Mahendradhata et al, 2017). Additionally, first-rate health facilities in Indonesia are able to provide caesarean section either by medical indication or according to individual request. Previous studies have stated that with the close proximity of a health facility, the choice to give birth by caesarean section is more likely to be made, out of consideration of the health and safety of the mother and child (Amaral et al, 2013;Vieira et al, 2015). For this reason, the ease of access to these facilities, particularly in rural areas, needs to be considered by the Indonesian government.

Strength and limitations

This research has determined factors associated with caesarean section, including education and antenatal care visits. This research provides national statistics from data taken across all regions in Indonesia. Thus, it can provide an interpretation of the determinants of caesarean sections across the whole of Indonesia.

The policy and equitable distribution of facilities in rural areas of Indonesia need to be taken into account, so that people who live far from urban areas have the option of a safe delivery process via caesarean section. In addition, this research showed that characteristics of a mother (maternal age>35 years, urban residence, high level of education, poorest wealth index, more than four visits to antenatal care centres, no problems accessing health facilities and first-time birth) have an important role in the selection of the birth process.

The limitations of this study are that other factors, such as those from a husband or other family members and the influence of culture and beliefs, were not included and require further exploration to provide more detailed information on the determinants of the decision to choose a caesarean section. Additionally, no information was gathered on the indications for caesarean section, meaning it is not possible to elucidate whether one was undertaken for medical reasons or by maternal request.

Conclusions

Overall, the number of caesarean deliveries in Indonesia was found to be 17.7%. In Indonesia, a caesarean section was more likely to occur for older women (35–47 years), those with a high level of maternal education, those living in a urban area, those who visited antenatal care four or more times, those who live in close proximity to a health facility and those who were giving birth for the first time. In addition, women from the poorest wealth quintile were more likely to have a caesarean section. Further monitoring and evaluation of the increasing number of caesarean sections without medical indication and the severity of labour in Indonesia is needed. Continuous health education for pregnant women is important to reduce the risk of pregnancy complications and ensuring a normal, healthy birth. BJM

Acknowledgements: *The authors would like to thank Universitas Airlangga for supporting this study.*

Funding: *The study was funded by Universitas Airlangga (number 346/UN3/2020).*

Declaration of interests: *The authors declare that there are no conflicts of interest.*

Peer review: *This article was subject to double-blind peer review and accepted for publication on 14 March 2022.*

Amaral G, Bushee J, Cordani UG et al. Experience of stigma and discrimination and the implications for healthcare seeking behavior among people living with HIV/AIDS in resource-limited setting. J Petrology. 2013;369(1):1689–1699. https://doi.org/10.1017/CBO9781107415324.004

Arifin H, Ibrahim K, Rahayuwati L et al. HIV-related knowledge, information, and their contribution to stigmatization attitudes among females aged 15–24 years: regional disparities in Indonesia. BMC Public Health. 2022;22(1):637. https://doi.org/10.1186/s12889-022-13046-7

Bakken S, Stone PW, Larson EL. A nursing informatics research agenda for 2008-18: contextual influences and key components. Nurs Outlook. 2008;56(5):206–214. https://doi.org/S0029-6554(08)00160-7

Bayou YT, Mashalla YJS, Thupayagale-Tshweneagae G. Patterns of caesarean-section delivery in Addis Ababa, Ethiopia. Afr J Prim Health Care Fam Med. 2016;8(2):1–6. https://doi.org/10.4102/phcfm.v8i2.953

Betran AP, Torloni MR, Zhang JJ, Gülmezoglu AM. WHO statement on caesarean section rates. BJOG. 2016;123(5):667–670. https://doi.org/10.1111/1471-0528.13526

Badan Kependudukan dan Keluarga Berencana Nasional, Badan Pusat Statistik, Kementerian Kesehatan, USAID. Survei Demografi Dan Kesehatan. Kesehatan Reproduksi Remaja: Badan Kependudukan dan Keluarga Berencana Nasional; 2017

Cardwell CR, Stene LC, Joner G et al. Caesarean section is associated with an increased risk of childhood-onset type 1 diabetes mellitus: a meta-analysis of observational studies. Diabetologia. 2008;51(5):726–735. https://doi.org/10.1007/s00125-008-0941-z

Claramonte Nieto M, Meler Barrabes E, Garcia Martinez S, Gutiérrez Prat M, Serra Zantop B. Impact of aging on obstetric outcomes: defining advanced maternal age in Barcelona. BMC Pregnancy Childbirth. 2019;19(1):1–10. https://doi.org/10.1186/s12884-019-2415-3

Consumer News and Business Channel Indonesia. Ditanggung BPJS Kesehatan, Persalinan Caesar Pun Tanpa Biaya. 2021. https://www.cnbcindonesia.com/news/20210331202503-4-234521/ditanggung-bpjs-kesehatan-persalinan-caesar-pun-tanpa-biaya (accessed 12 April 2022)

Croft TN, Marshall AMJ, Allen CK et al. Guide to DHS statistics. Rockville, Maryland: ICF; 2018

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. https://doi.org/10.1371/journal.pone.0213129

Dusabe J, Akuze J, Kisakye AN, Kwesiga B, Nsubuga P, Ekirapa E. A case-control study of factors associated with caesarean sections at health facilities in Kabarole district, western Uganda, 2016. Pan Afr Med J. 2018;29. https://doi.org/10.11604/pamj.2018.29.179.14870

Eide KT, Morken NH, Bærøe K. Maternal reasons for requesting planned caesarean section in Norway: a qualitative study. BMC Pregnancy Childbirth. 2019;19(1). https://doi.org/10.1186/s12884-019-2250-6

Faisal-Cury A, Menezes PR, Quayle J, Santiago K, Matijasevich A. The relationship between indicators of socioeconomic status and caesarean section in public hospitals. Revista de Saúde Pública. 2017;51:14. https://doi.org/10.1590/S1518-8787.2017051006134

Gebremedhin S. Trend and socio-demographic differentials of Caesarean section rate in Addis Ababa, Ethiopia: analysis based on Ethiopia demographic and health surveys data. Reproductive Health. 2014;11(1). https://doi.org/10.1186/1742-4755-11-14

Guendelman S, Gemmill A, Thornton D et al. Prevalence, disparities, and determinants of primary caesarean births among first-time mothers in Mexico. Health Affairs. 2017;36(4):714–722. https://doi.org/10.1377/hlthaff.2016.1084

Haines HM, Rubertsson C, Pallant JF, Hildingsson I. The influence of women's fear, attitudes and beliefs of childbirth on mode and experience of birth. BMC Pregnancy Childbirth. 2012;12(1):55. https://doi.org/10.1186/1471-2393-12-55

Health Ministry of Republic Indonesia. Age classification based on category. Jakarta: Ditjen Yankes; 2009

Heredia-Pi I, Servan-Mori EE, Wirtz VJ, Avila-Burgos L, Lozano R. Obstetric care and method of delivery in Mexico: results from the 2012 National Health and Nutrition Survey. PLOS One. 2014;9(8). https://doi.org/10.1371/journal.pone.0104166

Jenabi E, Khazaei S, Bashirian S, Aghababaei S, Matinnia N. Reasons for elective caesarean section on maternal request: a systematic review. J Matern-Fetal Neonatal Med. 2019:1–6. https://doi.org/10.1080/14767058.2019.1587407

Konlan KD, Baku EK, Japiong M, Dodam Konlan K, Amoah RM. Reasons for women's choice of elective caesarian section in Duayaw Nkwanta Hospital. J Pregnancy. 2019:

2320743. https://doi.org/10.1155/2019/2320743
Kusnanto K, Arifin H, Kurniawati Y. Determinant of BCG vaccine coverage among Indonesian children aged 0–2 months. Children and Youth Services Review. 2020;116:105238. https://doi.org/10.1016/j.childyouth.2020.105238
Larson CP. Poverty during pregnancy: its effects on child health outcomes. Paediatrics Child Health. 2007;12(8):673–677. https://doi.org/10.1093/pch/12.8.673
Lazasniti S, Machmud PB, Ronoatmodjo S. Factors that influence caesarean section deliveries in Indonesia. Jurnal Berkala Epidemiologi. 2020;8(2):100. https://doi.org/10.20473/jbe.V8I22020.100–108
Liamputtong P. Birth and social class: northern Thai women's lived experiences of caesarean and vaginal birth. Sociology of Health & Illness. 2005;27(2):243–270. https://doi.org/10.1111/j.1467-9566.2005.00441.x
Liamputtong P, Naksook C. Perceptions and experiences of motherhood, health and the husband's role among Thai women in Australia. Midwifery. 2003;19(1):27–36. https://doi.org/10.1054/midw.2002.0333
Long Q, Kempas T, Madede T, Klemetti R, Hemminki E. Caesarean section rates in Mozambique. BMC Pregnancy Childbirth. 2015;15(1):253. https://doi.org/10.1186/s12884-015-0686-x
Mahendradhata Y, Trisnantoro L, Listyadewi S et al. The Republic of Indonesia health system review (Vol. 7). India: World Health Organization; 2017
Manyeh AK, Amu A, Akpakli DE, Williams J, Gyapong M. Correction: socioeconomic and demographic factors associated with caesarean section delivery in Southern Ghana: evidence from INDEPTH Network member site. BMC Pregnancy Childbirth. 2019;19(1):1–9. https://doi.org/10.1186/s12884-018-2118-1
National Population and Family Planning Board, ICF Indonesia Demographic and Health Survey 2017. Jakarta, Indonesia: BKKBN, BPS, Kemenkes, and ICF; 2018
Ogawa K, Urayama KY, Tanigaki S et al. Association between very advanced maternal age and adverse pregnancy outcomes: A cross sectional Japanese study. BMC Pregnancy Childbirth. 2017;17(1):1–10. https://doi.org/10.1186/s12884-017-1540-0
Rahmawati D, Tamtomo D, Budihastuti UR. Analysis of factors affecting childbirth with caesarean in Kediri, Indonesia. J Mat Child Health. 2016;1(01):34–40. https://doi.org/10.26911/thejmch.2016.01.01.06
Sadiq M, Mehmood T, Aslam M. Identifying the factors associated with caesarean section modeled with categorical correlation coefficients in partial least squares. PLoS One. 2019;14(7):1–17. https://doi.org/10.1371/journal.pone.0219427
Schröders J, Wall S, Kusnanto H, Ng N. Millennium development goal four and child health inequities in Indonesia: a systematic review of the literature. PLoS One. 2015;10(5):e0123629. https://doi.org/10.1371/journal.pone.0123629
Seidu A-A, Hagan JE, Agbemavi W et al. Not just numbers: beyond counting caesarean deliveries to understanding their determinants in Ghana using a population based cross-sectional study. BMC Pregnancy Childbirth. 2020;20(1):114. https://doi.org/10.1186/s12884-020-2792-7
Sihombing N, Saptarini I, Putri DSK. Determinan Persalinan Sectio Caesarea Di Indonesia (Analisis Lanjut Data Riskesdas 2013) Neliti. Jurnal Kesehatan Reproduksi. 2017;8(1):63–75
Storksen HT, Garthus-Niegel S, Adams SS, Vangen S, Eberhard-Gran M. Fear of childbirth and elective caesarean section: a population-based study. BMC Pregnancy Childbirth. 2015;15(1):221. https://doi.org/10.1186/s12884-015-0655-4
Takegata M, Ronsmans C, Nguyen HAT et al. Socio-demographic factors of caesarean births in Nha Trang city, Vietnam: a community-based survey. Trop Med Int Health. 2020;48(1). https://doi.org/10.1186/s41182-020-00239-2
Thavagnanam S, Fleming J, Bromley A, Shields MD, Cardwell CR. A meta-analysis of the association between caesarean section and childhood asthma. Clin Exp Allergy. 2008;38(4):629–633. https://doi.org/10.1111/j.1365-2222.2007.02780.x
Toohill J, Fenwick J, Gamble J, Creedy DK. Prevalence of childbirth fear in an Australian sample of pregnant women. BMC Pregnancy Childbirth. 2014;14(1):275. https://doi.org/10.1186/1471-2393-14-275
Verma V, Vishwakarma RK, Nath DC, Khan HTA, Prakash R, Abid O. Prevalence and determinants of caesarean section in South and South-East Asian women. PLoS One. 2020;15(3):e0229906. https://doi.org/10.1371/journal.pone.0229906
Vieira GO, Fernandes LG, de Oliveira NF, Silva LR, Vieira TdO. Factors associated with caesarean delivery in public and private hospitals in a city of northeastern Brazil: a cross-sectional study. BMC Pregnancy Childbirth. 2015;15(1):132. https://doi.org/10.1186/s12884-015-0570-8
Vogel JP, Betrán AP, Vindevoghel N et al. Use of the robson classification to assess caesarean section trends in 21 countries: a secondary analysis of two WHO multicountry surveys. Lancet Global Health. 2015;3(5):e260–e270. https://doi.org/10.1016/S2214-109X(15)70094-X
Vyas S, Kumaranayake L. Constructing socio-economic status indices: how to use principal components analysis. Health Policy and Planning. 2006;21(6):459–468. https://doi.org/10.1093/heapol/czl029
Weeks FH, Sadler M, Stoll K. Preference for caesarean attitudes toward birth in a Chilean sample of young adults. Women Birth. 2020;33(2):e159–e165. https://doi.org/10.1016/j.wombi.2019.03.012
World Health Organization. Sustainable development goals (SDGs): Goal 3. Target 3.1: By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births. 2016a. http://iris.wpro.who.int/handle/10665.1/12775 (accessed 12 April 2022)
World Health Organization. Community health workers: a strategy to ensure access to primary health care services. 2016b. https://apps.who.int/iris/bitstream/handle/10665/249563/EMROPUB_2016_EN_1760.pdf?sequence=1&isAllowed=y (accessed 31 March 2022)

CPD reflective questions

- Do you think the prevalence of caesarean sections will continue to rise globally?
- What effect are higher numbers of caesarean sections likely to have?
- Why do you think mothers are more frequently choosing to give birth by caesarean section, despite the risk of short- and long-term effects?