



LITERATURE REVIEW

Rising trends and indication of Caesarean section in IndonesiaAli Sungkar¹, Ray Wagiu Basrowi^{2,3}^{1.} *Department of Obstetric Gynecology, Medical Faculty, Universitas Indonesia*^{2.} *Occupational Medicine Division, Department of Community Medicine, Medical Faculty, Universitas Indonesia*^{3.} *Danone SN Indonesia*Received 25th August 2020,
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www.worldnutrijournal.org**Abstract**

The rate of Caesarean delivery is rising dramatically worldwide, and also nationally. The number of Caesarean births exceeds the WHO recommended rate. This study aims to provide an overview of current increasing trend of Caesarean section, including elective procedure, and its risk. A review was conducted using online database, surveillance reports, and national surveys to identify studies with topics of prevalence, trend, indications, and risks of Caesarean delivery. Overall, there is an increase of Caesarean section in global, Asia, and Indonesia setting. We found an increase of 8% from 2013 to 2018 based on population survey, and increase of elective Caesarean surgery, particularly in tertiary care. We listed the possible health risks in short term, long term among mothers and child. Advanced maternal age, higher socio-economic status, higher educational level, residing in urban area, and ownership of health insurance were found to be factors associated with maternal choice on Caesarean delivery. The information presented is important to raise awareness among policy makers aimed to develop a national strategy in reducing the rate of Caesarean delivery.

Keywords: Caesarean section, prevalence, C-section indication, gut dysbiosis, synbiotic**Introduction**

Caesarean section (C-section) is a life-saving surgical procedure for both mother and the baby when pregnancy and birth complications occur. It has been recorded in the history as a procedure to save the fetus from a dying mother, even before the introduction of anesthesia.¹ However, in the modern era, the use of C-section is no longer limited to emergency indications. It is a popular alternative to vaginal delivery. The rate has been increased

progressively worldwide in the last decades, including those in the middle-lower income countries.^{2,3} The World Health Organization (WHO) has suggested that a national C-section rates should not exceed 10-15% as the higher rate would not reduce maternal and neonatal mortality rates.⁴ Nevertheless, recent evidences have shown that most countries have higher C-section rates than the WHO recommended rate, e.g. 40.5% in Latin America and the Caribbean region, 32.3% in Northern America, 25% in Europe, and 19.2% in Asia. In Indonesia, the trend is similar, with increasing C-section rate from 2% in 1986 to 16% in 2012.⁵

Nowadays, with the increased attention to patient's autonomy and shared decision making, women could express their preference for C-section, even without any medical indications. Fear of labor

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pain is the most common reason for elective surgical delivery.⁶⁻⁸ Other determinants include previous negative birth experiences, maternal age, economic, social and cultural factors. It has been estimated about 3.6% of about 18.5 million C-section around the world are carried out without any medical indications.⁹

Even with the advanced surgical technic, C-section procedure is not without complications. A multi-country survey had been carried out and found increased risks of C-section without indications for severe maternal outcome.¹⁰ There has been debate about the short-term and long-term risks of C-section, such as risk of miscarriage and stillbirth, placenta previa, placenta accreta in the subsequent pregnancy, and risk of childhood asthma.¹¹

Early interventions are proposed during pregnancy to reduce unnecessary C-section. WHO recommends various support programs, e.g. childbirth training workshop, psychosocial couple-based prevention program, nurse-led applied relaxation training program, and psychoeducation for women with fear of labor. Educational interventions identified to be effective in reducing C-section and increasing vaginal delivery.¹²

With the implementation of national health insurance in Indonesia, there has been concern towards the increase of C-section. Basic Health Research (*Riset Kesehatan Dasar/Riskesdas*) in 2018 recorded about 17.6% of all births were delivered through C-section, higher than the WHO recommended rate at population level.¹³ The high number of C-section delivery also contributing to the financial burden to BPJS, as the national insurance agency.¹⁴ Nevertheless, there has been any studies that summarized the evidences in this This study aims to provide a review on the trend of C-section in Indonesia, factors contributing to elective C-section, and the risks of C-section.

Methods

We identified articles through multiple channels, including surveillance reports or national surveys, United Nations report, and articles from electronic search database, e.g. PubMed, Cochrane, and Google Scholar. We also include those national publication from relevant institutions, e.g. Ministry of Health, Healthcare and Social Security Agency

(*Badan Penyelenggara Jaminan Sosial-Kesehatan/BPJS-Kesehatan*), Health Research and Development Agency (*Badan Penelitian dan Pengembangan Kesehatan/Balitbangkes*), and other national-based data from non-profit organizations. Literatures reported C-section rate in single institution or single area were excluded. We considered studies that provide nation-wide estimates, regional or multi-country estimates.

We reviewed all articles which included the following topics of prevalence, trend, indications, and risks of C-section, particularly in Indonesian setting. Articles were either in English or Indonesian language, and not limited to publication year. Studies included prospective, retrospective, trials, observational study, systematic review, and meta-analysis.

Results and Discussion

The result of this review is classified into three main topics: 1) Prevalence and trend of C-section; 2) Indications of C-section; and 3) Risks and intervention to reduce risks of C-section.

Prevalence and trend of C-section

Data presented in **Table 1** are C-section in global, regional, and national estimates. At global level, Bertrán identified the lowest rate in Africa (7.3%) and highest in Latin America and the Carribeans (40.5%). Nevertheless, the study found that the average increase rate was the highest in Asia (6.4% per year), compared to other regions, e.g. Africa (4.0%), Europe (3.4%), Latin America and the Carribeans (2.6%), and North America (1.6%).²

Study by Festin et al¹⁵ estimated the C-section rate from four countries in South East Asia and collected the data from hospital. While Verma et al obtained the data from 9 countries in South and South East Asia countries. The lowest C-section rate was found in Timor Leste, i.e. 1.51%. Meanwhile, the highest was found in Bangladesh (58.54%) for institutional birth, and Maldives (31.78%) for both institutional and non-institutional birth.¹⁶

We obtained the data for national estimate from research articles and nation-based population survey. Basic Health Research in 2010, 2013, and

2018 estimated the C-section rate between 9.8% to 17.6%, lowest in 2013, but then increased almost double in 2018. This number was higher than study done by Festin et al,¹⁵ whom collected the data from hospital. Overall, we observed an increasing trend of C-section use in national, regional, and global level.

Indications of C-section

The decision to perform a C-section should be based on what is best for the mother and child. We should consider the risks and benefit for the mothers, including previous experience of C-section or complicated pregnancy. The standard and globally accepted C-section offering pathway available through a recommendation from NICE and RCOG. In RCOG guideline (2015), planned vaginal birth after C-section (VBAC) has success rate of 72-75%.²⁰ Hence, clinician and patients should be aware that there is higher risk of uterine rupture for mothers with two or more previous surgical delivery. Additionally, VBAC is contraindicated in women with placental localization, previous uterine rupture or classical caesarean scar. RCOG also noted breech presentation as primary indication for 10% of all C-section, placenta previa for 3% and multiple pregnancy for 1%. The guideline also recommended women with HIV-positive and women with Herpes Simplex Virus infection to be offered with C-section to prevent mother-to-child transmission of maternal infection.²¹

WHO proposed the use of Robson classification system to assess, monitor, and compare C-section rate between health facilities.²² Using Robson, health providers would be able to identify the groups of women which contribute the most and least for C-section. Vogel et al²³ had identified that group 1 and 3 of Robson classification contributed the most to C-section rate among moderate human development index groups. Women in term gestation (≥ 37 weeks), nulliparous, with singleton and cephalic pregnancy in spontaneous labor is considered as group 1. While group 5 has similar characteristics, except that women are multiparous and had experienced C-section. The overall C-section rate was 28.4% in 2004-2008 to 32.4% in 2010-2011.

While in Indonesia, a national survey has not been performed using Robson classification. Nevertheless, Sungkar et al²⁴ had performed it in

tertiary health center in Indonesia, and found that group 10 contributed the most. Group 10 (women with single cephalic, < 37 weeks' gestation and previous scar) hold the largest group (28.1%), followed with group 1 (17.6%) and 3 (15.2%). A study held in public hospital in Indonesia assessed the indication of C-section between 2017 and 2018. The study reported having previous C-section as the main maternal indication (25.2%) and fetal distress among fetal indication (54.1%). When maternal and fetal indications are combined, severe preeclampsia and fetal distress were found to be the most common indications.²⁵ Other study conducted in one public hospital and one private hospital in 2011 obtained similar result for fetal indication, with fetal distress as the main indication.²⁶ While for maternal indication, premature rupture of membrane and preeclampsia were found to be significant factor related to C-section. Beside those indications, failed induction of labor also found to be one of the contributors.²⁷

This Robson classification can be used to understand which group contribute the most to C-section; however, we could not identify the underlying indication for performing C-section. A hospital-based analysis in South-east Asia, as part of SEA-ORCHID project, identified the reasons for C-section, with the most common indications were malpresentation, previous C-section, and cephalopelvic disproportion.¹⁵ Nevertheless, in that study, it was noted that maternal request was also the main reason found merely in Indonesia, and not in the other three countries, i.e. The Philippines, Malaysia, and Thailand.

C-section by maternal request

The American College of Obstetricians and Gynecologists stated that C-sections performed in the absence of medical indications are considered as maternal request.²⁸ Women who voluntarily choose this delivery method should understand its potential risks and benefits. The risks might not be apparent in the first delivery, but would increase in the subsequent delivery. For instance, repeated C-sections would increase the likelihood of placenta accreta, placenta previa, and other risks related to maternal mortality and morbidity.^{28,29} International

data estimates roughly about 4 to 18% of all C-sections were performed on demand.³⁰ No specific prevalence data on C-section by maternal request in Indonesia. Nevertheless, National Health and Demographic Survey revealed an increasing trend of C-section from 1991 to 2007. We have not obtained specific data regarding C-section by maternal request in Indonesia. Nonetheless, Festin et al found that it was commonly performed in tertiary hospital in Indonesia.¹⁵

Factors affecting women's choice on C-section

Evidences found several factors related with women's choice on C-section. A cohort study in Sweden among 357 mothers mentioned fear of childbirth as the main reason (64%), followed with anxiety for the infant's health (28%) and complex pregnancy condition among their relatives (20%).³¹ A systematic review has also been conducted to understand the reasons for elective C-section. Similar reasons were found in the result, such as fear of labor pain, fear of child birth, anxiety of their children's health, urinary incontinence, vaginal trauma, previous traumatic experience in birth delivery, lack of emotional support, etc.³²

We also looked at the characteristics of women who choose C-section. Jenabie et al³² found the following factors to be significant, e.g. advanced maternal age, education level, parity, maternal obesity, household income, number of children and marital age. An analysis among Indonesian women also considered the socio-economic status, educational level, area of residence (urban versus rural), employment, and ownership of health insurance, to be the factors of maternal choice for C-section. Verma et al¹⁶ analysed the determinants of C-section in Indonesia and found urban residence (adjusted OR: 2.78; 95% CI: 2.53-3.07), maternal age (adjusted OR: 1.07; 95% CI: 1.06-1.08), and educational level (adjusted OR: 3.95; 95% CI: 2.03-7.69) as significant factors. This result also aligned with study done by Sihombing et al.³³ Additionally, Sihombing et al³³ also considered that women with maternal gestation age ≥ 42 weeks, multiple pregnancy and maternal height < 145 cm were more likely to have C-section.

Risks of C-section

The risks associated with C-section can be divided into short-term, long-term, and future risk; and whether it affects the mother and/or the child. The **Table 2** summarized the potential health risks that occur in C-section procedures.

There are limitations to this review. The articles were not identified through a systematic searching strategy. Useful information and unpublished studies might have been missed. The role of medical staff as birth attendant also need to be reviewed as the decision making of C-section also part of the role of medical practitioner.³⁷ Nevertheless, we try to include information from trustworthy and reliable sources, including those published from government website. We aim for studies which have best methodology, i.e. systematic review and meta-analysis. Nevertheless, we did not perform critical appraisal for the included articles.

Conclusion

This literature review pointed out the increasing trend of C-section all over the world, and particularly in Indonesia. There have not been any studies in Indonesia that monitor the utilization of C-section using national data, and therefore, we could not conclude which group contributed the most to C-section based on Robson classification system. There are wide range of health risks associated with C-section procedure towards mother and child. Research should be conducted in the future to explore the main drivers that influence Indonesian women's decision making for childbirth. The process of coming to a decision for C-section is not easy, and the role of husband and family might be important in Indonesian context. Moreover, further exploration on C-section pattern in Indonesia using Robson classification system would give a comparable situation regarding C-section trend to international audience. It would also provide an audit and feedback system to the government of Indonesia in understanding the current maternal healthcare services.

Table 1. C-section estimate rate at global, regional, and national level

| Year of data collection | n of countries | Global estimate (%) | Regional estimate (%) | National estimate (%) | Source |
|-------------------------|----------------|--|---|--|--------|
| 1990-2014 | 150 | 18.6 (6.0–27.2) | Asia: 19.2 (1.7–47.5) South-eastern: 14.8 (1.7–32.0) | N/A | (2) |
| 2000-2015 | 169 | 2000: 12.1 (10.9–13.3) 2015: 21.1 (19.9–22.4) | 2000: 13.4 (11.0–15.9) 2015: 28.8 (26.3–31.2) | N/A | (17) |
| 2002-2016 | 9 | N/A | 11.8 (1.51–31.8) | 11.6 ^a 21.1 ^b | (16) |
| 2005 | 4 | N/A | 26.6 (19.1–34.8) | 29.6 ^b | (15) |
| 2010 | 1 | N/A | N/A | 15.3 ^a | (18) |
| 2013 | 1 | N/A | N/A | 9.8 ^a | (19) |
| 2018 | 1 | N/A | N/A | 17.6 ^a | (14) |

Table 2. Risks of C-section

| Risks | OR (95% CI) | Reference |
|-----------------------------|---------------------|-----------|
| Short-term* | | |
| Post-partum infection | 2.83 (1.58-5.06) | (34) |
| Hemorrhage | 0.52 (0.48-0.57) | (34) |
| Maternal death | 3.10 (1.92 – 5.00) | (34) |
| Thromboembolism | 3.7 (3.0-4.6) | (35) |
| Long-term | | |
| Urinary incontinence | 0.56 (0.47-0.66) | (11) |
| Pelvic organ | 0.29 (0.17-0.51) | (11) |
| Fecal incontinence | 1.04 (0.73-1.48) | (11) |
| Child | | |
| Childhood asthma | 1.20 (1.15-1.25) | (36) |
| Subsequent pregnancy | | |
| Uterine rupture | 25.81 (10.96-60.76) | (11) |
| Hysterectomy | 3.85 (1.04-14.02) | (11) |
| Placenta accreta | 2.95 (1.32-6.60) | (11) |
| Placenta previa | 1.74 (1.62-1.87) | (11) |
| Placental abruption | 1.38 (1.27-1.49) | (11) |
| Antepartum hemorrhage | 2.43 (0.81-7.34) | (11) |
| Postpartum hemorrhage | 0.72 (0.55-0.95) | (11) |

Note: Short-term risk was assessed for cesarean section without indication.

Conflict of Interest

Authors declared no conflict of interest regarding this article.

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