

Full Length Research Paper

Determinants of caesarean section rate among women 15 to 49 years at Nakuru Level 5 Hospital using the Robson classification system

Emmaculate Jepkemei Tanui and Doris Kibiwott*

School of Nursing, Kabarak University, Kabarak, P. O. Box Private Bag, Kabarak, Kenya.

Received 18 February, 2022; Accepted 30 January, 2023

Caesarean section (CS) is a lifesaving operation that has significant effect on the outcomes of maternal and perinatal health. World Health Organisation considers a CS rate of 10 to 15% to be optimal; however, there is significant increase in its practice especially in low resourced setting despite the persistent inequalities in access to the procedure. To determine, track and audit caesarean section rates and groups, the Robson classification system that classifies 10 groups. Therefore, we assessed the determinants of caesarean section rate among women 15 to 49 years at Nakuru Level 5 Hospital. Obstetric records of women who had delivered via CS at the Nakuru Level 5 Hospital between June and December 2019 was used. Data on sociodemographic, obstetric characteristics, including indications for caesarean section were collected and analysed. The overall CS rate was at 27.9% with two-thirds of the cases attributed to groups 1 (n=40, 12.3%), 3 (n=37, 11.3%), 5 (n=78, 24.0%) and 7 (n=33, 10.2%) as per the Robson 10 classification system. The rate of caesarean section in the study setting is twice the WHO recommended rate with previous caesarean section, prolonged labour and malposition being the main determinants. There is need to support implementation of instrumental delivery and give women trial of labour after caesarean section (TLACS). Continuous on- job training of skilled birth attendants on prevention and early detection of abnormal labour and early intervention in-order to decrease the rate especially among low-risk groups (Robson groups 1-4).

Key words: Nakuru, caesarean section, Robson classification system, Kenya, determinants.

INTRODUCTION

Caesarean section is a lifesaving operation performed when an urgent state of obstetric condition precludes vaginal delivery (Betran et al., 2016). Ensuring access to obstetric services is considered a critical factor in reducing maternal and perinatal mortality (Thomas et al., 2016) to achieve the set goal of attaining a huge decrease in maternal deaths by 2030 to less than 70 per 100,000 births bearing in mind that CS have significant effect on the outcomes of maternal and perinatal

health.

Globally, the rate of CS has risen over the years and have reached an unprecedented extent (Betran et al., 2016). Though there is no clear rate of prescribed caesarean section rate (Robson and Costa, 2017) no maternal and neonatal change was observed beyond the 10% CS threshold (Ye et al., 2014). In such situations, failure to perform the caesarean section may jeopardize the mother's and foetus' lives. Nevertheless, CS may be

*Corresponding author. E-mail: dchebet2000@gmail.com.

carried out without any medical justification or with imprecise signs, such as labour obstruction with intact membranes (Rijken et al., 2015).

It is a lifesaving procedure that is not risk-free and can also endanger life for both the mother and the infant. Increased risk of maternal mortality and morbidity, increased blood transfusion needs, long periods of hospitalization, postpartum infections, retained placentas, stillborn and postpartum haemorrhage, have all been identified as immediate and long-term complications of caesarean section (Belachew et al., 2014). Unnecessary CS is associated with risks for maternal and child morbidity and often contributes to the result of subsequent pregnancies (Timor-Tritsch and Monteagudo, 2012).

The crude caesarean section rate is an important global measure for determining the rates of the caesarean section (Vogel et al., 2015). For several developed countries, caesarean section levels have gradually risen over the last 3 decades (WHO, 1985). The statement issued by the WHO in 1985 suggested that the prevalence of caesarean section would not exceed 10 to 15% (Betrán et al., 2016). By comparison, in many developing countries, insufficient access to the caesarean section is a hindrance to improving women's quality of life and their unborn infants (Gibbons et al., 2012). High caesarean rates are a public health concern and a cause for debate about the possible maternal and perinatal complications and the complications associated with the cost and inequality of access to obstetric care (Vogel et al., 2015).

In 1985, The World Health Organization (WHO) stated: "There is no justification for any region to have a caesarean section (CS) rate higher than 10 to 15%" (Harrison and Goldenberg, 2016) (WHO, 1985). However, between 1990 and 2014, the global caesarean section rate rose from 12.4 to 18% (Harrison and Goldenberg, 2016). The increase in the rate of CS was varied significantly between countries and was associated with an inequality in access to and unnecessary CS. The global survey that was done in China registered 46.2% CS level, while other countries ranged from Angola having 1.62%; Paraguay had 42.0% (WHO, 2009). It is also noted that excluding China from the 23 countries surveyed the rate of CS performed without medical indication ranged from 0.01 to 2.10%. This figure was in contrast in China having 11.6% that represented 63% of the total number of CSs in the 24 countries examined without any medical indication (Souza et al., 2010).

In Eastern Ethiopia, a third of the women delivered via CS with the rate ranging from 26.6% in public institutions and 58.7% in private hospitals (Tura et al., 2018). In Kenya, the rate of CS at a national referral hospital was 37.9% mainly attributed to prior uterine scar and foetal compromise (Gwer et al., 2011). In another study, the CS rate in Kenya was found to vary from 24.9% in Nairobi to 30% in Kenyatta National Hospital, 20.4% in Aga Khan

Hospital and 33% in Nairobi Hospital. Existing literature clearly show that a high rate of CS in Kenya in public and private institutions. Therefore, is important to understand the causes of the CS in the county to inform appropriate interventions to improve the quality of maternal and neonatal care.

Also, there are few studies on caesarean section using the classification system of the Robson 10 Group. A review of CS in Kenya using the classification system would be key in creating a consistent and more agreed methodological system for the tracking, auditing, and analysis of caesarean section rates. Hence, we assessed the determinants of caesarean section rate among women aged 15 to 49 at Nakuru Level 5 Hospital using the Robson 10 group classification.

The Robson classification system was introduced by the World Health Organization (WHO) to be used worldwide and internationally to determine, track, and compare the cesarean section levels within and between health care facilities. The Robson's 10-group classification is based on simple obstetrical parameters (parity, previous CS, gestational age, onset of labour, fetal presentation and number of fetuses) and does not involve the indication for CS.(Robson, 2001). The system classifies women into one of ten detailed groups. The system is based on 5 obstetric characteristics obtained in all maternity facilities: Parity (nulliparous, multiparous with or without the previous CS), onset of labor (spontaneous, induced or pre-labor CS), gestational age (preterm or term), fetal presentation (cephalic or traverse) and number of fetuses (single or multiple).

METHODS

The study used a retrospective cross-sectional study design to collect data from files of women who had delivered via caesarean section between 1 June to 31 December 2019 at the Nakuru Level 5 Hospital. The hospital is located in Nakuru County, has a 300-bed capacity and provides inpatient and outpatient services. The hospital wing, Margaret Kenyatta's mother and baby is a specialised wing for both uncomplicated and complicated births. It also serves as a referral hospital for complicated cases from surrounding health facilities. The study population were all women who had undergone CS during 2nd half year of 2019. According to the maternity records, about 787 vaginal deliveries and 305 caesarean sections are performed monthly. During the study period, 2141 women delivered via caesarean section. The study used a census method to collect data from files of women who had caesarean section. For exclusion criteria the study excluded those files with incomplete data from any of the required parameter. Data were collected using a guided Robson 10 group checklists. The Robson 10 checklist was validated in Canada (Sherry et al., 2013) and was considered a reliable tool. Data on the participants socio-demographic and obstetric characteristics and indications for caesarean section were collected. Data were cleaned and imported into SPSS version 23 for analysis. Frequencies and percentages were used to describe the participants socio-demographic and obstetric characteristics and indications for caesarean section. Robson 10 group classification system was used to classify women into 10 groups based on parity, the onset of labour, gestational age, number of fetuses and foetal presentation (Robson et al., 2015).

Table 1. Sample characteristics.

Characteristics	Frequency	Percentage
Age		
15-25	155	47.7
26-35	136	41.8
36-49	34	10.5
Marital status		
Single	80	24.6
Married	245	75.4
Place of residence		
Rural	103	31.7
Urban	222	68.3
Employment status		
Employed	209	64.3
Unemployed	116	35.7
Parity		
Multiparous	193	59.4
Primiparous	132	40.6
Number of fetuses		
Single	293	90.7
Multiple	29	9.3
Indication for caesarean section		
Previous scar	80	24.6
Prolonged labour	74	22.8
Malposition	52	16.0
Foetal distress	29	8.9
Multiple pregnancies	26	8.0
Cephalopelvic disproportion (CPD)	21	6.5
Preeclampsia	13	4.0
Antepartum haemorrhage (APH)	5	1.5
Others *	24	7.4

Source: Authors 2022

RESULTS

Sample characteristics

The study had 325 participants, about half (n=155, 47.4%) were 15 to 25 years-old, three-quarters (n=245, 75.4%) were married, and two-thirds (n=222, 68.3%) from rural areas (Table 1). About 40% (n=132) were primiparous and 9.3% (n=29) had multiple births (Table 1). The main indication for caesarean section were previous CS scar (n=80, 24.6%), prolonged labour (n=74, 22.8%), and malposition (n=52, 16.0%) (Table 1).

Robson 10 group classification system

The overall caesarean section rate was at 27.9% (95% CI:) with two-thirds of the caesarean sections attributed to

groups 1 (n=40, 12.3%), 3 (n=37, 11.3%), 5 (n=78, 24.0%) and 7 (n=33, 10.2%) as per the Robson 10 classification system (Table 2). The least cause of caesarean sections were all the abnormal lies (including previous caesarean section), which contributed to only 2% of the caesarean sections.

DISCUSSION

Accessibility to comprehensive emergency obstetric care (including caesarean section) is crucial in preventing maternal and perinatal deaths that occur worldwide every year (Neuman et al., 2014). According to World Health Organization, the caesarean section has been increasing becoming a major public health issue due to potential maternal and perinatal risks associated with it, inequality

Table 2. Robson 10 group classification system.

Group	Description	n (%)
1	Nulliparous, single cephalic, ≥ 37 weeks, in spontaneous labour	40 (12.3)
2	Nulliparous, single cephalic, ≥ 37 weeks, induced or CS before labour	23 (4.1)
3	Multiparous (excluding prev. CS), single cephalic, ≥ 37 weeks, in spontaneous labour	37 (11.3)
4	Multiparous (excluding prev. CS), single cephalic, ≥ 37 weeks, induced or CS before labour	22 (6.8)
5	Previous CS, single cephalic, ≥ 37 weeks	78 (24.0)
6	All nulliparous breeches	10 (3.1)
7	All multiparous breeches (including previous CS)	33 (10.2)
8	All multiple pregnancies (including previous CS)	31 (9.5)
9	All abnormal lies (including previous CS)	2 (0.6)
10	All single cephalic, ≤ 36 weeks (including previous CS)	20 (6.2)

CS: Caesarean section.

Source: Authors 2022

of access and costs involved (Vogel et al., 2015). Studies have attributed the increase in caesarean section to multiple factors ranging from the type of health facility, socio-demographic characteristics, and other factors such as maternal age of the women, place of residence, employment status, maternal educational level, former caesarean section, obstetric complications, maternal complications and income level (Betran et al., 2016).

Our study agrees with a classification applied in hospitals from Tanzania and South Africa where the three major groups (1, 3 and 5) were the same, though in a different order. In South Africa, groups 1, 5 and 3 while in Tanzania groups 1, 3 and 5 were the leading contributors, who may be attributed to variations in population demographics and overall CS rates. The contribution of group 3 could be justifiable in our study since most CS were performed for absolute maternal indications prolonged labour and cephalopelvic disproportion (Tura et al., 2018). In Lithuania, group 1, 2 and 5 accounted for two-thirds of the overall caesarean section rate with group 5 being the largest contributor similar to our study. However in Cote d'Ivoire, groups 1, 2 and 3 were the main contributors to the overall caesarean section (Tura et al., 2018). The contribution of group 2 could be explained by differences in the induction guidelines for vaginal births or CS in the two settings. The profound contribution of group 5 towards the overall caesarean section rate in our study indicates the importance of preventing primary caesarean section if a meaningful reduction to the overall caesarean section is to be achieved.

The main limitations of our study are the missing data and missing files. However, the adaptation suggested by the Robson classification system such as finding a proxy for missing data or expanding the scope of the study so as not to interfere with the sample size was employed.

Conclusion

The study highlights that more than a quarter of all

deliveries in the study setting were caesarean section, which is more than the WHO recommended rate of 10 to 15% and the national average of 18%. Previous caesarean sections were the main contributors for the CS highlighting the need for implementation of evidence-based strategies to avoid unnecessary caesarean sections and encouraged the safe and appropriate use of vaginal birth after caesarean (VBAC) to decrease the overall CS rate. The study findings also highlight the need to promote focused antenatal care to identify pre-existing health conditions and detect early complications arising during pregnancy.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The National Council of Science, Technology and Innovation approved the study (NACOSTI/P/20/7162). Nakuru County Referral Hospital permitted the study.

AVAILABILITY OF DATA AND MATERIALS

The authors confirm that the data supporting the findings of this study are available within the article [and/or] its supplementary materials.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENT

The author acknowledges the almighty God for giving them a good team work and good health.

REFERENCES

Belachew J, Cnattingius S, Mulic-Lutvica A, Eurenium K, Axelsson O, Wikström AK (2014). Risk of retained placenta in women previously

- delivered by caesarean section: a population-based cohort study. *BJOG: An International Journal of Obstetrics and Gynaecology* 121(2):224-229.
- Betran A, Torloni MR, Zhang J, Gülmezoglu A, Section WWGC, Aleem H, Carroli G (2016). WHO statement on caesarean section rates. *BJOG: An International Journal of Obstetrics and Gynaecology* 123(5):667-670.
- Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR (2016). The increasing trend in caesarean section rates: global, regional and national estimates: 1990-2014. *PLoS One* 11(2):e0148343.
- Gibbons L, Belizan JM, Lauer JA, Betran AP, Meriardi M, Althabe F (2012). Inequities in the use of cesarean section deliveries in the world. *American Journal of Obstetrics and Gynecology* 206(4):331.e331-331. e319.
- Gwer SO, Mutungi A, Guyo J (2011). Optimality of the diagnosis for common indications in emergency Caesarean delivery at Kenyatta National Hospital, Nairobi, Kenya. *Journal of Obstetrics and Gynaecology of Eastern and Central Africa* 23(1):9-13.
- Makhanya V, Govender L, Moodley J (2015). Utility of the Robson Ten Group Classification System to determine appropriateness of caesarean section at a rural regional hospital in KwaZulu-Natal, South Africa. *South African Medical Journal* 105(4):292-295.
- Neuman MD, Silber JH, Magaziner JS, Passarella MA, Mehta S, Werner RM (2014). Survival and functional outcomes after hip fracture among nursing home residents. *JAMA Internal Medicine* 174(8):1273-1280.
- Rijken MJ, Meguid T, van den Akker T, van Roosmalen J, Stekelenburg J (2015). Global surgery and the dilemma for obstetricians. *The Lancet* 386(10007):1941-1942.
- Robson MS (2001). Classification of caesarean sections. *Fetal and Maternal Medicine Review* 12(1):23-39.
- Robson SJ, Costa CM (2017). Thirty years of the World Health Organization's target caesarean section rate: Time to move on. *Medical Journal of Australia* 206(4):181-185. <https://doi.org/10.5694/mja16.00832>
- Souza JP, Gülmezoglu A, Lumbiganon P, Laopaiboon M, Carroli G, Fawole B, Ruyan P (2010). Caesarean section without medical indications is associated with an increased risk of adverse short-term maternal outcomes: the 2004-2008 WHO Global Survey on Maternal and Perinatal Health. *BMC Medicine* 8(1):1-10.
- Thomas S, Meadows J, McQueen KK (2016). Access to cesarean section will reduce maternal mortality in low-income countries: a mathematical model. *World Journal of Surgery* 40(7):1537-1541.
- Timor-Tritsch IE, Monteagudo A (2012). Unforeseen consequences of the increasing rate of cesarean deliveries: early placenta accreta and cesarean scar pregnancy. A review. *American Journal of Obstetrics and Gynecology* 207(1):14-29.
- Tura AK, Pijpers O, de Man M, Cleveringa M, Koopmans I, Gure T, Stekelenburg J (2018). Analysis of caesarean sections using Robson 10-group classification system in a university hospital in eastern Ethiopia: A cross-sectional study. *BMJ Open* 8(4):e020520. <https://doi.org/10.1136/bmjopen-2017-020520>
- Vogel JP, Betrán AP, Vindevoghel N, Souza JP, Torloni MR, Zhang J, Ortiz-Panozo E (2015). Use of the Robson classification to assess caesarean section trends in 21 countries: a secondary analysis of two WHO multicountry surveys. *The Lancet Global Health* 3(5):e260-e270.
- World Health Organization (WHO) (1985). Appropriate technology for birth. *Lancet* 2:436-437.
- World Health Organization (WHO) (2009). WHO vaccine-preventable diseases: monitoring system: 2009 global summary (No. WHO/IVB/2009). World Health Organization.