Caesarean birth by maternal request: a poorly understood phenomenon in low- and middle-income countries

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Received 28 October 2019; revised 05 December 2019; editorial decision 29 March 2020; accepted 8 April 2020

Background: While trends in caesarean birth by maternal request in low- and middle-income countries are unclear, age, education, multiple gestation and hypertensive disease appear associated with the indication when compared with caesarean birth performed for medical indications.

Methods: We performed a secondary analysis of a prospectively collected population-based study of home and facility births using descriptive statistics, bivariate comparisons and multilevel mixed-effects logistic regression.

Results: Of 28,751 patients who underwent caesarean birth and had a documented primary indication for the surgery, 655 (2%) were attributed to caesarean birth by maternal request. The remaining 98% were attributed to maternal and foetal indications and prior caesarean birth. In a multilevel mixed effects logistic regression adjusted for site and cluster of birth, when compared with caesareans performed for medical indications, caesarean birth performed for maternal request had a higher odds of being performed among women ≥35 y of age, with a university or higher level of education, with multiple gestations and with pregnancies complicated by hypertension (P < 0.01). Caesarean birth by maternal request was associated with a two-times increased odds of breastfeeding within 1 h of delivery, but no adverse outcomes (when compared with women who underwent caesarean birth for medical indications; P < 0.01).

Conclusion: Caesarean performed by maternal request is more common in older and more educated women and those with multifoetal gestation or hypertensive disease. It is also associated with higher rates of breastfeeding within 1 h of delivery.

Keywords: caesarean birth, low- and middle-income countries, trends, risk factors, maternal request.

Introduction

Caesarean birth rates within the Global Network for Women's and Children's Health Research (Global Network) have been increasing, paralleling the global trend. One potential driver of rising rates is caesarean birth by maternal request (CBMR), which is when pregnant women choose an elective caesarean birth with no other medical indication. Caesarean birth performed without a medical indication is advised against by the World Health Organization. There are limited studies on the phenomenon and organizations in high-income countries, such as the American College of Obstetricians and Gynecologists, have cited insufficient evidence in the inability to make a recommendation for or against the practice, but they have provided guidelines on criteria for using the procedure. A recent meta-analysis on reasons women choose CBMR concluded that interventions should be designed to reduce this practice and promote vaginal birth.
The Global Network prospectively collects population-based data on home and facility births in six low- and middle-income countries (LMICs) that span Latin America, sub-Saharan Africa and Southeast Asia in an ongoing registry. Data from this Maternal and Child Health Registry (MNHR) within the network was previously analysed to show that over a relatively short period of time (2010–2016), caesarean birth rates doubled at all non-sub-Saharan African sites, almost reaching 30% in one Indian site. Given these trends, we wanted to analyse the rates of caesarean birth by maternal request (CBMR) within the Global Network to observe changes in those rates over time and to observe factors and pregnancy outcomes associated with CBMR.

To conduct this secondary analysis, we aimed to compare antepartum, intrapartum and post-partum factors and outcomes associated with CBMR as compared with the population of women who underwent caesarean birth for a clearly documented indication. Our primary outcome was factors associated with CBMR with pregnancy outcomes. Our hypothesis was that CBMR has increased within the Global Network over time. Compared with women who underwent caesarean birth for a medical indication, we hypothesized that immediate neonatal outcomes might be better for women who underwent CBMR than in the comparison group based on prior research.

**Methods**

This was a secondary analysis of the prospectively collected MNHR data from the Global Network between January 2010 and December 2013. The methodology of the MNHR has been published previously. In brief, the MNHR includes pregnancy-related data and outcomes from rural or semi-urban geographical areas. Each site includes between 6 and 24 distinct communities. Each community generally represents the catchment area of a primary healthcare centre and about 300–500 births take place annually in each community. They are located at seven sites in six LMICs (Argentina, Guatemala, Nagpur and Belagavi [India], Kenya, Pakistan and Zambia). The objective of the MNHR is to enrol pregnant women as early as possible during the pregnancy and to obtain data on pregnancy outcomes for all deliveries of registered women, regardless of birth location (i.e. home, health clinic or hospital). Data were obtained through the Data and Specimen Hub (DASH) supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development through a data use agreement with the University of Colorado.

The primary outcome of this analysis was CBMR, including trends over time, risk factors associated with the indication and outcomes of the indication, all compared with the population of women who underwent caesarean birth for medical indications. Women were categorized as having one of two indications: CBMR or medical indications. Medical indications comprised all other indications for caesarean birth offered on the MNHR form, including ‘obstructed/prolonged labour/failure to progress’, ‘major antepartum haemorrhage’, ‘transverse/oblique lie/breech’, ‘severe pre-eclampsia’, ‘foetal distress/cord prolapse’ or ‘previous C-section’. Women with ‘no indication’ or the indication ‘other’ or who were missing data on the primary indication for caesarean birth were excluded from the analysis.
Table 1. Indications for caesarean birth among those women who underwent caesarean birth at Global Network sites, 2010–2013

| Indication for caesarean birth | n (%) | (N = 34 160) |
|-------------------------------|-------|-------------|
| Obstructed/prolonged labour/failure to progress | 14 366 | (42) |
| Previous C-section | 6573 | (19) |
| Transverse/oblique lie/breech | 3679 | (11) |
| No clear indication/other | 3250 | (10) |
| Severe pre-eclampsia | 1473 | (4) |
| Foetal distress/cord prolapse | 1408 | (4) |
| Major antepartum haemorrhage | 597 | (2) |
| Maternal request | 655 | (2) |
| Missing | 2159 | (6) |

Comparisons were made between CBMR and women with a medical indication for caesarean birth in bivariate and multivariable comparisons adjusted for site and cluster of birth. A P-value <0.01 was used to determine statistical significance given the large sample size and multiple comparisons. Variables significant in the bivariate analysis to P < 0.05 were included in the multivariable model. Stata version 15.2 (StataCorp, College Station, TX, USA) was used for the analysis.

The study protocol was reviewed and approved by the institutional review boards/ethics research committees of the participating institutions approved by the MNHR study initially. Individual informed consent for study participation was requested and obtained from each study participant. A data monitoring committee, appointed by the National Institute of Child Health and Human Development, oversees and reviews the study semi-annually. This de-identified data analysis was reviewed and approved by the Colorado Multiple Institutional Review Board (19-0613).

Results

Figure 1 illustrates the population included in this analysis. Of 294 045 births that occurred in the registry between 2010 and 2013, 34 160 were by caesarean, 28 751 of which included the data necessary to classify them by primary indication for caesarean birth. A total of 655 women (2.3% of the study population) underwent CBMR. The remaining 98% of women (28 096) had a documented primary indication for caesarean birth, shown in Table 1. Obstructed/prolonged labour/failure to progress accounted for the largest proportion of caesarean births with a medical indication (42%), followed by a history of a previous caesarean (19%) and malpresenting foetuses (11%). Haemorrhage, pre-eclampsia and foetal indication were all less prevalent (10% combined).

Figure 2 shows CBMR rates over time within the Global Network; Argentina had a doubling in CBMR rates over the study timeframe. The trend in Guatemala and Southeast Asian sites (India and Pakistan) is unclear, as we did not test the trend, although they appear to be stable or even decreasing at those sites. The sub-Saharan African sites did not have any caesareans attributed to the indication of CBMR in either Zambia or Kenya.

Table 2 shows bivariate comparisons of women who underwent CBMR compared with women who underwent caesarean birth for a medical indication. These comparisons were made using a multilevel mixed effects logistic regression adjusting for site and cluster. The comparisons showed that women ≥35 y of age, those with a university or higher level of education, those with a multiple gestation and those with hypertension were more commonly delivered by CBMR (P < 0.05).

Table 3 shows the unadjusted and adjusted results of a multilevel mixed effects regression with the unadjusted model accounting for only site and cluster of delivery and the adjusted model accounting for site, cluster, maternal age and education, number of foetuses and hypertensive disorders of pregnancy. These models reaffirm the results of the univariate comparisons with age >35 y, a university or higher level of education,
Table 2. Univariate comparison of characteristics of women who underwent caesarean birth for a maternal indication compared with those who underwent CBMR at Global Network sites, 2010–2013

| Variables                      | Medical indication<sup>a,b</sup> (N = 28 096) | CMBR (N = 655) | P-value LR/site/cluster<sup>c</sup> |
|--------------------------------|-----------------------------------------------|----------------|--------------------------------------|
| Maternal age (years), n (%)    |                                               |                | <0.001                               |
| <20                            | 2566 (9)                                      | 56 (9)         |                                      |
| 20–35                          | 24 569 (88)                                   | 532 (81)       |                                      |
| >35                            | 913 (3)                                       | 67 (10)        |                                      |
| Maternal education, n (%)      |                                               |                | 0.005                                |
| No formal schooling            | 4192 (15)                                     | 91 (14)        |                                      |
| Primary school                 | 8089 (29)                                     | 217 (33)       |                                      |
| Secondary school               | 11,306 (40)                                   | 234 (36)       |                                      |
| University or higher           | 4386 (16)                                     | 109 (17)       |                                      |
| Parity, n (%)                  |                                               |                | 0.3                                  |
| 0                              | 13 204 (47)                                   | 321 (50)       |                                      |
| 1–2                            | 11 674 (42)                                   | 176 (27)       |                                      |
| ≥3                             | 3108 (11)                                     | 152 (23)       |                                      |
| BMI, n (%)                     |                                               |                | 0.3                                  |
| Underweight                    | 4763 (17)                                     | 79 (12)        |                                      |
| Normal                         | 14 232 (51)                                   | 271 (41)       |                                      |
| Overweight                     | 4007 (14)                                     | 114 (18)       |                                      |
| Obese                          | 5094 (18)                                     | 191 (29)       |                                      |
| Singleton gestation, n (%)     |                                               |                | 0.01                                 |
| Yes                            | 27 251 (97)                                   | 630 (96)       |                                      |
| No                             | 829 (3)                                       | 25 (4)         |                                      |
| Hypertension, n (%)            |                                               |                | <0.001                               |
| Yes                            | 2413 (9)                                      | 27 (4)         |                                      |
| No                             | 25 604 (91)                                   | 626 (96)       |                                      |

<sup>a</sup>Women with 'no indication' for caesarean birth not included in the analysis.
<sup>b</sup>Medical indication includes the first six indications in Table 1.
<sup>c</sup>Multilevel mixed effects regression adjusting for site and cluster.

LR, logistic regression.

Discussion

While caesarean birth rates within the Global Network for Women’s and Children’s Health Research have been found to be increasing, trends in rates of CBMR are less clear. The only site with a rising rate of CBMR over the study timeframe was Argentina (it increased from 6 to 12%). The Guatemalan and Southeast Asian sites had an unclear trend, and no CBMR existed at all in Zambia and Kenya. Our analysis found that older and more educated women, as well as those with multifetal gestation and hypertension, were more likely to undergo CBMR than women who underwent caesarean birth for a medical indication. We also found that in the context of CBMR, breastfeeding initiation rates were higher than those among women who had a caesarean birth for a medical indication.

One interesting finding of our analysis is the increasing trend of CBMR in Argentina. Argentina was actually not renewed within
Regarding outcomes after CBMR as compared with those resulting from a caesarean birth for a medical indication, we found that breastfeeding within 1 h of delivery was more common after CBMR than after caesarean for a medical indication. Prior research is consistent with this finding. A possible explanation for this is that CBMR is an elective procedure, not performed in an emergent setting. As such, after CBMR mothers and babies are likely to have a more stable environment in which to initiate breastfeeding. While emergent caesarean births may require stabilization of the mother and baby prior to breastfeeding attempts, the fact that it is happening more successfully after CBMR suggests that breastfeeding immediately post-partum should be encouraged, even in more acute environments, which is also supported by the literature.

This study is limited by the fact that the data are almost a decade old and that many variables were unable to be included in the analysis due to missing data. For example, regarding antenatal care, we hypothesized that antenatal care visits, history of a prior live birth and anaemic status might have been associated with CBMR. Similarly, regarding outcomes, we were unable to include the 7-d neonatal mortality rate, post-partum haemorrhage, use of oxytocics, administration of blood products and performance of a post-procedure dilation and curettage due to missing data. Additionally, data on maternal death were not included in the dataset from DASH and were unable to be obtained despite follow-up requests. The strengths of the analysis include the large (initial) sample size and the representativeness of the data from multiple LMICs in various world regions.

In conclusion, data from 2010 to 2013 in the Global Network’s MNHR does not provide definitive proof of any trend in CBMR in LMICs. However, based on this analysis, entities wishing to reduce CBMR rates might observe rates in their institutions among women with multiple gestations and those with hypertensive disease. Breastfeeding was found to be more common in women following CBMR than in those who underwent caesarean birth for another primary indication. More evidence on the rates, trends

### Table 3. Multivariate analysis of characteristics associated with CBMR within Global Network sites, 2010–2013

| Odds of CBMR | UOR | LLCI | ULCI | P-value | AOR | LLCI | ULCI | P-value |
|--------------|-----|------|------|---------|-----|------|------|---------|
| Maternal age (years) |     |      |      |         |     |      |      |         |
| < 20          | 0.7 | 0.5  | 0.9  | < 0.001 | 0.8 | 0.6  | 1.0  | 0.06    |
| 20–35         | 1   | 1.8  | 3.2  | < 0.001 | 1   | 1.9  | 3.4  | < 0.001 |
| > 35          | 2.4 |       |      |         |     | 2.5  |      |         |
| Maternal education |     |      |      |         |     |      |      |         |
| No formal schooling | 1.1 | 0.9  | 1.5  | 0.4     | 1.1 | 0.8  | 1.4  | 0.7     |
| Primary school  | 0.9 | 0.8  | 1.1  | 0.4     | 0.9 | 0.7  | 1.1  | 0.3     |
| Secondary school | 1 (ref) | 1.4 | 2.2  | < 0.001 | 1 (ref) | 1.3 | 2.2  | < 0.001 |
| University or higher | 1.7 |      |      |         |     |      |      |         |
| Multifoetal gestation | 1.8 | 1.2  | 2.7  | 0.007   | 1.8 | 1.2  | 2.8  | 0.005   |
| Hypertension   | 2.3 | 1.6  | 3.5  | < 0.001 | 2.4 | 1.6  | 3.5  | < 0.001 |

*Women with ‘no indication’ for caesarean birth not included in analysis.

*Multilevel mixed effects regression adjusting for site and cluster.

UOR, unadjusted odds ratio; LLCI, lower limit confidence interval; ULCI, upper limit confidence interval; AOR, adjusted odds ratio.
Table 4. Univariate comparison of outcomes of women who underwent caesarean birth for a maternal indication compared with those who underwent CBMR at Global Network sites, 2010–2013

| Variables                              | Medical indication\(^{a,b}\) (N = 28 096) | CMBR (N = 655) | P-value\(^{c}\) LR/site/cluster |
|----------------------------------------|------------------------------------------|----------------|---------------------------------|
| Gestational age, n (%)                 |                                          |                |                                 |
| Preterm                                | 7626 (27)                                | 219 (33)       | 0.2                             |
| Term                                   | 20 470 (73)                              | 436 (67)       |                                 |
|                                        | n = 28 094                               | n = 655        |                                 |
| Live birth, n (%)                      |                                          |                |                                 |
| Yes                                    | 27 655 (98)                              | 648 (99)       | 0.6                             |
|                                        | n = 27 870                               | n = 652        |                                 |
| No                                     | 439 (2)                                  | 7 (1)          |                                 |
| Post-partum haemorrhage, n (%)         |                                          |                |                                 |
| Yes                                    | 403 (1)                                  | 11 (2)         | 0.3                             |
|                                        | n = 26 942                               | n = 610        |                                 |
| No                                     | 27 467 (99)                              | 641 (98)       |                                 |
| Maternal blood transfusion, n (%)      |                                          |                |                                 |
| Yes                                    | 2311 (9)                                 | 33 (5)         | 0.1                             |
|                                        | n = 27 523                               | n = 649        |                                 |
| No                                     | 24 631 (91)                              | 577 (95)       |                                 |
| Baby received bag-mask resuscitation, n (%) |                                          |                |                                 |
| Yes                                    | 2007 (7)                                 | 35 (5)         | 0.1                             |
|                                        | n = 27 357                               | n = 641        |                                 |
| No                                     | 25 516 (93)                              | 614 (95)       |                                 |
| Baby breastfed within 1 h, n (%)       |                                          |                |                                 |
| Yes                                    | 12 025 (44)                              | 3433 (68)      | <0.001                          |
|                                        | n = 15 332 (56)                          | 208 (32)       |                                 |

\(^{a}\)Women with ‘no indication’ for caesarean birth not included in analysis.  
\(^{b}\)Medical indication includes the first six indications in Table 1.  
\(^{c}\)Multilevel mixed effects regression adjusting for site and cluster.  
LR, logistic regression.

Table 5. Multivariate analysis of associated of CBMR with breastfeeding within 1 h of delivery in Global Network sites, 2010–2013

| Odds of outcome after CBMR\(^{b}\) | UOR | LLCI | ULCI | P-value\(^{b}\) | AOR | LLCI | ULCI | P-value\(^{b}\) |
|-----------------------------------|-----|------|------|-----------------|-----|------|------|-----------------|
| Breastfeeding within 1 hour       | 2.0 | 1.6  | 2.5  | <0.001          | 2.0 | 1.6  | 2.5  | <0.001          |

\(^{b}\)Women with ‘no indication’ for caesarean birth not included in analysis.  
\(^{b}\)Multilevel mixed effects regression adjusting for age, education, number of gestations, hypertensive disease, site and cluster.  
UOR, unadjusted odds ratio; LLCI, lower limit confidence interval; ULCI, upper limit confidence interval; AOR, adjusted odds ratio; LR, logistic regression.

and outcomes of CBMR in LMICs are needed, especially if along with increasing national development comes increasing CBMR rates in these settings.

Authors’ contributions: MSH conceived of the analytic plan and performed the analysis. AG, LF, NK and MH helped with data interpretation and implications. MSH wrote the manuscript with input from all listed authors.

Acknowledgements: We want to thank all the women and men involved in collection of the data analysed in this work and all the women who participated in the study. Their health, well-being and successful pregnancy outcomes are the motivation for performing this work.
Funding: Funding for this project came from a Eunice Kennedy Shriver National Institutes of Child Health and Human Development Women’s Reproductive Health Research K12 award (SK12HD001271-18) and the Doris Duke Charitable Foundation.

Competing interests: None declared.

Ethical approval: The appropriate institutional review boards/ethics research committees of the participating institutions approved the MNHR study. Individual informed consent for study participation is requested and obtained from each study participant. A data monitoring committee appointed by the National Institute of Child Health and Human Development oversees and reviews the study semi-annually. The Colorado Multiple Institutional Review Board also approved of this research (COMIRB 19-0613).

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