Trends in the Beijing cesarean section rate and reasons for the fluctuations

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To the Editor: Cesarean section (CS) resolves dystocia and serious pregnancy-related complications but also has adverse outcomes such as long recovery time, uterine rupture, and dangerous placenta previa in future pregnancies. The increase in cesarean section rates (CSRs) worldwide has drawn the attention of international scholars.[1] In China, the CSR has increased since the 1980s, reaching 54.47% in 2011.[2] This present study sought to provide updated information on the changes in the CSR, and reasons for the changes in Beijing from 2012 to 2017 as a guide for obstetricians and to develop strategies to reduce the CSR.

Hospitalized deliveries of babies at gestational ages ≥28 weeks from January 1, 2012 to December 31, 2017 from centers with an average monthly delivery volume of ≥200 births and with continuous monthly data were included. The data from 28 midwifery hospitals in Beijing including 17 tertary and 11 secondary hospitals. A total of 747,918 women met the inclusion criteria. We removed 13,998 cases with invalid data, missing data, outlier data, or logical errors, ultimately resulting in a total of 733,920 women in the study cohort.

Medical information was extracted from the medical records' face sheets. All 733,920 deliveries were classified and grouped according to six complications, and deliveries with two or more complications were assigned to a single diagnostic classification. We referred to the hierarchical order designed by Selma[2]: (1) scarred uterus; (2) double/multiple-fetus pregnancy; (3) fetal malposition; (4) dystocia-related factors; (5) fetal distress; and (6) complications and comorbidities of pregnancy. Thus, a delivery with diagnoses of both fetal distress and dystocia-related factors would be assigned to the category “dystocia-related factors,” while a scarred uterus superseded all other diagnoses. There were some CS deliveries without medical indications. These cases were classified as “no medical indications,” that is, cesarean deliveries with no indications with respect to the above six categories. (Details of data processing and methods are included in Supplementary File 1, http://links.lww.com/CM9/B72).

R software (http://www.r-project.org), SPSS v. 20.0 software (IBM Corporation, Armonk, NY, USA), and Joinpoint Regression Program (https://surveillance.cancer.gov/joinpoint/) were employed to sort and analyze the data. The study protocol was approved by the Medical Ethics Committee of Beijing Obstetrics and Gynecology Hospital, Capital Medical University (No. 2018-KY-070-01).

Between 2012 and 2017, 307,576 from a total of 733,920 women at 28 hospitals in Beijing gave birth by CS (CSR of 41.9%). The overall trend of CSR from 2012 to 2017 was downward, with an average annual percentage change (AAPC) (95% confidence interval [CI]) of −2.9% (−6.7% to 0.9%); P > 0.05) [Table 1]; and the age-adjusted CSR trended significantly downward, with an AAPC (95% CI) of −4.6% (−7.5% to −1.7%; P < 0.05) [Supplementary File 2, http://links.lww.com/CM9/B72].

The incidence for mothers with a scarred uterus showed an increasing tendency from 2012 to 2017, with an AAPC (95% CI) of 26.2% (18.6%–34.2%). There were decreases from 2012 to 2017 for the diagnoses of factors related to dystocia, fetal distress, and fetal malposition; and the AAPCs (95% CIs) were −10.5% (−13.1% to −7.9%), −6.2% (−7.5% to −4.9%), and −4.5% (−6.9% to −2.1%), respectively [Supplementary File 3, http://links.lww.com/CM9/B72].

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The CSR for women with a scarred uterus remained the same from 2012 to 2017 (both rates at 96.2 cesareans per 100 deliveries in 2012 and 2017). CSRs for five classes of complications (double/multiple fetuses, fetal malposition, dystocia-related factors, fetal distress, and pregnancy complications/comorbidities) decreased significantly from 2012 to 2017; AAPCs (95% CIs) were −1.3% (−2.0% to −0.6%), −0.3% (−0.5% to −0.1%), −3.8% (−4.6% to −3.0%), −4.4% (−8.0% to −0.6%), and −7.5% (−9.0% to −5.9%), respectively [Supplementary File 4, http://links.lww.com/CM9/B72].

The change in the CSR between 2012 and 2017 (from 47.0 to 41.9 cesareans per 100 deliveries) was partitioned into the six classes of complications and no medical indication cesareans. The relative contribution was a function of the change in the reported incidence of the complication and the change in the CSR for the complication. +252.9% of the change was associated with a scarred uterus, +3.9% with double/multiple fetuses, −141.2% with no medical indication, −129.4% with factors related to dystocia, −51.0% with fetal distress, −19.6% with pregnancy complications/comorbidities, and −17.6% with fetal malposition [Supplementary Files 5, 6, http://links.lww. com/CM9/B72]. CSs due to a scarred uterus accounted for an increasing share of all cesarean deliveries, with nearly half of CSs performed in 2017 caused by a scarred uterus [Supplementary File 7, http://links.lww.com/CM9/B72].

The proportion of mothers ≥35 years of age increased from 9.2% in 2012 to 23.7% in 2017. Changes in the age distribution of the mothers accounted for 76.5% of the increase in the CSR. Had the age distribution of the mothers remained constant from 2012 to 2017—albeit using the age-specific CSRs reported for 2017—the CSR would have dropped from 47.0% in 2012 to 38.0% (rather than 41.9%) in 2017.

Analysis from 2012 to 2017 showed that the CSR without medical indication declined the most from 11.3% to 4.1%, accounting for −141.2% of the overall rate change. The restriction to one child likely brought about requests for unindicated CS whereas the gradual opening of the second-child policy may have reduced this effect. Data found that among women who wanted to have two or more children, vaginal delivery was preferred. Greater access to information and medical decision-making with respect to delivery methods could have played a role. Government control and hospital management constitute another possible reason for the decline in the CSR.
The indication-specific CSR for factors related to dystocia declined from 13.4% in 2012 to 6.8% in 2017; and its indication-contribution ratio was −129.4%. Following application of new labor stage management standards, hospital-driven policy changes, and increased appreciation of CS-associated short-term and long-term complications, obstetricians have changed in the application of subjective CS indications, thus reducing over-diagnosis of dystocia-related factors. In the present study we also noted a rise in the rate of assisted vaginal delivery [Table 1], which was, therefore, related to the reduction in the CSR for mothers with factors related to dystocia.

The CSR for fetal distress declined from 6.3% in 2012% to 3.7% in 2017, accounting for −51.0% of the overall rate change. Monitoring of abnormal fetal heart rate, umbilical blood flow, amniotic fluid status, and other clinical indicators combined with comprehensive assessments of the condition may be helpful to accurately judge the fetal condition and thus, avoid over diagnosis of fetal distress. In this study, the CSR for mothers with a diagnosis of fetal distress dropped 21.3% and at the same time, the incidence of neonatal asphyxia displayed a downward trend instead of a growing trend [Table 1].

With the promulgation of the second-child policy, the proportion of mothers ≥35 years of age has increased, and the incidence of pregnancy complications/comorbidities has increased commensurately. However, most of the pregnancy complications/comorbidities are relative indications of CS, and many of the mothers can successfully deliver vaginally under close monitoring without affecting the mother or newborn outcome. Therefore, the CSR for mothers with pregnancy complications/comorbidities decreased 30.5%, overshadowing the 11.6% rise in the rate of vaginal birth after previous cesarean (VBAC) was very low.[3] However, providing ideal information from the present and published studies to reduce the primacy CSR is more important.

The older the maternal age, the greater the development of chronic diseases such as diabetes, hypertension, scarred uterus, and pregnancy-related diseases (eg, gestational diabetes, preeclampsia, and placenta previa), which increase antepartum and intrapartum CS risk. In addition, older maternal age also leads to dystocia-related CS.[7] This study showed that the percentage of mothers ≥35 years of age more than doubled between 2012 and 2017, and that the changing maternal age distribution led to an elevation in the CSR, with 76.5% of the increase in the CSR attributable to it.

In summary, a retrospective review of 28 hospitals in Beijing identified a decrease in the CSR from 2012 to 2017. A decline in indications – including no medical indications, dystocia-related factors, and fetal distress – were mainly responsible for the drop in the CSR. The increasing proportion of mothers with scarred uteruses and increasing maternal age restricted the decline in the overall CSR. Implement VBAC for mothers with uterine scars and improving the management of mothers ≥35 years of age can further reduce the CSR. However, the most important thing is to take comprehensive interventions to improve the overall maternal and fetal health rather than simply targeting the CSR.

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**Conflicts of interest**

None.

**References**

1. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, Regional and National Estimates: 1990–2014. PLoS One 2016;11:e0148343.1–12. doi: 10.1371/journal.pone.0148343.

2. Hou L, Li G, Zhou LY, Li CD, Chen Y, Ruan Y, et al. Cesarean delivery rate and indications in mainland China: a cross sectional study in 2011 (in Chinese). Chin J Obstet Gynecol 2014;49:728–735.

3. Taftel SM, Placek PJ, Teri Liss. Trends in the United States cesarean section rate and reasons for the 1980–85 rise. Am J Public Health 1987;77:955–959. doi: 10.2105/aph.77.8.955.

4. Liang H, Fan Y, Zhang N, Chongsuvivatwong V, Wang Q, Gong J, et al. Women’s cesarean section preferences and influencing factors in relation to China’s two-child policy: a cross-sectional study. Patient Prefer Adherence 2018;12:2093–2101. doi: 10.2147/PPA.S171533.

5. Xiao XR, Li B, Gu WR, Li XT, Xiong Y. [Changes in cesarean delivery rate and indications against the background of two-child policy]. Zhonghua Fu Chan Ke Za Zhi 2018;52:139–145. doi: 10.3769/cma.j.issn.1007-9408.2018.01.009.

6. Chen Y, Zheng XL, Wu SW, Zhang WY. [Clinic characteristics of women with advanced maternal age and perinatal outcomes]. Zhonghua Fu Chan Ke Za Zhi 2018;52:508–512. doi: 10.3769/cma.j.issn.0529-567X.2017.08.002.

7. Osmundson SS, Gould JB, Butwick AJ, Yeaton-Massey A, El-Sayed YY. Labor outcome at extremely advanced maternal age. Am J Obstet Gynecol 2016;214:362.E1–362.E7. doi: 10.1016/j.ajog.2015.09.103.

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