Predictors of preference for caesarean delivery among pregnant women in Beijing

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Abstract

Objective: To evaluate factors associated with preference for caesarean or vaginal delivery among pregnant Chinese nulliparous and parous women.

Methods: In this cross-sectional study, a self-administered questionnaire was used to collect information on sociodemographic characteristics, preference/reasons for delivery mode, and knowledge of delivery complications.

Results: Of the 450 participants, 85 (18.9%) reported a preference for caesarean section (CS) pre-partum. Compared with women who would prefer a vaginal delivery, nulliparous women who preferred CS were more likely to be: ≥35 years; have no medical insurance; have had two or more pregnancies; have access to only one source of information about birthing options; knowledge of the complications of vaginal delivery and think doctors have no right to decide the type of delivery. For parous women who preferred CS, they were more likely to have had a previous caesarean delivery and live outside Beijing.

Conclusions: From this study conducted at a large, maternity centre in Beijing, the proportion of pregnant women with preference pre-partum for CS was moderate and their reasons were varied.

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Introduction

The global increase in rates of caesarean delivery without medical indication is of substantial concern.[1] Advancements in medicine that have reduced surgical risks have made caesarean section (CS) a more agreeable option for both pregnant women and their health service providers.[2] Data from 32 countries in the Organization for Economic Cooperation and Development showed that the average rate of caesarean delivery has increased from 20% in 2000 to 28% in 2013.[3] Although, the World Health Organization (WHO) recommends that national rates of caesarean delivery should not exceed 15%,[4] a recent study showed that rates of up to 19% were not associated with lower maternal or neonatal mortality.[5]

Data from nationwide population studies have shown that in China, the rates of CS have increased from 0.9% in the 1970s[6] to 36% in 2011,[7] with the most rapid growth occurring since the 1990s.[6] However, rates have varied among different settings because of a range of national and cultural factors and diverse patient characteristics.[8] A systematic review has estimated that the current prevalence of caesarean births in China is approximately 40%.[9] A WHO survey found that the caesarean birth rate in China is the highest in Asia and estimated that between 2007 and 2008 the proportion of deliveries by CS was approximately 46%.[2] Interestingly, a study of pregnant women in a tertiary (i.e. top class) hospital in Beijing showed that although the rate of CS was 53%, only 10% of the sample had indicated that they preferred this delivery method in the pre-partum period.[10] The reason for the disparity in the aforementioned rates remains unclear. Nevertheless, it is important to try and identify the predictors of preference for CS in order to inform policy-makers to ensure the wellbeing of mothers and their newborns. Factors associated with a preference for caesarean or vaginal delivery can assist clinicians and health administrators to make provisions for appropriate prenatal counselling. Therefore, the aim of this study was to examine preferred delivery methods among a sample of nulliparous and parous Chinese women pre-partum and determine the reasons for their preference and assess influencing factors.

Patients and methods

Patient population

This cross-sectional study took place between April 2014 and June 2014 at the Beijing Obstetrics and Gynaecology Hospital, Beijing, China, which is a large maternity centre. Pregnant women were recruited from the hospital's obstetrical outpatient departments. Eligible subjects were at least 18 years of age, were at gestational weeks 28–37, had a singleton pregnancy and intended to give birth at the hospital. Women who were unable to understand Chinese and/or unable to understand the requirements of the study were excluded from the survey. Participants were given a self-administered questionnaire, usually at the end of a clinic visit.

The study was approved by the Institutional Review Board of Beijing Obstetrics and Gynaecology Hospital, Capital Medical University, Beijing, China. The study was fully explained to the women and their families before they took part in the voluntary survey and they were assured that they could withdraw from the study at any time without prejudice. Verbal informed consent was obtained from all participants before the start of the study.

Questionnaire development

The questionnaire was developed by three researchers (H.Z., J.W. and Y.H.) and was based on data from three previous studies.[11–13] The content of the questionnaire was determined following focus group discussions among experienced obstetricians and gynaecologists from the hospital.

Information collected from the questionnaire included sociodemographic data, obstetric preferences/reasons for delivery mode, information sources affecting delivery preference, knowledge of delivery complications and whether the physician had the right to determine the choice of delivery method. The content validity of the questionnaire was assessed following completion by obstetricians and pregnant women and Cronbach's alpha was used to test for internal consistency. Cronbach's alpha for the overall questionnaire was 0.8 and each section had a value that varied from 0.75 to 0.83, indicating that the questionnaire had a high internal consistency.

Indications for CS

Indications for CS at the hospital followed routine clinical diagnosis and a treatment protocol that included maternal (e.g. presence of infection, abnormal pelvis, concomitant diseases), fetal (e.g. fetal distress, mal-presentation) and maternal-fetal (e.g. poor progress in labour, placenta abruption, placenta praevia) factors. However, indications for CS were not absolute and the doctors could also make a judgement based on maternal and/or fetal conditions and advice from the women and their families.

Statistical analyses

In considering the sample size, the birth rate in China by CS was considered to be 40%.[9] Therefore, it was estimated that a sample size of approximately 400 women would have 80% power to detect a 5% difference in delivery preference.[14]

Data were extracted by two researchers (H.Z. and J.W.). Statistical analyses were performed using SAS software (version 9.3; SAS Institute Inc., Cary, North Carolina, USA). A P-value < 0.05 was considered to indicate statistical significance.

A normality test was used to test the distributions of all continuous data before analysis. Not normally distributed continuous data were described using median, interquartile range (IQR) and range. Normally distributed continuous data were presented as mean $\pm$ SD. Pearson's χ^2-test was used to assess differences in the knowledge of delivery complications between caesarean and vaginal delivery preferences. If the expected number was between 1 and 5 or lower than 1, a continuous correction χ^2-test or a Fisher's exact test was chosen, respectively. Univariate logistic regression analyses were performed to examine the crude odds ratio for preference for caesarean delivery versus maternal age, residence, parity and delivery mode, gravidity, family income, medical insurance status, knowledge of delivery complications, information resource, and 'the right of a choice'. Variables were considered for inclusion in the multivariate logistic regression model if they were significant ($P < 0.05$) in univariate analyses. Variables were selected through a stepwise regression using entry and exit criteria of $P < 0.05$.[15,16]

A multicollinearity diagnostic test was performed among the included variables before the multivariate analysis was conducted. Correlations between the included variables were examined and found to be weak or non-existent. In addition, tolerances and variation inflation factors (VIF) were examined for the individual variables. This analysis showed that multicollinearity did not affect the multivariate analyses because the range of tolerances was 0.88–1.00 and VIFs ranged from 1.00–1.14.

Results

In total, 472 women were included in the survey; three women did not complete the questionnaire and 19 were surveyed twice and so data were available from 450 women for these analyses. Overall, 85 (18.9%)

Table 1. Sociodemographic characteristics of the pregnant women who completed questionnaires in this study (*n* = 450).

Characteristic	*n* = 450
Age	
<35 years	377 (83.8)
≥ 35 years	73 (16.2)
Residence	
Downtown Beijing	369 (82.0)
Suburban Beijing	40 (8.9)
Outside Beijing	41 (9.1)
Education	
High school or lower	41 (9.1)
Junior college	75 (16.7)
University degree	243 (54.0)
Graduate	91 (20.2)
Monthly family income[a]	
<3000 RMB	13 (2.9)
3000–4999 RMB	44 (9.8)
5000–9999 RMB	151 (33.5)
≥10 000 RMB	242 (53.8)
Medical insurance	
Yes	380 (84.4)
No	70 (15.6)
Parity	
Nulliparous	389 (86.4)
Parous	61 (13.6)
Previous vaginal delivery only	33 (7.3)
Caesarean history	28 (6.2)
Gravidity	
1	247 (54.9)
2+	203 (45.1)
Age of partners	
<40 years	408 (90.7)
≥40 years	42 (9.3)

Data presented as *n* of patients (%).
[a]100 RMB = $16.

women stated pre-partum that they would prefer a caesarean delivery.

Of the 450 participants, 389 were nulliparous and 61 were parous (Table 1). More than 80% of the women were less than 35 years old, most (82%) were living in downtown Beijing, had medical insurance (84%), were nulliparous (86%), and had a partner with age < 40 years (91%). Over half of the sample had a bachelor's degree (54%), had a monthly family income ≥10 000 RMB ($1615) (54%) and for 55% of the sample, it was the first pregnancy. The median ages of women and their partners were 31 (IQR: 29–33 years; range: 22–43 years) and 32 (IQR: 30–35 years; range: 23–59 years) years, respectively. The median gravidity was 1 (IQR: 1–2) with a range from 1 to 6.

The top five reasons for preferring a CS were: low risk of fetal distress; avoidance of vaginal tears and episiotomy; avoidance of emergency CS; prior CS; and less labour pain and pressure (Table 2). The top five reasons for preferring a vaginal delivery were: natural process; faster recovery; healthier babies; less pain after delivery; and easier breastfeeding.

Over 40% of the participants thought that their parents/partner/friends (43.1%, 194/450) and physicians/midwives (42.4%, 191/450) influenced their preference for the delivery mode. One-third of the women (32.4%, 146/450) indicated that media such as the internet, television, magazines, and newspapers had an influence on their preference. One-fifth (20.0%, 90/450) of the sample thought that information targeted for pregnant women helped them to determine a delivery preference. Most women (336/450, 74.7%) chose one information source to support their preferences.

When asked to rate suggested complications associated with caesarean (15 items) or vaginal delivery (12 items), statistically significant differences between the preference groups were found for 10 complications of CS and four complications of vaginal delivery (Table 3). Compared with women who preferred vaginal delivery, more women who preferred CS disagreed with the suggested complications of CS.

There was a statistically significant difference between women preferring CS and women who preferred vaginal delivery in the number who chose all 15 complications of CS (8 [9.4%] versus 80 [21.9%]; *P* = 0.009) and in those who chose all 12 complications

Table 2. Reasons for delivery preference among pregnant women pre-partum.

Preference for caesarean section (n = 85)		Preference for vaginal delivery (n = 365)	
Reasons[a]	n (%)	Reasons[a]	n (%)
Less risk of fetal distress	35 (41.2)	Natural process	241 (66.0)
To avoid vaginal tearing and episiotomy	20 (23.5)	Faster recovery	240 (65.8)
Avoidance of emergency caesarean section	20 (23.5)	Healthier babies	235 (64.4)
Prior caesarean section	15 (17.6)	Less pain after delivery	130 (35.6)
Less labour pain and pressure	14 (16.5)	Easier breast feeding	119 (32.6)
Safer for women	10 (11.8)	No scar	108 (29.6)
A chance to choose a specific birth date	9 (10.6)	Shorter hospital stay	74 (20.3)
To reduce the damage of the pelvic floor	8 (9.4)	No operative or anaesthetic risk	68 (18.6)
Quick restoration of sexual activities	8 (9.4)	Lower risk of morbidity and mortality	43 (11.8)
A fashion	1 (1.2)	No parity limits	35 (9.6)
Prior negative experience from vaginal delivery	1 (1.2)	Less costly	29 (7.9)

[a]Multiple reasons were permitted.

of vaginal delivery (29 [34.1%] versus 60 [16.4%]; $P < 0.05$) (Table 3). After assessing knowledge of delivery complications, the rates of correct awareness of complications with caesarean or vaginal delivery were 31.3% (141/450) for all women regardless of birth preference.

Factors associated with a preference for CS were analysed using logistic regression methods. The analyses were performed for all participants nulliparous and parous. Women had statistically significantly ($P < 0.05$) higher odds of preferring CS if they were parous and had a history of CS (odds ratio [OR] 17.1, 95% confidence interval [CI] 3.9, 75.6) or were nulliparous (OR 3.8, 95% CI 1.0, 14.0) compared with women who had only experienced vaginal delivery.

The following factors were strongly associated with all women who preferred CS by comparison with those who preferred vaginal delivery: older than 35 years of age; not unigravidas; access to only one information source to help decide delivery mode; lacking in knowledge (> one item) of the complications of caesarean delivery; having knowledge of the complications of vaginal delivery; and thought that doctors had no right to decide the delivery mode (Table 4).

The following factors were strongly associated with nulliparous women who preferred CS compared with those who preferred vaginal delivery: older than 35 years of age; no medical insurance; not unigravidas; access to only one information source to help decide delivery mode; having knowledge of the complications of vaginal delivery; and thought that doctors had no right to decide the delivery mode (Table 4).

For parous women who preferred CS, living outside of Beijing was a significant factor affecting their preference (Table 4).

Discussion

This cross-sectional study, conducted in one of the biggest and most prestigious obstetric hospitals in China and involving 450 women, found that 19% with a singleton

Table 3. Comparison of the knowledge of delivery complications according to delivery method among pregnant women pre-partum.

Caesarean section (15 items)[a]	Preference for CS (n = 85)	Preference for VD (n = 365)	Statistical significance[b]	Vaginal delivery (12 items)[a]	Preference for CS (n = 85)	Preference for VD (n = 365)	Statistical significance[b]
Longer hospital stay[c]	75 (88.2)	350 (95.9)	$P < 0.05$	Risk of fetal distress and cerebral palsy	68 (80.0)	218 (59.7)	$P < 0.05$
Potential baby distress caused by GA	19 (22.4)	154 (42.2)	$P < 0.05$	Risk of emergency CS	62 (72.9)	230 (63.0)	NS
Wet lung syndrome	32 (37.6)	221 (60.5)	$P < 0.05$	Risk of episiotomy	71 (83.5)	299 (81.9)	NS
More risky VD due to prior CS	53 (62.4)	255 (69.9)	NS	Risk of instrumental delivery	51 (60.0)	167 (45.8)	$P < 0.05$
≤ 3 times CS	80 (94.1)	335 (91.8)	NS	Genital prolapse	54 (63.5)	196 (53.7)	NS
Bowel obstruction	47 (55.3)	238 (65.2)	NS	Urinary or faecal incontinence	49 (57.6)	190 (52.1)	NS
Uterine rupture in future pregnancy	58 (68.2)	303 (83.0)	$P < 0.05$	Reduction in sexual satisfaction	57 (67.1)	199 (54.5)	$P < 0.05$
Haemorrhage	57 (67.1)	296 (81.1)	$P < 0.05$	Vaginal tears	72 (84.7)	321 (87.9)	NS
Incision pain	79 (92.9)	343 (94.0)	NS	Anal or rectal tears	54 (63.5)	197 (54.0)	NS
Wound infection	59 (69.4)	316 (86.6)	$P < 0.05$	Bladder damage	45 (52.9)	147 (40.3)	$P < 0.05$
Bladder damage	32 (37.6)	205 (56.2)	$P < 0.05$	Pelvic floor damage	54 (63.5)	203 (55.6)	NS
Deep vein thrombosis	30 (35.3)	204 (55.9)	$P < 0.05$	Damage to urethral and anal sphincters	55 (64.7)	241 (66.0)	NS
Pulmonary embolism	29 (34.1)	178 (48.8)	$P < 0.05$				
Anaesthesia complications	52 (61.2)	283 (77.5)	$P < 0.05$				
Urinary catheterization[d]	85 (100.0)	361 (98.9)	NS				
Chose all 15 complications of CS	8 (9.4)	80 (21.9)	$P < 0.05$	Chose all 12 complications of VD	29 (34.1)	60 (16.4)	$P < 0.05$

Data presented as n of patients (%).
[a]Knowledge of complications encompassed 15 items for caesarean delivery and 12 for vaginal delivery.
[b]Pearson's χ^2-test
[c]Continuous correction χ^2-test.
[d]Fisher's exact test.
CS, caesarean section; VD, vaginal delivery; GA, general anaesthesia; NS, no statistically significant between-group difference ($P \geq 0.05$).

Table 4. Logistic regression analysis showing factors that significantly affected women's preference for caesarean section compared with those who preferred vaginal delivery.

	All women who preferred CS (n = 85)			Nulliparous women who preferred CS (n = 65)			Parous women who preferred CS (n = 20)		
	aOR	95% CI	Statistical significance	aOR	95% CI	Statistical significance	aOR	95% CI	Statistical significance
Parity & delivery mode, nulliparous	3.8	1.0, 14.0	P < 0.05						
Parity & delivery mode, parous, caesarean history	17.1	3.9, 75.6	P < 0.05				21.0	4.1, 106.9	P < 0.05
Age, ≥ 35 years	2.3	1.2, 4.5	P < 0.05	4.0	1.9, 8.3	P < 0.05	7.6	1.1, 52.7	P < 0.05
Living outside Beijing				2.3	1.1, 5.0	P < 0.05			
No medical insurance				2.2	1.2, 4.0	P < 0.05			
Gravidity (2+)	2.1	1.2, 3.8	P < 0.05	3.0	1.3, 6.9	P < 0.05			
Only one information source	2.8	1.3, 5.9	P < 0.05						
Lacking knowledge (>1 item) about CS complications	3.6	1.5, 8.7	P < 0.05						
Lacking knowledge (>1 item) about VD complications	0.2	0.1, 0.4	P < 0.05	0.3	0.2, 0.6	P < 0.05			
Thought doctors had no right to decide delivery mode	2.0	1.1, 3.8	P < 0.05	2.5	1.3, 4.9	P < 0.05			

All independent variables presented in Table 1 were used in the model and those with a $P < 0.05$ were included.
CS, caesarean section; aOR, adjusted odds ratio; CI, confidence interval; VD, vaginal delivery.

pregnancy at gestational age between 28 and 37 weeks preferred caesarean delivery pre-partum. These findings are similar to the estimated rate obtained from a multi-national meta-analysis of women's preference for caesarean delivery (i.e. 16%, 95% CI 13%, 19%).[17] However, the 19% caesarean delivery preference pre-partum found in this study was higher than that obtained from another hospital-based study in Beijing (i.e. 10%), which involved women at a gestational age of 36–40 weeks.[10] Indeed, gestational age may be a factor influencing the caesarean delivery preference rate.[10,18,19] Understanding the dynamics of childbirth preference would certainly help clinicians and policymakers in the development of valuable interventions or guidance. Interestingly, more than 80% of the women in this study were less than 35 years old. People in China regard 35 years as the turning point for fertility and beyond 35 years is regarded as high-risk for birth.

The primary reason for preferring caesarean delivery in this study was to reduce fetal distress. The primacy given to the fetus in China can be partially explained by its family planning policy. Since the number of children in most Chinese families remains officially restricted, the baby, even *in utero*, is often given special concern or priority. This may explain differences between these current results and those from similar studies conducted in Italy and Singapore, which found that 'avoidance of pain' was the main reason for choosing caesarean delivery.[11,12] In this present study, the top three reasons for preferring vaginal delivery were natural process, faster recovery, and healthier babies. Yet again, a wish for a healthy baby emphasises the importance of children to a Chinese family, which may go some way to explain the difference between these preference results and those from other countries.[12,20] Therefore, we suggest that in China, obstetricians should place great emphasis on fetal health and safety when discussing delivery modes with pregnant women.

After assessing knowledge of delivery complications, the rates of correct awareness of complications with caesarean or vaginal delivery were only approximately 31% for all women irrespective of birth preference. The results also showed that women were influenced by their physicians/midwives as well as their parents/partners/friends. In addition, the media also played an important role in determining their delivery preference. These findings highlight the importance of obstetricians and midwives in disseminating accurate information on delivery complications to Chinese women of childbearing age and their families. This policy should be supplemented with relevant information from the media. Importantly, the current study found that women who preferred caesarean delivery were more likely to be lacking in knowledge about caesarean birth. This observation further underscores the importance of the supply of accurate information from public service announcements about delivery complications.

A history of CS was the strongest predictor of preference for caesarean delivery, as a previous Norwegian cross sectional study has also indicated.[21] This present study found the odds of preferring a caesarean delivery were 17-times greater among women with a history of CS. This finding may be a critical issue for further studies since China has now implemented a 'two-child policy'. Several hospitals in China have attempted to promote vaginal delivery after previous caesarean delivery to try and change the policy of 'once a caesarean, always a caesarean'.[22] However, the increased use of assisted reproductive technology among women at advanced maternal age has enhanced the chance of those women preferring a caesarean delivery because of concerns for fetal safety.[23] In addition, obstetricians may perform unnecessary caesarean deliveries because of fear of malpractice claims.[24]

Although the present study had adequate power to detect a true effect according to its sample size, there were some limitations. For example, the study was conducted at a municipal maternity hospital in Beijing and so the results may not be representative of all hospitals in China. However, it is probably representative of tertiary maternity hospitals in major cities in China. In addition, information about non-respondents' characteristics or their delivery preferences was not collected.

This present study reported a moderate proportion (19%) of women preferring CS and its influential factors were varied. Further studies are required to explore the dynamics of delivery preference and provide more information for policymakers. Building a doctor–patient mutual trust environment and increasing effective dissemination of correct and neutral delivery option advice to pregnant women is imperative. With the initiation and roll out of '*two-child policy*' the preference of delivery mode may vary but a rule of '*once a caesarean, always a caesarean*' must be avoided.

Declaration of conflicting interests

The authors declare that there are no conflicts of interest.

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