

Women's preference for caesarean section and the actual mode of delivery – comparing five sites in Norway

ABSTRACT

Objectives: The caesarean (CS) section rate varies among hospitals in Norway, and little is known about whether this is influenced by women's preferences. The aim of this study was to investigate the differences in women's preferred mode of delivery during pregnancy between five hospitals in Norway, and to relate this to the actual mode of delivery.

Study design: A prospective cohort study of 2,177 unselected pregnant women in five hospitals in Norway. Women were recruited at their standard ultrasound examinations, and data was collected through questionnaires and electronic patient charts. The exposure was a CS preference and the main outcome measure was the actual mode of delivery.

Results: In total, 3.5% of the primiparous women and 9.6% of the multiparous women reported a preference for CS. This was associated with fear of childbirth and education between 10 and 13 years in both groups, symptoms of depression and an age over 35 years old among the primiparous women, and a previous CS and/or negative birth experience among the multiparous. The multiparous women in Drammen and Tromsø were less likely to prefer a CS, and none of the primiparous women in Tromsø preferred a CS. A total of 67.8% of those who preferred a CS gave birth with this mode of delivery.

Conclusion: There were significant differences between the hospitals according to the CS preference. This preference was associated with the previous obstetric history and psychological factors. Therefore, creating good birth experiences and offering women counselling may reduce the CS preference rate.

Key words: Bidens, caesarean section, preference, maternal request, mode of delivery

Introduction

There has been an increase in the caesarean section (CS) rate, both globally and in Norway, over the last few decades [1, 2]. In addition, there is a tendency toward more women preferring a CS [3], and therefore, delivering their babies via CSs without medical indications [4, 5]. Since 1985, the World Health Organization (WHO) has considered the ideal CS rate to be 10–15% [6], and it has recommend the demedicalisation of normal pregnancy and birth, with only the necessary interventions being implemented [7]. In Norway, the CS rate has

increased from 4% in 1995 to 16% in 2015 [2]. It has remained around 16% over the last decade; however, there is a large variation between the hospitals, from 10% to 25% [2].

The increase in CSs has partly been explained by the changes in the population of pregnant women [8]. Generally, women are older when they give birth, their mean body mass indexes (BMIs) have increased, and there are proportionally more multiple pregnancies [2]. Among other factors are the changes in obstetric practice [8], and that a woman's own preferences are taken into consideration when the mode of delivery is chosen [9, 10].

In Norway, a CS is not recommended by maternal request alone, without medical indications [11]. Despite this, a Norwegian study found that the two most common indications for an elective CS were maternal request and a previous CS [4]. A Swedish study that examined the changes in the indications for CSs from the early 1990s to 2005 found that the dominant indication for an elective CS had changed from a purely medical indication, like a pathological foetal position, to a psychosocial indication, like a fear of childbirth (FOC), or a maternal request with no coexisting medical indications [5]. Other studies have found that a desire for a CS was associated with FOC, previous CS and negative birth experience [12-14].

A CS is associated with an increased medical risk [11]. It is a major operation with a risk of infection, bleeding, thrombosis, damage to the abdominal organs and possible complications in subsequent pregnancies [15, 16]. Children born by CSs often need respiratory care afterwards, and they are at a greater risk of developing asthma [17, 18].

Because of the tendency toward more women preferring a CS, and because a CS is associated with a higher risk, it is of interest to explore the variations in the CS preferences and mode of delivery among hospitals. Therefore, the aim of this study was to investigate the differences in women's preferred mode of delivery during pregnancy between five hospitals in Norway, and relate these preferences to the actual mode of delivery. In addition, the associations between the different sociodemographic, psychological and obstetric factors and a CS preference were examined.

Materials and methods

This study was based on the Bidens cohort study, which was conducted in six European countries: Belgium, Iceland, Denmark, Estonia, Norway and Sweden [19]. The main purpose of the Bidens study was to investigate the factors related to maternity anxiety, abuse history and the mode of delivery in order to improve pregnancy and childbirth care. The Norwegian data from the Bidens study was used in our analyses.

The data was obtained from unselected pregnant women at five hospitals in five cities in Norway: Ålesund, Drammen, Trondheim (St. Olavs University Hospital), Tromsø (University Hospital of North Norway) and Oslo (Oslo University Hospital, Rikshospitalet). The first two are local hospitals and the last three are university hospitals.

Recruitment

The participants were recruited from March 2008 to August 2010. At the hospitals in Ålesund and Drammen, the study invitation and a consent form were sent together with the invitation for the routine ultrasound screening to all women that planned to give birth at the hospitals. Each woman received a questionnaire with a prepaid envelope at her ultrasound screening at around week 18. In Oslo, Trondheim and Tromsø, an invitation was sent together with the questionnaire and the consent form in an included prepaid envelope after the ultrasound screening to all women except those with major foetal pathologies. The invitation, consent form and questionnaire were written in Norwegian. To participate in the study, each woman had to have mastered the language sufficiently to fill out the form.

In total, 2,431 Norwegian women were recruited in the Bidens study. For the study, 254 women were excluded: 20 did not report a preferred mode of birth, 59 were expecting twins, 30 had unknown parity, 139 were missing data about the mode of delivery and 6 had incomplete answers about abuse. Therefore, the total number of women included in our study was 2,177. Of these, 453 women were recruited from Trondheim, 361 from Tromsø, 479 from Ålesund, 423 from Drammen and 461 from Oslo. The average answer rate was 50%, with the highest in Oslo (61%) and lowest in Ålesund (44%) [19].

Instrument

The demographic data was obtained from the questionnaires, and the birth outcome data was later collected from the electronic patient charts. The questionnaire included the sociodemographic information and obstetric history, in addition to validated self-assessment scales, such as the short version of the Edinburgh Depression Scale (EDS) [20], the Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) [21] and the NorVold Abuse Questionnaire (NorAQ) [22].

Data coding

The preferred mode of birth was assessed by asking “How would you prefer to give birth?” with four response options: vaginally, probably vaginally, probably CS and CS. The

response options were used both individually and in two main categories: preferred vaginal birth and preferred CS birth. Those who responded “CS” or “probably CS” were classified as preferring a CS.

The mode of delivery were collected from the electronic patient charts and included “spontaneous vaginal birth”, “vacuum”, “forceps” and “CS”. However, the first three were recoded as “vaginal birth”. To determine whether it was an elective or emergency CS, the participants were asked if the CS was planned, with the following response options: “no”, “yes, and performed as an elective caesarean section” and “yes, but performed as an emergency caesarean section”. A CS that was planned, but performed as an emergency CS, was coded as an emergency CS. The CS indications included “foetal distress”, “dystocia”, “maternal request”, “psychosocial reasons” and “other medical reasons”. Multiple answers were allowed. The answer options “maternal request” and “psychosocial reasons” were recoded into “only non-medical” if no other reasons were given.

The sociodemographic variables were coded as shown in the tables. The age and gestational age (GA) were collected as continuous variables, but recoded as presented in Table 2. The GA was used as both a continuous and categorical variable.

To assess the symptoms of depression, the 5-item version of the EDS was used. The EDS-5 is a 4-point scale with a minimum score of 0 and a maximum of 15. An EDS score ≥ 7 was defined as moderate to severe symptoms of depression [20].

The FOC was assessed with the W-DEQ, an instrument validated to assess the FOC [21]. The W-DEQ consists of a 6 point, 33-item self-assessment rating scale, with a minimum score of 0 and maximum score of 165. A woman was defined as having a severe FOC if the total score was 85 or greater [21, 23].

The questions from the validated NorAQ measured emotional, physical and sexual abuse, and were used to investigate whether the women had experienced abuse [22]. A woman was defined as having a history of abuse if she answered yes to at least one of the questions, excluding a mild degree of physical abuse as a child.

The multiparous women were asked about their previous modes of delivery and their first and most recent childbirth experiences. A previous CS history included those women who previously had elective or emergency CSs and no vaginal births. The birth experience was considered to be negative if the woman described it as a “purely negative experience” or a “mainly negative experience, but with positive elements”.

Ethics

This study was approved by the Regional Committees for Medical and Health Research Ethics (REC; 2006/72) and the Norwegian Centre for Research Data (NSD; 15214/3/). The women signed consent forms, which included participation and allowed data collection from the patient charts.

Statistical analysis

Cross-tabulation and the Pearson's chi-squared test were used to analyse the proportions and assess the differences in the preferred mode of birth and actual mode of delivery at the different hospitals. The GA continuous variable was analysed by using the one-way ANOVA. The CS indications and background variables, according to the preferred mode of birth, were also analysed via cross-tabulation and the Pearson's chi-squared test. The Fisher's exact test was used when appropriate. In the analyses, a p-value < 0.05 was considered to be significant. Logistic binary regression analyses were used to calculate the crude odds ratios (ORs) and 95% confidence intervals (CIs) of the associations between the psychological, sociodemographic and obstetric variables and a CS preference. There were adjustments for the "a priori" selected potential confounding variables, based on the previous literature in the field. The adjusted ORs (AORs) were estimated by using the hospital, age, education, marital status, symptoms of depression, FOC, history of abuse, previous negative birth experience and previous CS, stratified for parity. Trondheim was used as the reference hospital because it reported the most women who preferred a CS. The analysis was stratified because it was likely that the multiparous women had preferences for the mode of delivery other than those of the primiparous women, based on their earlier obstetric histories. All of the statistical analyses were conducted with the Statistical Package for the Social Sciences (SPSS, version 24) data processing program.

Results

In this study, more multiparous women (9.6%) than primiparous women (3.5%) preferred a CS when asked during pregnancy.

There were significant differences between the hospitals among both the primiparous and multiparous women in relation to their preferred mode of delivery (Table 1). Overall, the majority of the women preferred a vaginal birth. Among the primiparous women, the CS preference was highest in Drammen (3.1%) and lowest in Tromsø and Ålesund, where none of the primiparous women preferred a CS. The CS preference was highest in Trondheim (9.6%) and lowest in Tromsø (5.4%) among the multiparous women. By including the

women who responded that they probably wanted a CS, the significant differences between the hospitals disappeared. The gestational week in which the women filled out the questionnaires differed between the hospitals (Table 1) among both the primiparous and multiparous women ($p < 0.001$), and it was not associated with a CS preference (Table 2).

The associations between the different sociodemographic, psychological and obstetric factors and a CS preference are presented in Table 2. The women who were multiparous, over 30 years old, had an education between 10 and 13 years, had depressive symptoms, had FOC or had a history of abuse preferred a CS more often. Among the multiparous women, a negative birth experience or a previous CS were also associated with this preference. Differences regarding sociodemographic variables and a CS preference between the different sites are presented in the supplementary table S1.

After adjusting for the background factors (Table 3) the multiparous women were less likely to prefer a CS in Tromsø (AOR: 0.44, 95% CI: 0.20–0.97) and Drammen (AOR: 0.37, 95% CI: 0.17–0.81). There were no significant differences among the primiparous women according to the different hospitals, but none of the primiparous women in Tromsø preferred a CS. The primiparous and multiparous women with FOC and an education between 10 and 13 years, the primiparous women with symptoms of depression, and the multiparous women with a previous negative birth experience had higher odds of preferring a CS. The primiparous women over 35 years old had five times higher odds of preferring a CS when compared to those under 25 years old. The multiparous women with previous CSs had 17 times higher odds of preferring a CS when compared to those without any previous CSs.

When looking at the actual mode of delivery, the primiparous women had the highest CS rate (15.8%) when compared with the multiparous women (14.5%). The CS prevalence among the multiparous women differed between the hospitals ($p < 0.05$), from 10.7% in Tromsø to 20.2% in Oslo.

There were no significant differences between the hospitals regarding the mode of delivery among those women who preferred a CS, but there were large variations in the occurrence of elective CSs (Table 4). Oslo had the highest prevalence with 75.7% and Ålesund had the lowest with 42.1% ($p = 0.066$). Of the 152 women that preferred a CS, 103 (67.8%) gave birth by CS, 89 (58.6%) had an elective CS and 14 (9.2%) had an emergency CS. When compared to the group of women who preferred a vaginal birth, only 65 (3.2%) women ended up having an elective CS and 159 (7.9%) had an emergency CS.

The indications for a CS differed between the women with and without a CS preference (Table 5). The most common indications among the women who reported a CS

preference were other medical reasons, maternal requests and psychosocial reasons ($p < 0.001$). Slow progression, foetal distress and a breech presentation were the more common indications for a CS among those who preferred a vaginal birth. A total of 40 (12.2%) women had a CS for non-medical reasons only. This was more common among those with a preference for CS when compared to those without (34% versus 2.2%, $p < 0.001$).

Discussion

In this study, a total of 3.5% of the primiparous and 9.6% of the multiparous women preferred a CS when asked during pregnancy. After adjusting for the sociodemographic, psychological and obstetric factors, a CS preference was associated with FOC and an educational level between 10 and 13 years in both groups, symptoms of depression and age over 35 years old among the primiparous women, and a previous CS and negative birth experience among the multiparous women. The multiparous women in Tromsø and Drammen were less likely to prefer a CS, while none of the primiparous women in Tromsø had a preference for a CS during pregnancy. There were no significant differences between the hospitals with regard to the actual mode of delivery among those who preferred a CS. In total, 67.8% of these women ended up undergoing a CS. The most common indications for the CSs in this group were other medical reasons, maternal requests and psychosocial reasons.

This study showed that only 7% of the participating women preferred to deliver by a CS when asked during pregnancy. This value is low when compared to a previous review that included 38 studies worldwide, in which the pooled prevalence for a CS preference was 15.6% [3]. However, in previous Scandinavian studies, the prevalence was 6–8%, which is comparable with our results [10, 12, 14, 23]. An interesting finding was that the multiparous women in Tromsø and Drammen were less likely to prefer a CS after adjusting for the a priori selected confounders. When we compared the sociodemographic variables between the hospitals Oslo differed from the others with older and more educated women participating (Table S1). GA when filling out the questionnaire also differed between the hospitals (Table S1) but this was not associated with a preference for CS (table 2). One possible explanation, although speculative, is that the women connected to these hospitals had more trust in themselves to manage a vaginal birth, or more trust in their obstetricians, and waited for them to decide. For instance, one Norwegian study found that the women who reported positive self-efficacy were more likely to prefer a natural birth [24]. Another suggestion is that the women with FOC, symptoms of depression, previous CSs or negative birth experiences might be treated differently in antenatal care, with a higher focus on a natural birth or more

possibilities for counselling. The associations between FOC, previous CS and previous negative birth experience and a CS preference were also found in other Scandinavian studies [12-14, 23]. For example, Mazzoni et al. [3] reported that a previous CS influenced the preference. In addition, a Norwegian study found that the women with symptoms of depression were more likely to prefer a CS [25].

A total of 67.8% of those who preferred a CS during pregnancy were delivered by a CS. This is high when compared to previous Norwegian [9] and Swedish [10] studies, in which the equivalent figures were 48% and 45%, respectively. The findings in our study might be related to the changes in practice among obstetricians, or the fact that the women had stronger preferences and a greater influence on the decision regarding the mode of delivery. Both the abovementioned studies [9, 10] found that the preference affected how the women actually gave birth. Our findings indicated the same; however, a fulfilled request does not guarantee a positive birth experience. One study found that the women who preferred and actually delivered by a CS experienced a higher degree of FOC and had a negative birth experience more often [26].

There were no significant differences among the hospitals in how the women who preferred a CS ended up giving birth, despite the major percentage differences. Oslo had higher rates of elective CSs and less emergency CSs when compared to Ålesund, where it was the opposite. One explanation for these differences may be that the hospital in Oslo, department Rikshospitalet, had a higher proportion of women with high-risk pregnancies [27]. For example, all women in Norway with a heart disease give birth here. This is probably reflected in the higher CS rate at this site compared to the other sites in our material. Because of this, there could have been more elective CSs based on medical conditions, which could have resulted in fewer emergency CSs. The low prevalence of elective CSs and the high occurrence of emergency CSs in Ålesund may have been due to a higher focus on vaginal births or more follow-ups during pregnancy, with the possibility for counselling. Therefore, a change in attitude towards CSs may have occurred. This is supported by a study from Norway in which they found that 86% of the women changed their opinions after receiving counselling [25].

In our study, the CS indications were mostly due to medical reasons, which was also true among the women who preferred a CS. This suggests that the woman's preference may have been based on her knowledge of her own risks, and that a vaginal birth could be complicated. Knowledge about the complications may also be the explanation why the primiparous women over 35 years old were more likely to prefer a CS. Being older when

expecting your first child is related to more complications, during both pregnancy and birth [28], and it is not unlikely that women over 35 years old are aware of this. Another Norwegian study also found an increase in the CS preference among women over 35 years old [12], which supports our findings.

We found that 34% of those who preferred a CS during pregnancy underwent them without medical reasons. This indicates that the women had an influence on the decision-making process. Similarly, a Swedish study that investigated the changes in the CS indications over the last decade found that more CSs were performed without medical reasons [5]. In Norway, a CS is not recommended based on a maternal request alone, in the absence of a medical indication. According to guidelines, if a woman wants a CS in the absence of a medical reason, she is referred for consultation from primary care to the hospital where she plans to give birth [11]. Here she will talk to an obstetrician regarding her request. Severe fear of birth can be considered a medical indication for CS [11]. The guidelines recommend that this is assessed on an individual basis. A clear definition regarding FOC does not exist. It differs from hospital to hospital to which extent a CS is granted and this is may be reflected in the different CS rates in Norway [2]. Based on the recommendation, the prevalence in our study may have been high; however, only 7% of the participants preferred a CS.

Strengths and limitations

The population based design and the sample of unselected pregnant women are strengths of this study. Our sample of over 2,000 women allowed us to control for any potential confounding factors and covariates associated with the outcome, and stratify for the parity. The other strengths include the use of validated instruments in the questionnaire and the follow-up design. The main outcome was collected independently for the exposure by healthcare professionals; therefore, bias regarding the mode of delivery and the different CS indications is unlikely.

Despite the use of unselected women, the overall CS rate in this study was considerably lower than that in the whole population, according to the Medical Birth Registry of Norway (MBRN) [2]. The CS rate at each site in this study was also lower than the CS rate at the time of recruitment at all sites except Trondheim, which had a similar rate [2]. This may indicate that only the healthiest women participated in our study and we do not have any information regarding complications during pregnancy. However, based on the exclusion of women with foetal pathologies and multiple pregnancies, a lower CS rate was expected, since

these women have increased risks of giving birth by a CS [11]. Because of these exclusions, our results may not be generalizable to the whole population of Norway.

The Bidens study had a moderate response rate. Unfortunately, we lack information on the women who did not participate, and selection bias is a cause for concern. Despite this, our study population was similar to the population of women who were giving birth in Norway during the study period [2], and the estimates of the exposure-outcome associations could still be valid [29].

The preferred mode of birth was reported during pregnancy at a mean of 24.8 (SD 4.6, Table 2) and it is unknown how strong the preference was or if the participants changed their preferences during their pregnancies. The preference for a CS was associated with FOC and FOC may have changed during pregnancy. Studies are inconsistent to whether FOC changes or not with a higher GA [23, 30]. The FOC prevalence could be influenced by counselling and we have not controlled for this in our analysis. Women were asked if they had counselling for FOC in the questionnaire as a yes/no question and due to lack of information regarding both timing, content and providers of the counselling we did not use this variable.

For this research, the women with an insufficient knowledge of the Norwegian language were excluded. A recent Swedish study found a higher FOC prevalence among foreign-born women [31]. Thus, including immigrant women could have affected the results, since FOC had an impact on the CS preference in our study. The mode of birth preference could also vary based on other cultural factors. For example, a high prevalence of CS in the country of origin or fear of surgery. This could result in both higher and lower prevalence rates. Therefore, we cannot know how the inclusion of these women would have affected our results.

Conclusion and implication for practice

This study found significant differences between the participating hospitals regarding the women's CS preferences during pregnancy. A CS preference was associated with the previous obstetric history and psychological factors, like FOC. Our findings indicate that the preferred mode of birth had an impact on the actual mode of delivery; therefore, it may be important to uncover a desire for a CS early in the pregnancy. Being aware of the factors that are associated with a CS preference can help midwives to identify these women. In addition, creating good birth experiences and offering counselling may reduce the desire for a CS, and therefore, unnecessary CSs. Our findings provide a basis for further research to explore the

differences between hospitals regarding how they treat women that prefer a CS and their possibilities for counselling.

Competing interests

There are no conflicts of interest to declare.

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Table 1. Preferred mode of birth, gestational age (GA) when reporting preference and actual caesarean section (CS) rate in five obstetric departments, stratified for parity. Norwegian sample of the Bidens cohort study 2008–2010. N = 2,177.

	Trondheim n = 453 (%)	Tromsø n = 361 (%)	Ålesund n = 479 (%)	Drammen n = 423 (%)	Oslo n = 461 (%)	Total n = 2,177 (%)	P value ^a
Primiparous	n = 224	n = 137	n = 165	n = 193	n = 213	n = 932	
1. Vaginally	154 (68.8)	109 (79.6)	114 (69.1)	130 (67.4)	156 (73.2)	663 (71.1)	0.034
2. Probably vaginally	59 (26.3)	28 (20.4)	46 (27.9)	55 (28.5)	48 (22.5)	236 (25.3)	
3. Probably CS	8 (3.6)	0 (0.0)	5 (3.0)	2 (1.0)	7 (3.3)	22 (2.4)	
4. CS	3 (1.3)	0 (0.0)	0 (0.0)	6 (3.1)	2 (0.9)	11 (1.2)	
Preference for CS (3&4)	11 (4.9)	0 (0.0)	5 (3.0)	8 (4.1)	9 (4.2)	33 (3.5)	0.142
Mean GA when reporting preference (weeks, SD)	26.8 (4.2)	29.6 (3.9)	23.0 (3.8)	21.6 (3.5)	23.6 (3.7)	24.7 (4.7)	< 0.001 ^b
Delivered by CS	41 (18.3)	12 (8.8)	26 (15.8)	33 (17.1)	35 (16.4)	147 (15.8)	0.166
Multiparous	n = 229	n = 224	n = 314	n = 230	n = 248	n = 1,245	
1. Vaginally	168 (73.4)	184 (82.1)	227 (72.3)	187 (81.3)	192 (77.4)	958 (76.9)	0.041
2. Probably vaginally	35 (15.3)	23 (10.3)	54 (17.2)	28 (12.2)	28 (11.3)	168 (13.5)	
3. Probably CS	4 (1.7)	5 (2.2)	13 (4.1)	1 (0.4)	7 (2.8)	30 (2.4)	
4. CS	22 (9.6)	12 (5.4)	20 (6.4)	14 (6.1)	21 (8.5)	89 (7.1)	
Preference for CS (3&4)	26 (11.4)	17 (7.6)	33 (10.5)	15 (6.5)	28 (11.3)	119 (9.6)	0.240
Mean GA when reporting preference (weeks, SD)	26.0 (4.1)	29.9 (4.2)	23.1 (3.5)	21.6 (3.6)	24.2 (4.0)	24.8 (4.7)	< 0.001 ^b

preference (weeks, SD)							
Delivered by CS	39 (17.0)	24 (10.7)	38 (12.1)	29 (12.6)	50 (20.2)	180 (14.5)	0.015

^a P value calculated using Chi-squared test

^b One-way ANOVA

SD = standard deviation

Table 2. Associations between sociodemographic, psychological and obstetric factors and a caesarean section (CS) preference. Norwegian sample of the Bidens cohort study 2008–2010. N = 2,177.

	Preferred birth by CS n = 152 (%)	Preferred vaginal birth n = 2,025 (%)	Crude OR (95%CI)	P value ^a
Age (years, n = 2,177)				
< 25	9 (3.5)	246 (96.5)	1	0.001
25–30	49 (5.9)	779 (94.1)	1.72 (0.83 – 3.55)	
31–35	55 (7.3)	697 (92.7)	2.16 (1.05 – 4.43)	
> 35	39 (11.4)	303 (88.6)	3.52 (1.67 – 7.40)	
Education (years, n = 2,165)				
< 9	3 (5.9)	48 (94.1)	1.01 (0.31 – 3.30)	0.002
10–13	57 (10.2)	500 (89.8)	1.84 (1.30 – 2.60)	
>13	91 (5.8)	1466 (94.2)	1	
Marital status (n = 2,177)				
Married/cohabitant	145 (6.9)	1942 (93.1)	1	0.762
Single	7 (7.8)	83 (92.2)	1.13 (0.51 – 2.49)	
Parity (n = 2,177)				
Primiparous	33 (3.5)	899 (96.5)	1	< 0.001
Multiparous	119 (9.6)	1126 (90.4)	2.88 (1.94 – 4.28)	
GA when reporting preference (weeks, n = 2,157)				
< 21	20 (4.7)	402 (95.3)	1	0.148
21–28	96 (7.5)	1183 (92.5)	1.63 (0.99 – 2.68)	
>28	32 (7.0)	424 (93)	1.52 (0.85 – 2.70)	
Hospital (n = 2,177)				
Trondheim	37 (8.2)	416 (91.8)	1	0.144
Tromsø	17 (4.7)	344 (95.3)	0.56 (0.31 – 1.00)	
Ålesund	38 (7.9)	441 (92.1)	0.97 (0.60 – 1.55)	
Drammen	23 (5.4)	400 (94.6)	0.65 (0.38 – 1.11)	
Oslo	37 (8.0)	424 (92.0)	0.98 (0.61 – 1.58)	
Symptoms of depression (n = 2,152)	23 (13.8)	144 (86.2)	2.38 (1.48 – 3.83)	< 0.001
Fear of childbirth (n = 2,144)	48 (18.6)	210 (81.4)	4.17 (2.87 – 6.06)	< 0.001
History of abuse (n = 2,177)	76 (8.4)	827 (91.6)	1.45 (1.04 – 2.02)	0.027
Previous negative birth experience (n = 1,245) ^b	55 (20.8)	209 (79.2)	3.77 (2.55 – 5.57)	< 0.001
Previous CS and no previous vaginal birth (n = 1,245) ^b	59 (48.0)	64 (52.0)	16.32 (10.52 – 25.31)	< 0.001

^a P value calculated using Chi-squared test

^b Only multiparous

OR = odds ratio

CI = confidence interval

Table 3. Adjusted associations between a caesarean section (CS) preference and background factors, stratified for parity. Norwegian sample of the Bidens cohort study 2008–2010. N = 2,177.

	All women n = 2,177	Primiparous n = 932	Multiparous n = 1,245
Hospital			
Trondheim	1	1	1
Tromsø	0.43 (0.23 – 0.81)	-	0.44 (0.20 – 0.97)
Ålesund	0.76 (0.45 – 1.26)	0.36 (0.09 – 1.38)	0.76 (0.39 – 1.47)
Drammen	0.59 (0.33 – 1.03)	0.88 (0.33 – 2.34)	0.37 (0.17 – 0.81)
Oslo	0.85 (0.52 – 1.42)	0.90 (0.34 – 2.39)	0.71 (0.36 – 1.43)
Age (years)			
< 25	1	1	1
25–30	2.29 (1.08 – 4.90)	2.75 (0.84 – 9.04)	0.78 (0.24 – 2.60)
31–35	2.70 (1.25 – 5.82)	1.23 (0.27 – 5.58)	1.03 (0.31 – 3.40)
> 35	5.45 (2.45 – 12.12)	4.79 (1.02 – 22.45)	2.04 (0.60 – 6.91)
Education (years)			
< 9 years	1.08 (0.29 – 4.00)	2.02 (0.17 – 23.62)	0.70 (0.13 – 3.76)
10–13	2.15 (1.46 – 3.18)	2.71 (1.14 – 6.48)	1.86 (1.11 – 3.11)
>13	1	1	1
Marital status			
Married/cohabitant	1	1	1
Single	1.04 (0.42 – 2.61)	1.15 (0.27 – 4.94)	1.50 (0.38 – 5.89)
Symptoms of depression	1.83 (1.07 – 3.13)	3.21 (1.13 – 9.16)	1.25 (0.59 – 2.67)
Fear of childbirth	3.82 (2.55 – 5.73)	2.98 (1.21 – 7.38)	3.18 (1.81 – 5.59)
History of abuse	1.17 (0.81 – 1.69)	0.84 (0.37 – 1.90)	1.07 (0.66 – 1.72)
Previous negative birth experience^a			3.10 (1.88 – 5.11)
Previous CS and no previous vaginal birth^a			17.39 (10.51 – 28.77)

^a Only multiparous

Table 4. Actual mode of delivery of all the participating women at five hospitals, stratified for the preferred mode of birth. Norwegian sample of the Bidens cohort study 2008–2010.

N = 2,177.

	Trondheim n = 453 (%)	Tromsø n = 361 (%)	Ålesund n = 479 (%)	Drammen n = 423 (%)	Oslo n = 461 (%)	Total n = 2,177 (%)	P value ^b
Preferred birth by CS	n = 37	n = 17	n = 38	n = 23	n = 37	n = 152	
Elective CS	21 (56.8)	10 (58.8)	16 (42.1)	14 (60.9)	28 (75.7)	89 (58.6)	0.066
Emergency CS	4 (10.8)	2 (11.8)	4 (10.5)	2 (8.7)	2 (5.4)	14 (9.2)	0.914
Vaginal birth ^a	12 (32.4)	5 (29.4)	18 (47.4)	7 (30.4)	7 (18.9)	49 (32.2)	0.132
Preferred vaginal birth	n = 416	n = 344	n = 441	n = 400	n = 424	n = 2,025	
Elective CS	12 (2.9)	6 (1.7)	17 (3.9)	15 (3.8)	15 (3.5)	65 (3.2)	0.458
Emergency CS	43 (10.3)	18 (5.2)	27 (6.1)	31 (7.8)	40 (9.4)	159 (7.9)	0.039
Vaginal birth ^a	361 (86.8)	320 (93.0)	397 (90.0)	354 (88.5)	369 (87.0)	1801 (88.9)	0.041

^a Vaginal birth includes spontaneous vaginal birth, forceps and vacuum

^b P value calculated using Chi-squared test

CS = caesarean section

Table 5. Indications for caesarean section (CS) among women delivered via CS by preferred mode of birth. Norwegian sample of the Bidens cohort study 2008–2010. N = 327.

	Preferred birth by CS n = 103 (%)	Preferred vaginal birth n = 224 (%)	Total n = 327 (%)	P value ^b
Indications^a				
Foetal distress	6 (5.8)	63 (28.1)	69 (21.1)	< 0.001
Dystocia	5 (4.9)	71 (31.7)	76 (23.2)	< 0.001
Maternal request	36 (35.0)	18 (8.0)	54 (16.5)	< 0.001
Psychosocial reasons	15 (14.6)	1 (0.4)	16 (4.9)	< 0.001 ^c
Breech presentation	7 (6.8)	50 (22.3)	57 (17.4)	0.001
Other medical reasons	49 (47.6)	60 (26.8)	109 (33.3)	< 0.001
Only non-medical reasons	35 (34.0)	5 (2.2)	40 (12.2)	< 0.001

^a More than one indication may be given; therefore, the column totals will be greater than the total for the column

^b P value calculated using Chi-squared test

^c Fisher's exact test

Table S1. Differences in socio-demographic, psychological and obstetric factors between hospitals in the Norwegian sample of the Bidens cohort study 2008–2010. N = 2,177.

	Trondheim n (%)	Tromsø n (%)	Ålesund n (%)	Drammen n (%)	Oslo n (%)	Total n=2,177 n (%)	p -value
Age							
< 25	59 (13.0)	57 (15.8)	76 (15.9)	50 (11.8)	13 (2.8)	255 (11.7)	
25-30	201 (44.4)	128 (35.5)	183 (38.2)	164 (38.8)	152 (33.0)	828 (28.0)	
31-35	138 (30.5)	115 (31.9)	159 (33.2)	149 (35.2)	191 (41.4)	752 (34.5)	<0.001
> 35	55 (12.1)	61 (16.9)	61 (12.7)	60 (14.2)	105 (22.8)	342 (15.7)	
Education (years)							
< 9 år	6 (1.3)	12 (3.4)	18 (3.8)	12 (2.8)	3 (0.7)	51 (2.4)	
10-13	122 (24.8)	105 (29.3)	162 (34.0)	120 (28.4)	58 (12.7)	557 (25.7)	<0.001
>13	333 (73.8)	241 (67.3)	296 (62.2)	291 (68.8)	396 (86.7)	1557 (71.9)	
Marital status							
Married/cohabitant	436 (96.2)	346 (95.8)	459 (95.8)	403 (95.3)	443 (96.1)	2087 (95.9)	
Single	17 (3.8)	15 (4.2)	20 (4.2)	20 (4.7)	18 (3.9)	90 (4.1)	0.962
Paritet							
Primiparous	224 (49.4)	137 (38.0)	165 (34.4)	193 (45.6)	213 (46.2)	932 (42.8)	
Multiparous	229 (50.6)	224 (62.0)	314 (65.6)	230 (54.4)	248 (53.8)	1245 (57.4)	<0.001
GA when reporting preference (weeks)							
< 21	7 (1.6)	0 (0.0)	128 (27.1)	218 (52.2)	69 (15.1)	422 (19.6)	
21–28	301 (67.2)	156 (43.3)	298 (63.0)	187 (44.7)	337 (73.6)	1279 (59.3)	<0.001
>28	140 (31.3)	204 (56.7)	47 (9.9)	13 (3.1)	52 (11.4)	456 (21.1)	
History of abuse	177 (39.1)	168 (46.5)	192 (40.1)	176 (41.6)	190 (41.2)	903 (41.5)	0.259
Symptoms of depression	32 (7.1)	31 (8.7)	32 (6.7)	36 (8.6)	36 (7.9)	167 (7.8)	0.762
Fear of childbirth	51 (11.5)	45 (12.6)	60 (12.9)	38 (9.1)	64 (14.0)	258 (12.0)	0.224

Previous negative birth experience n=1,245^a	47 (10.4)	52 (14.4)	65 (13.6)	53 (12.5)	50 (10.8)	267 (12.3)	0.321
Previous CS and no previous vaginal birth n=1,245^a	22 (4.9)	16 (4.4)	26 (5.4)	25 (5.9)	34 (7.4)	123 (5.6)	0.378

^aMultiparous women only

GA= gestational age

CS= caesarean section