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Title: Impact of national guidelines on the cesarean delivery rate in France: a 2010 – 2016 comparison using the Robson classification

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Abstract

Objective: French national guidelines on indications of pre-labor cesarean delivery and management of women with a previous cesarean delivery (CD) were published in 2012. Our aim was to assess if these guidelines have impacted the global CD rate in France and the CD rate in specific groups according to the Robson classification, using the national perinatal population-based surveys of 2010 and 2016.

Methods: Women included in the French National Perinatal Surveys in 2010 and 2016 were classified using maternal characteristics and obstetrical history in 12 groups according to Robson's classification (N=14176 in 2010 and N=13057 in 2016). We estimated relative size, CD rate and contribution of each group to the global CD rate in 2010 and 2016. Then, we compared the 2 survey years. We analyzed the population characteristics, timing and indications of CD in the groups with significant changes between the two survey years.

Results: The global CD rate was 20.5% in 2010 and 19.5% in 2016 ($p=0.027$), with a lower pre-labor CD rate (10.9% versus 9.2%, $p<0.001$). Despite an increasing of maternal age in 2016, we observed a decrease of the relative size of group 2b (nulliparous, singleton, cephalic, term, pre-labor CD): 1.1% in 2010 versus 0.8% in 2016 ($p=0.008$). Group 5 (previous CD, singleton, cephalic, ≥ 37 weeks) was the higher contributor to the global CD rate in both 2010 and 2016 (contribution: 5.8% of the 20.5% CD rate and 5.4% of the 19.5% CD rate, respectively). Despite an increase of BMI in this group, its CD rate significantly decreased between the two years (61.2% in 2010 versus 55.1% in 2016, $p=0.001$).

Conclusion: In France, CD rates have decreased between 2010 and 2016, among women having a pre-labor CD and women with a previous CD, in accordance with national guidelines. National guidelines can help mode of delivery decision-making of physicians and impact the national CD rates.

Key words: cesarean; Robson classification; national guidelines

1. Introduction

Decreasing or stabilizing the national cesarean delivery (CD) rate is a goal in most countries. The World Health Organization recommends analyzing the CD rate at maternity unit level and if possible at national level, using the Robson classification (1-3). Robson classification offers multiple advantages: easy to use, based on basic obstetric information, pragmatic and reproducible.

In France, this classification was previously used to analyze the stabilization of the CD rate at the beginning of the 2000's (4). Indeed, the national rate of CD was 19.7% in 2003 and 20.5% in 2010. The analysis of the recent 2016 French perinatal survey, demonstrated a persistent stabilization of this rate with a CD rate of 19.5% (5, 6).

In France, as in many other countries, College of Gynaecologists and Obstetricians (CNGOF) and National health agencies, such as Haute Autorité de Santé (HAS), publish national guidelines on several themes. French national guidelines on indications of pre-labor cesarean delivery and management of women with a previous cesarean delivery (CD) were published in 2012 (7, 8). These recommended in most situations to favor a trial of labor.

Our objective was to assess the impact of these guidelines on the global CD rate in France and the CD rate in specific groups according to the Robson classification, comparing data from the national perinatal population-based surveys of 2010 and 2016, i.e. before and after implementation of these national guidelines.

2. Methods

The French national perinatal surveys were performed in 2010 and 2016 and had similar designs previously described (5). Data collection covered all births during one week, that is, all live born or stillborn children, at a gestational age of at least 22 weeks or weighing at least 500 grams, in all French public and private maternity units. Data used in this analysis were collected from each woman's medical record and a face-to-face interview during the postpartum stay. The samples included 14681 women in 2010 and 13148 in 2016 in metropolitan France, and are representative of all births in France. The Robson classification considers basic items: parity, gestational age, number of fetuses, fetal presentation, mode of onset of labor, and previous caesarean delivery (1).

We first compared maternal characteristics (age, parity, previous caesarean, nationality, educational level, in vitro fertilization, BMI) and pregnancy characteristics (multiple pregnancy, onset of labor, premature delivery) between the 2 years.

Then, for each survey year, we calculated for each Robson group its relative size (as a percentage of the total population of women) and its specific caesarean rate, that is, the number of women with caesarean over the total number of women in the group. We also calculated each group's contribution to the overall caesarean rate as a percentage, that is, the number of women with a caesarean delivery in the group divided by the total population of women. We compared for each group, its relative size, the CD rate and its contribution, between 2010 and 2016.

Finally, we explored women characteristics, complications of pregnancy, mode of onset of labor and indications of caesarean in groups with significant size changes or CD rate changes between 2010 and 2016. Complications of pregnancy studied were hypertension, diabetes and

suspected antenatal growth anomaly. Indications of pre-labor CD were: history of previous CD, non-reassuring fetal status, suspicion of macrosomia, placenta praevia and maternal disease. Indications of intrapartum CD were: labor dystocia, abnormal fetal heart rate (FHR) and combination of both indications. Since several CD indications were reported, we analyzed only the main indication. We also analyzed the timing of the caesarean: before or during labor.

We used the Chi2 test for all the comparisons, using the Stata 13.0 software (StataCorp., College Station, TX, USA).

3. Results

All the study variables were available in the French national perinatal surveys for 14176 women (96.6%) in 2010 and 13057 (99.3%) in 2016. They composed our study population.

The maternal characteristics are described in Table 1. Women were older, had a higher educational level, a higher BMI and delivered more frequently prematurely in 2016 than in 2010.

There was a slight, but significant decrease of the global cesarean rate from 20.5% in 2010 to 19.5% in 2016 ($p=0.027$), with a lower rate of pre-labor CD in 2016 (10.9% versus 9.2%, $p<0.001$).

The details for each group of the Robson classification are reported in Table 2. There is no significant difference in the relative size, cesarean delivery rate and contribution between the two survey years for group 1 (*Nulliparous, singleton cephalic, ≥ 37 weeks, in spontaneous labor*), group 2a (*Nulliparous, singleton cephalic, ≥ 37 weeks, induced labor*), group 4a (*Multiparous (excluding previous CD), singleton cephalic, ≥ 37 weeks, induced labor*), group 4b (*Multiparous (excluding previous CD), singleton cephalic, ≥ 37 weeks, CD before labor*), group 6 (*All nulliparous breeches*), group 7 (*All multiparous breeches (including previous CD)*), group 8 (*All multiple pregnancies (including previous CD)*), group 9 (*All abnormal lies (including previous CD)*) and group 10 (*All singleton cephalic, ≤ 36 weeks (including previous CD)*).

Significant changes were observed for group 2b (*nulliparous, singleton, cephalic, term, pre-labor CD*), group 3 (*multiparous (excluding previous CD), singleton cephalic, ≥ 37 weeks, in spontaneous labor*) and group 5 (*previous CD, singleton cephalic, ≥ 37 weeks*).

3.1 Group 2 b (nulliparous, singleton, cephalic, term, CD before labor)

There was a significant decrease in its relative size: 1.1% in 2010 versus 0.8% in 2016 ($p=0.008$). This decrease lead to a significant decrease of its contribution to the global CD rate between 2010 and 2016. Comparing women's and pregnancy's characteristics between 2010 and 2016, we found no significant difference, except for maternal age with more women aged 35 or older in 2016 (Table 3). The distribution of the indications of cesarean did not change between 2010 and 2016. Maternal diseases remained the main cesarean indication; 27.6% in 2010 and 37.5% in 2016.

3.2 Group 3 (Multiparous (excluding previous CD), singleton cephalic, ≥ 37 weeks, in spontaneous labor)

There was an increase in its relative size (31.1% vs 32.2%, $p=0.03$) and a decrease of the CD rate (2.1% vs 1.5%, $p=0.04$), but no significant difference between the contribution of 2010 and 2016 (Table 1).

3.3 Group 4b (multiparous, singleton, cephalic, term, CD before labor)

There was no change in its relative size (0.7% vs 0.6%, $p=0.31$). Women in this group were more educated in 2016 than in 2010. The distribution of indications of CD before labor in this group differ between the two years with less cesarean indicated for maternal disease (Table 4).

3.4 Group 5 (Previous CD, singleton cephalic, ≥ 37 weeks)

This group was the highest contributor to the global caesarean rate in 2010 and 2016 (contribution: 5.8% of the 20.5% global CD rate in 2010 and 5.4% of the 19.5% CD rate in 2016, respectively). The CD rate significantly decreased between the 2 years (61.2% in 2010 versus 55.1% in 2016, $p=0.001$) (Table 1).

Except for BMI, with more women with a BMI ≥ 25 kg/m² in 2016, we found no differences in the women's and pregnancy's characteristics between 2010 and 2016 (Table 5). The proportion of women with a history of two or more caesareans was similar between the two survey years (18.7% versus 17.3%, $p=0.36$). The mode of onset of labor was significantly different between 2010 and 2016 with more spontaneous and induced labors and less pre-labor caesarean deliveries (42.7%, 8.4%, 48.8% in 2010 versus 49.6%, 11.6%, 38.8% in 2016, respectively, $p<0.001$). The rate of intrapartum caesarean delivery increased from 20.3% in 2010 to 29.0% in 2016 ($p<0.001$). The distribution of the indications of caesarean before labor varied between 2010 and 2016 ($p<0.001$). The rate of women having a pre-labor CD indicated for only one previous CD was lower in 2016 (44.6% versus 33.8%). The distribution of the indications of caesarean during labor did not significantly change between 2010 and 2016.

4. Discussion

While maternal characteristics were less favorable in 2016 compared to 2010, with more advanced age and obese women, the global CD rate slightly but significantly decreased in France (5). The analysis of cesarean rates using the Robson classification between 2010 and 2016 demonstrated that the main changes occurred in group 2b women, i.e. nulliparous with a term singleton fetus, who had a pre-labor cesarean and group 5, i.e. multiparous with previous CD and a term singleton fetus. The results concerning pre-labor cesarean delivery and women with a previous CD could reflect the impact of the national guidelines published in 2012, between the two survey years.

Our study has several strengths. The samples from the French national perinatal surveys are large, population-based and representative of national practices (9). As recommended by international guidelines, we used the Robson classification, which is a simple, useful and reproducible tool to monitor caesarean rates (2). The Robson classification allows to identify target groups to explore, but does not allow the investigation of why the CD rates decrease or increase. The French national perinatal surveys data are different from routine data, because they are collected by midwives from the medical file of each woman and include a large range of variables on socio-demographic, pregnancy, obstetric characteristics, especially the timing of caesarean sections and their indications. These data are, thus, not only exhaustive, but also reliable. We also could investigate women' characteristics, caesarean timing and indications in groups 2b (*nulliparous, singleton, cephalic, term, pre-labor CD*) and 5 (*Previous CD, singleton cephalic, ≥ 37 weeks*). However, we cannot exclude a lack of statistical power due to the sample size in subgroups like group 4b (*multiparous, singleton, cephalic, term, pre-labor CD*). In addition, we could not analyze the impact of the decrease CD rate on severe adverse maternal and neonatal outcomes, such as uterine rupture. It is known that in case of

previous cesarean delivery, induction of labor and intrapartum CD is more frequently associated with uterine rupture than pre-labor CD (10, 11).

In group 2b, there was a significant decrease of the relative size, without consequences on the CD rates of groups 1 and 2a. Although the distribution of CD indications is not significantly different between the 2 years, we noted less caesarean for abnormal pelvis and more caesareans for maternal disease in 2016. Except for very specific clinical situations, such as bone diseases, a suspected abnormal pelvis should not be an indication of planned CD in term nulliparous women with a cephalic fetus (12). The main indication for caesarean in this group remains maternal disease, slightly more frequent in 2016 than in 2010, which could be explained by an increased proportion of women of 35 years old and more. The HAS guidelines published in 2012 restricted medical indications for planned cesarean delivery (8). Thus, the observed changes in indications of CD between 2010 and 2016 are concordant with the national guidelines.

In group 4b, we observed a change in the distribution of indication of cesarean before labor, with less CD for maternal disease. Inclusion of previous myomectomy in this category could partly explain this decrease between the two years. Indeed, the experts of the French guidelines decided that TOLAC is possible for women with a history of myomectomy (7). It seems that vaginal birth after myomectomy is possible with a success rate similar to vaginal birth after cesarean section (13).

Similarly, in group 5, the significant decrease of the CD rate seems to reflect the opinion of the 2012 CNGOF national recommendation experts who were very supportive of trial of labors after cesarean especially for women with only one previous caesarean delivery. Indeed, previous unique caesarean delivery, which was the first indication for pre-labor caesarean delivery in 2010 became the second in 2016. French guidelines consider vaginal birth as an

option in women with two previous CD, but with a low level of evidence. Comparing with European countries, CD rate among group 5 was low (6). However, because of the large and continuing to increase size of group 5, it remains in 2016, the largest contributor to the overall CD rate. It is now necessary to focus on the size of this group, by decreasing the rate of primary caesarean delivery among nulliparous women, especially in groups 1 and 2a, which are, after group 5 and as shown in other international publications, the two largest contributors to the overall caesarean delivery rate (14-16). We can expect that the national guidelines concerning the use of oxytocin during labor among spontaneous laboring women published in 2017 by the National College of French Midwives (CNSF) and the French College of Gynecologists and Obstetricians (CNGOF) (17), and those concerning the management of normal labors and deliveries published in 2018 by the Haute Autorité de Santé (HAS) (18) have an impact on the cesarean rate in group 1. It will be interesting to analyze these trends using the data from the next French Perinatal Survey, planned in 2021.

The CNGOF published in 2011, guidelines for the management of twin pregnancies and their delivery. In these guidelines, the delivery route was left to the appreciation of the physician, without strong recommendation in favor of attempted vaginal birth (19). That maybe explain the stabilization of the cesarean rate among group 8. The new recent publications on this subject, an international randomized trial (20) and a French national cohort study (21) , both conclude that vaginal birth is as safe as planned CD for twins. When major results like these are published, it seems necessary to produce new recommendations or to be able to update the national guidelines.

5. Conclusion

National guidelines could have positively influenced the national cesarean delivery rate. In France, the rate of nulliparous women with a term singleton fetus having a pre-labor CD and the rate of CD among women with previous CD and a term singleton fetus decreased between 2010 and 2016, in line with the French national guidelines published in 2012. Publication of national guidelines can help mode of delivery decision-making of physicians, and impact the CD rate at the national level.

Conflict of interest: The authors report no conflict of interest.

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Table 1: Characteristics of women and pregnancies in 2010 and 2016

	2010 (%) N = 14 176	2016 (%) N = 13 057	p
Age (years)			<0.001
<20	349 (2.5)	256 (2.0)	
20-24	2056 (14.6)	1555 (11.9)	
25-29	4664 (33.2)	4071 (31.2)	
30-34	4293 (30.6)	4392 (33.7)	
35-39	2196 (15.6)	2251 (17.2)	
≥40	490 (3.5)	526 (4.0)	
	N=14 048	N=13 051	
Parity and previous caesarean			0.08
Nulliparous	6204 (43.9)	5542 (42.5)	
Multiparous without caesarean	6393 (45.3)	6032 (46.2)	
Multiparous with caesarean	1524 (10.8)	1481 (11.3)	
	N=14 121	N=13 055	
Foreign nationality	1814 (13.2)	1643 (14.1)	0.06
	N=13 708	N=11 685	
Educational level			<0.001
Middle school or less	3830 (28.1)	2664 (22.9)	
High school	2713 (19.9)	2505 (21.6)	
Beyond high school	7106 (52.0)	6442 (55.5)	
	N=13 649	N=11 611	
In vitro fertilization	314 (2.4)	387 (3.3)	<0.001
	N=13 287	N=11 652	
BMI (kg/m²)			<0.001
<18.5	1073 (8.2)	860 (7.4)	
18.5-24.9	8497 (64.6)	7020 (60.8)	
25.0-29.9	2281 (17.4)	2305 (20.0)	
30.0 or more	1299 (9.9)	1358 (11.8)	
	N=13 150	N=11 543	
Multiple pregnancy	220 (1.6)	235 (1.8)	0.11
	N=14 176	N=13 057	
Onset of labour			<0.001
Spontaneous	9397 (66.3)	8909 (68.3)	
Induced	3223 (22.8)	2941 (22.5)	
Caesarean	1549 (10.9)	1204 (9.2)	
	N=14 169	N=13 054	
Delivery before 37 weeks	977 (6.9)	981 (7.5)	0.05
	N=14 175	N=13 055	

Table 2: Trends in the relative size, the caesarean, and the contribution of each group in Robson's classification between 2010 et 2016

	2010				2016				Comparison 2010 and 2016		
	Number of CD/ all women	Relative size (%)	CD rate (%)	Contribution (%)	Number of CD/ all women	Relative size (%)	CD rate (%)	Contribution (%)	relative size p	CD rate p	contribution p
Group 1: Nulliparous, singleton cephalic, ≥ 37 weeks, in spontaneous labour	403/3795	26.8	10.6	2.8	359/3409	26.1	10.5	2.8	0.22	0.9	0.64
Group 2a: Nulliparous, singleton cephalic, ≥ 37 weeks, induced labour	401/1473	10.4	27.2	2.8	383/1309	10	29.3	2.9	0.32	0.23	0.61
Group 2b: Nulliparous, singleton cephalic, ≥ 37 weeks, CD before labour	155/155	1.1	100.0	1.1	102/102	0.8	100.0	0.8	0.008	-	0.008
Group 3: Multiparous (excluding previous CD), singleton cephalic, ≥ 37 weeks, in spontaneous labour	93/4393	31.0	2.1	0.7	64/4209	32.2	1.5	0.5	0.03	0.04	0.07
Group 4a: Multiparous (excluding previous CD), singleton cephalic, ≥ 37 weeks, induced labour	98/1324	9.3	7.4	0.7	94/1172	9.0	8.0	0.7	0.3	0.56	0.78
Group 4b: Multiparous (excluding previous CD). singleton cephalic, ≥ 37 weeks, CD before labour	94/94	0.7	100.0	0.7	74/74	0.6	100.0	0.6	0.31	-	0.31
Group 5: Previous CD, singleton cephalic, ≥ 37 weeks	817/1334	9.4	61.2	5.8	703/1276	9.8	55.1	5.4	0.31	0.001	0.17
Group 6: All nulliparous breeches	243/295	2.1	82.4	1.7	208/269	2.1	77.3	1.6	0.90	0.13	0.43
Group 7: All multiparous breeches (including previous CD)	177/259	1.8	68.3	1.2	163/223	1.7	73.1	1.2	0.46	0.25	0.99
Group 8: All multiple pregnancies (including previous CD)	124/220	1.6	56.4	0.9	126/235	1.8	53.6	1.0	0.11	0.56	0.44
Group 9: All abnormal lies (including previous CD)	61/72	0.5	84.7	0.4	55/63	0.5	87.3	0.4	0.77	0.67	0.91
Group 10: All singleton cephalic, ≤ 36 weeks (including previous CD)	242/762	5.4	31.8	1.7	207/716	5.5	28.9	1.6	0.69	0.23	0.43
Total	2908/14176			20.5	2538/13057			19.5		0.027	

Table 3: Group 2b: comparison of characteristics of women and cesarean indications between 2010 and 2016

	Group 2b Nulliparous, singleton cephalic, ≥ 37 weeks, CD before labour		p
	2010 N=155 n (%)	2016 N=102 n (%)	
Age (years)			0.03
<20	1 (0.7)	6 (5.9)	
20-24	26 (16.9)	8 (7.8)	
25-29	53 (34.4)	32 (31.4)	
30-34	47 (30.5)	31 (30.4)	
35-39	19 (12.3)	15 (14.7)	
≥ 40	8 (5.2)	10 (9.8)	
	N=154	N=102	
Foreign nationality	23 (15.3)	14 (16.3)	0.85
	N=150	N=86	
Educational level			0.44
Middle school or less	28 (18.4)	13 (15.1)	
High school	36 (23.7)	16 (18.6)	
Beyond high school	88 (57.9)	57 (66.3)	
	N=152	N=86	
In vitro fertilization	11 (7.6)	12 (14.1)	0.11
	N=144	N=85	
BMI (kg/m^2)			0.63
<18.5	8 (5.4)	8 (9.5)	
18.5-24.9	96 (64.9)	55 (65.5)	
25.0-29.9	25 (16.9)	12 (14.3)	
30.0 or more	19 (12.8)	9 (10.7)	
	N=148	N=84	
<u>HTA-High blood pressure</u> during pregnancy	18 (11.7)	8 (8.3)	0.37
	N=154	N=97	
Gestational diabetes	25 (16.7)	13 (13.3)	0.53
	N=150	N=98	
Suspected antenatal growth anomaly			0.17
No	127 (81.9)	70 (72.2)	
Growth restriction	7 (4.5)	8 (8.3)	
Macrosomia	21 (13.6)	19 (19.6)	
	N=155	N=97	
Indication of caesarean delivery			0.57
Non-reassuring fetal status	37 (25.2)	17 (21.2)	
Suspicion of macrosomia	28 (19.3)	13 (16.3)	
Placenta praevia	9 (6.2)	8 (10.0)	

Maternal disease	40 (27.6)	30 (37.5)
Abnormal pelvis	25 (17.2)	6 (7.5)
No medical indication	3 (2.1)	4 (5.0)
Other	3 (2.1)	2 (2.5)
	N=145	N=80

Table 4: Group 4b: comparison of characteristics of women and cesarean indications between 2010 and 2016

	Group 4b		
	Multiparous (excluding previous CD), singleton cephalic, \geq 37 weeks, CD before labor		
	2010	2016	p
	N=94 n (%)	N=74 n (%)	
Age (years)			0.68
<20	0 (0.0)	0 (0.0)	
20-24	7 (7.4)	3 (4.1)	
25-29	18 (19.2)	20 (27.0)	
30-34	30 (31.9)	22 (29.7)	
35-39	30 (31.9)	24 (32.4)	
≥ 40	9 (9.6)	5 (6.8)	
	N=94	N=74	
Foreign nationality	13 (14.0)	7 (11.1)	0.60
	N=93	N=63	
Educational level			<0.001
Middle school or less	35 (39.3)	10 (16.3)	
High school	13 (14.6)	14 (22.6)	
Beyond high school	41 (46.1)	38 (61.3)	
	N=89	N=62	
In vitro fertilization	3 (3.3)	4 (6.3)	0.45
	N=90	N=63	
BMI (kg/m²)			0.24
<18.5	5 (5.6)	4 (6.6)	
18.5-24.9	47 (52.8)	32 (52.5)	

25.0-29.9	14 (115.7)	16 (26.2)	
30.0 or more	23 (25.8)	9 (14.7)	
	N=89	N=61	
High blood pressure during pregnancy	6 (6.5)	2 (2.9)	0.47
	N=92	N=68	
Gestational diabetes	19 (20.9)	15 (22.1)	0.86
	N=91	N=68	
Suspected antenatal growth anomaly			0.40
No	75 (81.5)	49 (72.0)	
Growth restriction	3 (3.3)	4 (5.9)	
Macrosomia	14 (15.2)	15 (22.1)	
	N=92	N=68	
Indication of caesarean delivery			0.005
Non-reassuring fetal status	10 (11.6)	17 (27.9)	
Suspicion of macrosomia	6 (7.0)	5 (8.2)	
Placenta previa	13 (15.1)	9 (14.8)	
Maternal disease	42 (48.8)	13 (21.3)	
History of complicated delivery or other	15 (17.4)	17 (27.9)	
	N=86	N=61	

Table 54: Group 5: comparison of characteristics of women and cesarean indications between 2010 and 2016

	Group 5		
	Previous CD, single cephalic, ≥ 37 weeks		
	2010 (%)	2016 (%)	p
Among all women	N = 1334	N= 1276	
Age (years)			0.55
<20	3 (0.2)	3 (0.2)	
20-24	73 (5.5)	70 (5.5)	
25-29	350 (26.4)	297 (23.3)	
30-34	478 (36.1)	487 (38.2)	
35-39	349 (26.3)	340 (26.7)	
≥ 40	72 (5.4)	79 (6.2)	
	<i>N=1325</i>	<i>N=1276</i>	
Foreign nationality	218 (16.8)	200 (17.4)	0.69
	<i>N=1301</i>	<i>N=1152</i>	
Educational level			0.15
Middle school or less	410 (31.8)	323 (28.2)	
High school	266 (20.6)	254 (22.1)	
Beyond high school	615 (47.6)	570 (49.7)	
	<i>N=1291</i>	<i>N=1147</i>	
In vitro fertilization	19 (1.5)	23 (2.0)	0.35
	<i>N=1264</i>	<i>N=1149</i>	
BMI (kg/m^2)			0.0125
<18.5	62 (5.0)	52 (4.6)	
18.5-24.9	721 (57.5)	581 (51.4)	
25.0-29.9	272 (21.7)	279 (24.7)	
30.0 or more	198 (15.8)	219 (19.4)	
	<i>N=1253</i>	<i>N=1131</i>	
History of 2 caesareans or more	249 (18.7)	215 (17.3)	0.36
	<i>N=1334</i>	<i>N=1244</i>	
Onset of labour			<0.001
Spontaneous	568 (42.7)	617 (49.6)	
Induced	112 (8.4)	144 (11.6)	
Caesarean	649 (48.8)	482 (38.8)	
	<i>N=1329</i>	<i>N=1243</i>	
Among women having a CD	N = 817	N = 703	<0.001
Indications of CD before labor			<0.001
One previous caesarean	289 (44.6)	154 (33.8)	
Two or more previous caesarean	209 (32.2)	191 (42.0)	
Non-reassuring fetal status	24 (3.7)	29 (6.4)	
Suspicion of macrosomia	64 (9.9)	34 (7.5)	
Placenta praevia	5 (0.8)	2 (0.4)	
Maternal disease	57 (8.8)	45 (9.9)	

<i>Missing</i>	<i>1</i>	<i>42</i>	
Indications of CD during labor			0.66
Labor dystocia	60 (36.4)	76 (40.0)	
Abnormal FHR	47 (28.5)	43 (22.6)	
Labor dystocia and Abnormal FHR	32 (19.4)	39 (20.5)	
Maternal indication	26 (15.8)	32 (16.8)	
<i>Missing</i>	<i>0</i>	<i>15</i>	