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Caesarean section rates in immigrant and native women in Spain: the importance of geographical origin and type of hospital for delivery

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Background: Spain has become a principal destination for immigrants and delivery is the major reason for hospitalization in this population. However, research about inequities between native and immigrant women regarding the quality of the care received during pregnancy and delivery is still scarce. One of the indicators used to evaluate the quality of the obstetric care is the rate of caesarean sections (CSs). **Methods:** A cross-sectional study of 215 379 single deliveries from Spanish and immigrant women from Latin America, East Europe and Maghreb was carried out in Spain in 2005–06. Prevalence of CS according to maternal and neonatal characteristics was calculated by geographical origin. Two associations were explored by means of multiple logistic regression analysis. First, the association between geographical origin and the risk of CS in public or private hospitals separately, and, second, the risk of CS for women from the same geographical origin depending on whether they delivered at public or private hospitals. **Results:** Overall, the risk of CS was lower for immigrants as a whole than for native women (odds ratio (OR) = 0.83 95% confidence interval (CI) = 0.80–0.85), but the risk varied markedly by area of origin, being higher for Latin Americans (OR = 1.09 95% CI = 1.05–1.13) and lower for East Europeans (OR = 0.61 95% CI = 0.57–0.66) and Maghrebians (OR = 0.60 95% CI = 0.57–0.63). Public hospitals followed the overall pattern of risk. CS risk was higher in private than in public hospitals for all groups. However, the increase in risk was higher for immigrant than for natives. Conclusion: Immigrants in Spain are a heterogeneous population regarding the risk of CS. Geographical origin and type of hospital are key aspects underlying such a risk.

Keywords: Caesarean section, immigrants, obstetric care quality

Introduction

During the last decade, Spain has become a new destination for migrant populations. A resulting change from this migratory process has been the progressive increase in births from immigrant mothers that begin or continue their reproductive live after migration. Catalonia and Valencia are among the Spanish regions with the highest proportion of deliveries (22% on average) from immigrant mothers. Currently, these two regions concentrate about 36% of all the annual births from immigrant women in Spain.[1]

In developed countries, trends in reproductive and perinatal outcomes in immigrant women are viewed as key indicators to identify potential needs and inequities in access to and quality of the health care.[2,3] Research about such indicators and other indicators of care is still scarce in Spain as compared to other European countries with longer tradition as migrant receptors. Nevertheless, recent studies have shown that the main groups of immigrant women in Spain have a higher perinatal mortality than natives and roughly similar preterm rates. However, low birthweight rates were lower in women from Latin America and Maghreb.[4,5]

One of the indicators used to evaluate the quality of the obstetric care in any population is the rate of caesarean sections (CSs). In developed countries, the safety of this surgical procedure is taken for granted. Nevertheless, CSs are still associated to a higher risk of mortality and morbidity than vaginal births[6–8] and its growing rate in several countries does not seem to be justified by medical or obstetrical indications.[9–13] In this respect, the Spanish Ministry of Health, faced with a steady increase in the annual rate of CS recommends to reduce this practice.[14]

Research comparing CS risks in native and immigrant populations carried out in several European countries has produced unequal results. Several studies have reported that CS was more frequent among most immigrant groups than among natives,[15–18] and in particular among Latin American and sub-Saharan women. Another found no difference,[19] but immigrants were considered as a whole entity and not classified by area of origin, while most of the studies revealed

that some ethnic groups (mainly from Northern Africa and Eastern Europe) had a lower prevalence than natives.[15,18,20] These differences may be due to the ethnical heterogeneity of the immigrant populations living in the different European countries, to the coverage of its health-care systems and also to differences in data collection and in the population included as migrants. In this last-mentioned regard, it is worth mentioning that the Spanish National Health Care System has a regional structure and its coverage is almost universal (99.5%). It is mainly financed by taxes and all health services are free at the point of use. Private health insurance is not very extended and only around 15% of the population is covered by private schemes. It is to be noted that even irregular (undocumented) immigrants are also entitled to public health care since 2000, when the government passed a law entitling irregular immigrants to health care if they accomplished one of the following conditions: registration with their municipal census (which has no implication on their irregular status), visiting an emergency room, being less than 18 years old or being pregnant.

Several studies have found a higher prevalence of CS in private than in public hospitals,[9,18,21–23] adjusting by maternal age, parity, obstetric risk, education or social class. However, to our knowledge, there has been only one study that has specifically looked at the differences in CS rates between private and public hospitals differentiating natives from immigrants (as a whole) whenever possible.[9] In this particular study, it was found that in public hospitals the rate of CS delivery among Greek women doubled that of immigrants. No immigrant women delivered at the private hospital.

Thus, the aim of our study was to compare, in both public and private hospitals, the risk of CS in native women of Catalonia and Valencia with that in the three major immigrant groups living in those regions, namely women from Latin America, Maghreb and East Europe.

Methods

Data sources

In Spain, data about mode of delivery are not recorded in the National Vital Statistics Registry. However, the Congenital Metabolic Diseases Registries set up in some Regions, with coverage similar to the National Vital Statistics Registry (100% of all births registered), record information supplied by the hospitals and maternity centres on all births occurring in their regions. They collect information about mode of delivery (vaginal or caesarean) as well as about type of hospital for delivery (public or private), maternal age, country of origin of the mother (as reported by themselves), sex of the newborn, gestational age and weight of the neonates. For the last two variables, the information is more accurate and reliable than in the National Registry, since it is generally recorded by midwives based on hospital records and not supplied by the father or relative as is the case in the National Registry.[24]

Design and study population

A cross-sectional study was carried out using single births data from native and immigrant women that had both type of hospital and area of origin recorded during 2005 and 2006 at the Congenital Metabolic Diseases Registries of Catalonia and Valencia.

Variables

Area of origin was classified as native or as immigrant from Latin America (all countries of Central and Southern America), Maghreb (Morocco, Algeria, Tunisia, Libya and Mauretania) and East Europe (Albania, Bulgaria, Croatia, Hungary, Poland, Czech Republic, Romania, Russia and Ukraine). The place of delivery was coded as public or private hospital. Maternal age, defined as age of the mother at delivery, was divided into three categories (<20, 20–34 or ≥35 years of age). Gestational age was also divided into three categories (<37, 37–41 or ≥42 weeks). Birth weight was classified into three categories (<2500, 2500–3999 and ≥4000 g). It was not possible to differentiate between elective or acute CS. Since a high correlation between birthweight and gestational age was observed, and therefore including both variables in regression models could lead to unstable estimations due to colinearity, we created a third variable. This variable had 16 categories resulting from all possible combinations of birthweight and gestational age categories (<2500 g and <37 weeks, <2500 g and 37–41 weeks, <2500 g and ≥42 weeks, etc.), including combinations of unknown weight and/or age.

Statistical analysis

The proportion of deliveries and the prevalence of CS by geographical origin according to maternal (age of mother) and neonatal (gestational age, birthweight and sex) characteristics, and type of hospital were assessed using chi-square tests.

The association between the region of origin of the women and the risk of CS was assessed separately for public and private hospitals and for both together, using simple and multiple logistic regression analyses to calculate both crudes (cOR) and adjusted odds ratios (aOR) as well as their respective 95% confidence intervals (CI). For these analyses, the reference group was the native women. The variables included in all models were maternal age, sex and the combined variable of birthweight and gestational age.

Finally, we also performed other multiple logistic regression analyses adjusted for the above-mentioned variables in order to explore the risk of CS for women of the same geographical origin depending on whether they delivered at public or private hospitals. Possible interactions between area of origin and age of the mother as well as between mother's area of origin and the variable resulting from the combination of birth weight and gestational age categories were also checked.

Statistical analysis was conducted using Stata 9.2. statistical software.

Results

Among the 246 068 single births registered during the period of study, 73.4% belonged to native mothers, 14.1% to immigrants from Latin America, Maghreb and East Europe, 4.0% to other foreign mothers (European Union, sub-Sahara, etc.) and 8.7% were of unknown origin or type of hospital. Thus, the number of single births finally included was 215 379.

Type of delivery and type of hospital data were missing for the 2.9% and 0.4% of births, respectively. Sex and maternal age were unknown for 3.8% and 3.4% of births, respectively. Regarding gestational age and birthweight, no information was available for 3.3% and 1.4% of births.

Table 1 describes the distribution of singleton births by type of hospital, maternal and neonatal characteristics by area of origin. The proportion of single birth deliveries in private hospitals was much higher in native (26.2%) than in immigrants as a whole (4.0%), ranging in this latter group from 0.5% in Maghrebian to 6.4% in Latin American women.

Significant differences in maternal age between native and all immigrant groups were found. While the proportion of births in the <20 years age group was 1.5% in native women, it ranged from 5.4% to 6.9% in immigrant groups.

Table 1 Singleton births by type of hospital, maternal and neonatal characteristics by mother's area of origin

	Spain *n* = 180 633[a] *n* (%)	Immigrant *n* = 34 746[a] *n* (%)	Latin America *n* = 16 232[a] *n* (%)	East Europe *n* = 6785[a] *n* (%)	Maghreb *n* = 11 729[a] *n* (%)
Hospital		[b]	[b]	[b]	[b]
Public	133 404 (73.8)	33 364 (96.0)	15 186 (93.6)	6511 (96.0)	11 667 (99.5)
Private	47 229 (26.2)	1382 (4.0)	1046 (6.4)	274 (4.0)	62 (0.53)
Maternal age		[b]	[b]	[b]	[b]
<20	2623 (1.5)	1959 (5.8)	867 (5.4)	454 (6.9)	638 (5.6)
20–34	125 807 (72.2)	26 762 (78.8)	12 393 (77.5)	5502 (83.5)	8867 (77.9)
≥35	45 818 (26.3)	5244 (15.4)	2736 (17.1)	631 (9.6)	1877 (16.5)
Gestational age		[b]	[b]	[b]	[b]
<37	10 547 (6.0)	2032 (6.1)	935 (6.0)	488 (7.7)	609 (5.4)
37–41	160 892 (91.7)	29 889 (90.2)	14 209 (91.0)	5671(89.3)	10 009 (89.5)
≥42	3984 (2.3)	1228 (3.7)	463 (3.0)	193 (3.0)	572 (5.1)
Birthweight		[b]	[b]	[b]	[b]
<2500	10 484 (5.9)	1505 (4.4)	693 (4.3)	384 (5.7)	428 (3.7)
2500–3999	159 560 (89.4)	29 420 (86.0)	13 885 (86.9)	5704 (86.0)	9831 (84.8)
≥4000	8331 (4.7)	3285 (9.6)	1405 (8.8)	548 (8.3)	1332 (11.5)
Sex					
Male	88 940 (51.5)	17 751 (51.8)	8320 (51.9)	3499 (52.1)	5932 (51.4)
Female	83 907 (48.5)	16 536 (48.2)	7712 (48.1)	3212 (47.9)	5612 (48.6)

a: Figures do not add up because of missing values
b: Differences between group and Spanish statistically significant $P < 0.05$

Table 2 Number (*n*) and prevalence (%) of caesarean sections by type of hospital, maternal and neonatal characteristics by mother's area of origin

	Spain *n* (%)	Immigrant *n* (%)	Latin America *n* (%)	East Europe *n* (%)	Maghreb *n* (%)
Hospital					
Public	30 861 (23.8)	6716 (20.8)[a]	3815 (25.8)[a]	1007 (16.0)[a]	1894 (16.9)[a]
Private	16 926 (36.9)	575 (42.7)[a]	465 (45.2)[a]	83 (32.1)[a]	27 (45.0)[a]
Overall	47 787 (27.2)	7291 (21.7)[a]	4280 (27.1)[a]	1090 (16.6)[a]	191 (17.1)[a]
Maternal age					
<20	391 (15.5)	240 (12.7)[a]	128 (15.1)[a]	54 (12.4)[a]	58 (9.49)[a]
20–34	31 824 (26.1)	5353 (20.7)[a]	3094 (25.7)[a]	874 (16.3)[a]	1385 (16.3)[a]
≥35	14 398 (32.2)	1548 (30.4)[a]	998 (37.3)[a]	131 (21.6)[a]	419 (23.1)[a]
Gestational age					
<37	3995 (38.8)	660 (33.2)[a]	369 (40.0)[a]	112 (23.4)[a]	179 (30.3)[a]
37–41	41 348 (26.4)	5987 (20.7)[a]	3569 (25.8)[a]	884 (16.1)[a]	1534 (15.9)[a]
≥42	1208 (31.2)	346 (29.1)[a]	176 (38.9)[a]	39 (20.7)[a]	131 (23.9)[a]
Birthweight					
<2500	4081 (39.8)	555 (37.8)[a]	310 (45.5)[a]	105 (27.9)[a]	140 (33.9)[a]
2500–3999	40 173 (25.9)	5617 (19.7)[a]	3360 (24.8)[a]	816 (14.7)[a]	1441 (15.3)[a]
≥4000	2985 (36.8)	1013 (31.8)[a]	555 (40.5)[a]	135 (25.4)[a]	323 (25.1)[a]
Sex					
Male	24 414 (28.3)	3959 (23.1)[a]	2340 (28.9)[a]	578 (17.1)[a]	1041 (18.3)[a]
Female	21 108 (25.9)	3239 (20.3)[a]	1886 (25.2)[a]	501 (16.2)[a]	852 (15.8)[a]

a: Significantly different from the native group, chi-square tests, $P < 0.05$. Statistical significance for bold values was always < 0.001

The proportion of births in women of ≥35 years of age was remarkably higher in native (26.3%) than in immigrants (15.4%), ranging from 9.6% in Eastern Europe to 17.1% in Latin America.

The proportions of preterm births were roughly similar in natives and immigrants (6.0% vs. 6.1%) but the proportion of births with 42 or more weeks of gestational age was significantly higher among immigrants (3.7%) than natives (2.3%). There was a significantly higher proportion of low birthweight babies in native women (5.9%) than in immigrants as a whole (4.4%), and also a significant much lower proportion of births in the highest birthweight category (4.7% vs. 9.6%). Maghrebian women showed the highest proportion of births in the highest gestational age (5.1%) and birthweight (11.5%) categories. No differences by area of origin were found in the sex distribution of births.

Table 2 shows the number and prevalence of caesarean deliveries by type of hospital, maternal and neonatal characteristics in native and immigrant women.

There was a significantly higher prevalence of CS in natives (27.2%) than in immigrants as a whole (21.7%). However, women from Latin America showed similar rates to natives, while women from Eastern Europe and Maghreb experienced much lower rates (16.6% and 17.1%, respectively). In public hospitals, the prevalence of CS followed the overall pattern, while in private hospitals the prevalence was lower in natives (36.9%) than in immigrants (42.7%).

As table 2 shows, the CS prevalence increased with maternal age in all groups, and was significantly higher in natives than in immigrants for each age group. However, Latin American women had the same prevalence as natives in the two younger age groups, but significantly higher in the older age group.

In all groups, the prevalence of CS was higher in preterm and low birthweight babies and was higher in natives as compared to immigrants for each gestational age and birthweight categories, being significantly different in the first two categories of gestational age and the last two of birthweight. Again, as regards gestational age, Latin American women showed no difference to native women except for babies of 42 or more gestational weeks where the prevalence was significantly higher in the former group. The prevalence was also significantly higher among Latin American women for babies weighting less than 2500 or more than 4000 g. In all groups, the prevalence of CS was higher when the baby was a male.

cOR and aOR by maternal age, sex and a variable with combinations of birthweight and gestational age categories, for the overall data set and stratified by type of hospital, are shown in table 3. Taking together public and private hospitals, the odds of having a CS was lower among immigrants as a whole (OR = 0.83; 95% CI: 0.80–0.85). However, when the different areas of origin were considered, significant differences were found. While women from Latin America showed a higher odds than natives (OR = 1.09; 95% CI: 1.05–1.13), women from Maghreb and East Europe had significantly lower odds (OR = 0.61; 95% CI: 0.57–0.66 and OR = 0.60; 95% CI: 0.57–0.63, respectively). In public hospitals, the odds of having CS comparing immigrants with natives followed the pattern observed in the whole set of data, with a more marked effect upon Latin American women (OR = 1.21; 95% CI: 1.16–1.26). On the contrary, in private hospitals, there was a higher odds of CS for immigrant women as a whole, and the detailed comparison of native women with each immigrant group confirm a higher odds for mothers from Latin America (OR = 1.48; 95% CI: 1.30–1.68). Although statistically non-significant, women from Maghreb also showed higher odds than natives (OR = 1.36; 95% CI: 0.80–2.31), and Eastern Europeans lower odds (OR = 0.79; 95% CI: 0.61–1.04).

Age-stratified logistic models (data not shown) showed that the risk of CS followed the same trend seen in the non-stratified analysis, for all age groups and area of origin except for Latin American women. The higher risk observed in this group was specifically concentrated in the more than 35 age category (23% higher), while in the other two age categories the risk was similar to natives.

In women of the same ethnic group, the odds of CS was consistently higher in private than in public hospitals (table 4) but was more pronounced for all the groups of immigrant mothers than for natives.

None of the interaction terms included in the models was significant.

Discussion

In our study, the prevalence of CS increased with maternal age and was higher for preterm and low birthweight neonates. In public hospitals, the odds of CS for immigrant women was lower than in natives except for women from Latin American origin who had a slightly higher risk of CS. Age-stratified analysis revealed that the higher risk observed in this group compared to natives was limited to women $\geq$35 years of age. On the contrary, in private hospitals, it was higher for immigrants, with the only exception of women from Eastern Europe. For women of the same geographical origin, the odds of CS was higher in private than in public hospitals for both native and immigrant women, but greater for all groups of immigrant mothers.

There is evidence in the scientific literature about the increasing risk of CS with maternal age, preterm birth and low birthweight.[25] Our results confirm such a pattern in all the population groups. Our study agrees with the results of the only one study that looked at the differences in CS rates between private and public hospitals differentiating natives from immigrants, in the sense that the proportion of women having CS in public hospitals was lower among immigrants. Our results also agree with the pattern described in other countries that show higher risk of CS in Latin American mothers and lower ones in mothers from Maghreb or East Europe.[15,18,20]

The immigrant population living in Spain is not homogeneous and the different groups may have different needs as regards CS.

Focusing on Latin American women, they speak Spanish and arrived into Spain some years before the other groups, what makes them more familiar with the health-care system. Thus, one would expect quite similar CS rates to the native population (since language and access to the system are no barriers). This is what happens for women less than 35 years. Therefore, it can be assumed that there are no differences in care with native women and the prevalence of CS is similar to them and to other Western European countries. Latin

Table 3 Association between mother's area of origin and caesarean section by type of hospital

	All		Public		Private	
	cOR[a] (95% CI)	aOR[b] (95% CI)	cOR[a] (95% CI)	aOR[b] (95% CI)	cOR[a] (95% CI)	aOR[b] (95% CI)
Spain	**1**	**1**	**1**	**1**	**1**	**1**
Immigrants	**0.74 (0.72–0.76)**	**0.83 (0.80–0.85)**	**0.84 (0.82–0.87)**	**0.93 (0.90–0.95)**	**1.27 (1.14–1.42)**	**1.32 (1.18–1.47)**
Latin America	0.99 (0.96–1.03)	**1.09 (1.05–1.13)**	**1.12 (1.07–1.16)**	**1.21 (1.16–1.26)**	**1.41 (1.25–1.60)**	**1.48 (1.30–1.68)**
East Europe	**0.53 (0.50–0.57)**	**0.61 (0.57–0.66)**	**0.61 (0.57–0.65)**	**0.69 (0.64–0.74)**	0.81 (0.62–1.05)	0.79 (0.61–1.04)
Maghreb	**0.55 (0.52–0.58)**	**0.60 (0.57–0.63)**	**0.65 (0.62–0.69)**	**0.70 (0.67–0.74)**	1.40 (0.84–2.33)	1.36 (0.80–2.31)

a: Crude odds ratios

b: Odds ratios adjusted by maternal age, sex and a variable with combinations of birthweight and gestational age categories

Table 4 Risk of caesarean section in private vs. public hospitals by mother's area of origin

	Spain	Immigrants	Latin America	East Europe	Maghreb
Public hospital	1	1	1	1	1
Private hospital	1.85 (1.81–1.90)[a]	2.65 (2.36–2.96)	2.27 (1.99–2.59)[a]	2.24 (1.69–2.97)[a]	3.52 (2.06–6.03)[a]

a: Odds ratios adjusted by maternal age, sex and a variable with combinations of birthweight and gestational age categories

American women over 35 years have a higher risk than natives. While the registries did not inform about the number and the mode of delivery of previous births, it is well known that parity (a risk factor for CS) is higher in Latin American mothers, and also that many Latin American countries reach higher annual rates of CS than other countries, including Spain.[26–28] Many Latin American immigrants arriving into Spain have a history of previous pregnancies ending up in CS.[29] It could be that a substantial number of Spanish obstetricians would, in the absence of previous medical records, still routinely assign women to CS if they had reported previous caesarean deliveries.[30,31] On the contrary, many native women have their first baby around 35 years and thus no history of previous CS. This could explain the differences with natives in this age group.

As regards women from Maghreb and Eastern Europe, in spite of having CS rates close to what is theoretically advisable (WHO), they should have quite similar rates to natives and Latin Americans in public hospitals, unless their needs are different. This might be the case as it has consistently been shown in several studies that women from East Europe and Maghreb have the lowest rate of CS. However, both are recent immigrant groups and represent an important proportion of the undocumented population living in Spain. This situation, coupled with the language barriers and a different cultural conception of pregnancy, acts as a barrier to health care (physicians having difficulty in obtaining informed consent, difficulty in access to care) despite universal coverage of the Spanish Health System. In fact, studies carried out in Spain by our group have shown a high proportion of inadequate prenatal care in women from these two areas and a much higher stillbirth rate than in natives.[4] In this respect, several studies have shown that the CS rate is lower among women with inadequate prenatal care, as measured by the number of visits.[32,33] There is also some evidence that CS reduces stillbirth risk under certain circumstances.[34,35] This deserves further consideration in order to elucidate the potential contribution of a much lower CS rate to the much higher stillbirth rate in these two groups of immigrants as compared to natives. Therefore, it cannot be discarded that women from Maghreb and Eastern Europe living in Spain are delivering by CS at a lower rate than required.

Two other related factors associated with a higher risk of CS are to give birth in private hospitals and to belong to a high social class.[21–23] Our results confirm a higher rate of CS in private hospitals for both natives and immigrants. Several reasons have been advanced to explain this difference, among them a higher request of elective CS at private centers.[36]

The percentage of native women delivering in private hospitals was 26%, what would include also middle-class women. This percentage was only 4% in immigrant women. Since all pregnant women living in Spain (including undocumented immigrants) are entitled to free and universal coverage, those women attending private hospitals have, generally, a higher socioeconomic status than their compatriots attending public hospitals. In addition, it is likely that the difference in the average socioeconomic status between immigrant women attending public or private hospitals is higher than in natives. This might explain the higher increase in odds of CS experienced by immigrant women in private hospitals as compared to natives.

Our results cannot be attributed to selection bias since its strength lies in the size and validity of the population database used. However, our data only allowed for the adjustment of sex, maternal age, gestational age and birthweight. The influence of other variables, such as social class, differently distributed between native and immigrants and known to affect the risk of CS cannot be ruled out. Our database had also no details on induction or mode of CS (elective vs. emergency), which is related to both quality of prenatal care and perinatal outcomes. Women with adequate prenatal care are more likely to be placed on elective CS if it is required, than women with inadequate or no prenatal care for whom CS may have to be performed on an emergency basis. If data on CS mode were available, and its distribution would differ between native and immigrants groups, the results observed might be better explained in terms of quality of care.

Another potential source of bias could be an information bias resulting from the classification of the area of origin. However, this is unlikely since data were collected by midwives asking the women directly to state their country of origin.

Our results suggest that the strategy advocated by the Spanish Ministry of Health for the reduction of CS rates might imply, beyond a global reduction, divergent guidelines of action depending on the population groups considered. In this way, to promote vaginal delivery after CS might turn out to be an especially favourable measure to reduce the high rate of CS in Latin-American women. However, among women from Maghreb and East Europe, it is likely that better access to prenatal care carries an increase in medically indicated CS, which in turn might contribute to a reduction of their high perinatal mortality rates.

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Key points

- Studies in Europe comparing the risk of CS in native-born and immigrant women have produced mixed results, with higher or lower prevalence in immigrant women as a whole depending on the context.
- Our results show that both heterogeneity of the immigrant populations and type of hospital have to be considered. In Spanish public hospitals, Latin American women were at higher odds of CS than native-born women, and East-European and Maghrebian women at lower odds. In private hospitals, Latin American and Maghrebian women were at higher odds than native born and East-European at lower odds.
- For women of the same geographical origin, the odds of CS was higher in private than in public hospitals for both native and immigrant women, but greater for all groups of immigrant mothers.

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