

Variations in cesarean and repeated cesarean section rates in Brazil according to gestational age at birth and type of hospital

Variações das taxas de cesariana e cesariana recorrente no Brasil segundo idade gestacional ao nascer e tipo de hospital

Variaciones en las tasas de cesárea y de cesárea recorrente en Brasil según la edad gestacional al nacer y el tipo de hospital

Barbara Almeida Soares Dias ¹
Maria do Carmo Leal ²
Ana Paula Esteves-Pereira ³
Marcos Nakamura-Pereira ⁴

doi: 10.1590/0102-311XEN073621

Abstract

This study aimed to describe cesarean and repeated cesarean section rates in Brazil according to gestational age (GA) at birth and type of hospital. This is an ecologic study using data from the Brazilian Information System on Live Births and the 2017 National Registry of Health Facilities. Overall and repeated cesarean section rates were calculated and analyzed according to GA, region of residence, and type of hospital. Spearman correlations were performed between cesarean and repeated cesarean section rates by GA subgroups at birth (≤ 33 , 34-36, 37-38, 39-41, and ≥ 42 weeks) and analyzed according to the type of hospital. Overall and repeated cesarean section rates were 55.1% and 85.3%, respectively. More than 60% of newborns between 37-38 weeks were delivered via cesarean section. Private hospitals in all regions showed the highest cesarean section rates, especially those in the Central-West Region, with more than 80% at all GAs. The overall cesarean section rate was highly correlated with all cesarean section rates of GA subgroups ($r > 0.7$, $p < 0.01$). Regarding repeated cesarean sections, the overall rate was strongly correlated with the rates of 37-38 and 39-41 weeks in public/mixed hospitals, differing from private hospitals, which showed moderate correlations. This finding indicates the decision for cesarean section is not based on clinical factors, which can cause unnecessary damage to the health of both the mother and the baby. Then, changes in the delivery care model, strengthening public policies, and encouragement of vaginal delivery after a cesarean section in subsequent pregnancies are important strategies to reduce cesarean section rates in Brazil.

Cesarean Section; Vaginal Birth After Cesarean; Maternal and Child Health; Health Systems

Correspondence

B. A. S. Dias
Centro de Ciências da Saúde, Universidade Federal de Roraima.
Av. Ene Garcez 2413, Boa Vista, RR 69304-000, Brasil.
barbaraalmeida4@hotmail.com

¹ Centro de Ciências da Saúde, Universidade Federal de Roraima, Boa Vista, Brasil.

² Vice-Presidência de Ensino, Informação e Comunicação, Fundação Oswaldo Cruz, Rio de Janeiro, Brasil.

³ Escola Nacional de Saúde Pública Sergio Arouca, Fundação Oswaldo Cruz, Rio de Janeiro, Brasil.

⁴ Instituto Nacional de Saúde da Mulher, da Criança e do Adolescente Fernandes Figueira, Fundação Oswaldo Cruz, Rio de Janeiro, Brasil.



Introduction

In recent decades, cesarean section rates have significantly increased in all regions of the world, representing 21.1% of all live births. This increase is mainly related to a growing number of unnecessary cesarean sections in several middle- and high-income countries ¹. However, recent studies have reported stabilized or reduced cesarean section rates in the United States ^{2,3}, China ⁴, and some countries in Western Europe ⁵, while Latin American countries have the highest cesarean section rates, accounting for 44.3% of all births ¹.

Among Latin American countries, Brazil shows the second highest cesarean section rate in the world ¹, reaching 56.3% of all births in 2019 ⁶. In addition, the distribution of cesarean sections rates significantly varies across the country: higher rates are observed in more developed regions, in white women, aged 35 years or older, with a higher level of education ^{7,8,9}. Rates also vary with the type of hospital (public hospitals – funded by the federal government; mixed hospitals – funded by both the public and private sectors; and private hospitals), with higher rates reported in private hospitals, which also show a higher prevalence of late preterm (34-36 weeks) and early term newborns (37-38 weeks) when compared to public hospitals ^{10,11}.

Cesarean sections can save the mother and the baby when clinically recommended; however, cesarean section rates above 10% are not associated with reduced maternal and neonatal morbidity and mortality rates ¹². Scientific evidence shows that high cesarean section rates are associated with worse neonatal ^{13,14} and maternal ^{15,16} outcomes, higher chances of preterm and early term births ^{17,18}, and repeated cesarean sections ¹⁹.

Also, a cumulative effect is seen due to an excessive use of cesarean sections, that is, as cesarean section rates increase, more women will have a repeated cesarean section ¹⁹. According to the Pelotas Birth Cohort Study, 87.4% of repeated cesarean sections; however, among women with vaginal delivery in the first pregnancy, only 18.1% underwent cesarean section in the second pregnancy ²⁰. Repeated cesarean sections increase the risk of obstetric and postpartum complications ^{21,22}; therefore, clinical protocols recommend that women with previous cesarean section and low-transverse incision can undergo labor in subsequent gestations, as they are candidates for vaginal delivery after a cesarean section ²³.

Considering the heterogeneous distribution of cesarean section rates in the country and that women with previous cesarean section represent a large portion of these rates, our study aimed to describe cesarean section and repeated cesarean section rates in Brazil according to gestational age at birth and type of hospital.

Methods

Ecological study using data from the Brazilina Information System on Live Births (SINASC) and the Brazilian National Registry of Health Facilities (CNES), available at Brazilian Health Informatics Department (DATASUS) ⁶, and managed by the Brazilian Ministry of Health. Data from 2017 were selected due to data availability at the moment this study was conducted.

Women with one prior gestation, live newborn, and gestational age (GA) equal to or greater than 22 weeks were considered eligible for this study. In SINASC, since 2011 the GA has been estimated considering the first day of the last menstrual period (LMP). However, when the LMP is unknown, the GA is calculated by other methods, such as physical examination or ultrasonography ²⁴.

For the purposes of result presentation, GA was used continuously and categorized into: early preterm (≤ 33 weeks), late preterm (34-36 weeks), early term (37-38 weeks), term (39-41 weeks) and post-term (≥ 42 weeks) ^{25,26}. In addition, the following variables were selected: residence (North, Northeast, Southeast, South, or Central-West regions); maternal age (12-19 years, 20-34 years, ≥ 35 years); skin color (white, black, brown); mother's education level (incomplete elementary school, complete elementary school, high school or more); marital status (no partner, with a partner); and parity (primiparous, multiparous).

In our study, national and regional data about cesarean section and repeated cesarean section rates were analyzed according to hospital type and GA. First the SINASC and CNES databases were paired

to define the type of hospital (public, mixed, private) of health facilities included in SINASC, using the hospital code provided in both databases as a key variable. Then, public and mixed hospitals were joined to create a single category.

Then, cesarean section and repeated cesarean section rates were calculated. To calculate cesarean section rates, the number of newborns via cesarean section was divided by the total number of live births, multiplied by one hundred. For repeated cesarean section, we included in the numerator all multiparous women with current cesarean section and in the denominator the total number of women with previous cesarean section, multiplied by one hundred.

Then, overall and repeated cesarean section rates were characterized according to the variables extracted from SINASC and analyzed both in general and according to the type of hospital (public/mixed, private) and region of residence.

Finally, overall and repeated cesarean section rates were calculated for each health facility and analyzed according to the type of hospital and GA subgroups in order to increase data variability. Then, the Spearman correlation test was applied to analyze the correlations between: (a) the overall cesarean section rates and the cesarean section rates of GA subgroups; (b) the cesarean section rates of GA subgroups; (c) the overall cesarean section rates and the repeated cesarean section rates of GA subgroups; (d) the repeated cesarean section rates of GA subgroups.

Correlation values can vary from -1 to 1. A weak correlation was considered when $r = 0.10$ to 0.30 ; moderate correlation when $r = 0.40$ to 0.60 ; and strong correlation when $r = 0.70$ to 1.00 , adopting a confidence level lower than 5%²⁷. All analyses were performed using the SPSS version 21.0 (<https://www.ibm.com/>).

This study was approved by the Ethics Research Committee of Sergio Arouca National School of Public Health, Oswaldo Cruz Foundation (ENSP/Fiocruz; protocol n. 2.972.153).

Results

A total of 2,850,744 live births and 5,298 health facilities were considered eligible for this study. The overall cesarean section and repeated cesarean section rates corresponded to 55.1% and 85.3%, respectively, and were even higher in private hospitals, which accounted for 85% of cesarean sections and more than 95% of repeated cesarean sections.

The Central-West Region showed the highest overall and repeated cesarean section rates (62.3% and 88.4%). In addition, cesarean section rates were higher in white women, aged ≥ 35 years, with higher education, and with a partner. Regarding parity, 57% of cesarean sections occurred in primiparous women; however, high rates of cesarean sections were observed in private hospitals, particularly in multiparous women, reaching around 85%. More than 60% of births between 37-38 weeks were via cesarean section, followed by births between 34-36 weeks of gestation, which were mainly seen in private hospitals (Table 1).

The analysis of overall cesarean section rates in Brazil according to the type of hospital and GA (Figure 1) showed high rates of cesarean sections in all gestational weeks, particularly in private hospitals. Also, a small reduction in rates was observed as GA increased in public/mixed hospitals located in the Southeast and South regions; however, increased rates were observed at 38 weeks of gestation in both public/mixed and private hospitals of all regions.

The distribution of repeated cesarean section rates according to hospital type and gestational week (Figure 2) showed even higher rates in both hospital types, exceeding 90% in private hospitals. Despite the variations, the rates were mainly concentrated between 36 and 39 gestational weeks.

Table 2 shows the overall and repeated cesarean section rates in the regions of the country according to GA subgroups and type of hospital. Higher rates of overall and repeated cesarean section were observed in the 37-38 week subgroups for all regions and hospitals. Public/mixed hospitals in the North Region concentrated the lowest overall and repeated cesarean section rates in all GA subgroups analyzed, while the Central-West Region showed the highest rates of overall and repeated cesarean section in private hospitals, surpassing the rates reported at country level.

Regarding the correlations between overall and repeated cesarean section rates, in general the overall cesarean section rate was highly correlated with all cesarean section rates from the GA

Table 1

Characterization of cesarean section rates according to types of hospital. Brazil, 2017.

	Geral			Public/Mixed			Private		
	Live births (n)	Cesarean section rate (%)	Repeated cesarean section rate (%) *	Live births (n)	Cesarean section rate (%)	Repeated cesarean section rate (%) *	Live births (n)	Cesarean section rate (%)	Repeated cesarean section rate (%) *
Total	2,795,116	55.3	85.3	2,234,136	48.8	82.2	532,962	84.9	96.1
Region									
North	292,034	46.3	80.8	250,581	43.6	78.4	30,344	84.5	96.5
Northeast	770,025	50.0	84.8	672,444	45.3	82.4	92,182	86.5	96.8
Southeast	1,113,758	58.1	85.8	818,527	49.5	81.7	287,351	83.5	95.7
South	384,858	60.8	86.0	315,378	55.8	83.7	67,447	85.5	95.8
Central-West	234,441	62.3	88.4	177,206	54.2	85.0	55,638	89.6	96.9
Maternal age (years)									
**									
12-19	461,119	38.2	77.1	434,934	36.8	76.4	20,619	75.9	95.7
20-34	1,933,735	56.6	84.6	1,535,282	50.2	81.7	379,902	84.3	96.0
≥ 35	400,158	69.2	89.8	263,839	60.4	86.0	132,437	88.2	96.3
Skin color **									
White	986,872	66.0	88.8	672,361	57.2	85.2	309,057	85.8	95.9
Black	152,188	48.6	81.5	128,118	43.3	78.7	22,314	81.3	95.8
Brown	1,523,505	49.6	83.1	1,328,824	45.4	80.8	180,846	83.7	96.4
Yellow	11,487	56.4	87.1	7,458	44.4	80.9	3,957	79.6	95.0
Indigenous	23,236	20.1	62.2	16,393	26.2	63.2	554	66.2	88.2
Education **									
Incomplete elementary school	127,100	37.2	75.0	117,614	38.2	74.8	3,012	75.4	95.1
Complete elementary school	662,152	42.1	78.9	630,430	41.3	78.2	22,617	77.8	95.3
High school or more	1,958,674	61.1	88.1	1,443,817	53.0	84.5	503,647	85.3	96.1
Marital status **									
No partner	1,238,749	48.2	81.0	1,078,185	43.9	78.8	147,428	82.7	95.9
With a partner	1,528,226	61.2	88.0	1,131,696	53.6	84.7	382,181	85.8	96.1
Parity									
Primiparous	1,107,361	57.0	-	852,399	49.2	-	210,358	84.5	-
Multiparous	1,687,755	54.3	85.4	1,381,737	48.6	82.2	242,308	85.3	96.1
GA (weeks) **									
≤ 33	75,243	51.6	78.6	62,457	47.7	76.3	11,314	79.3	90.8
34-36	206,135	54.2	84.3	166,259	48.5	81.4	37,030	83.4	95.2
37-38	808,511	61.2	88.7	591,323	52.2	84.9	210,183	87.9	97.1
39-41	1,627,829	53.0	84.0	1,343,544	47.5	81.2	268,740	83.1	95.5
≥ 42	77,398	49.5	82.7	70,553	47.6	81.4	5,695	82.5	95.9

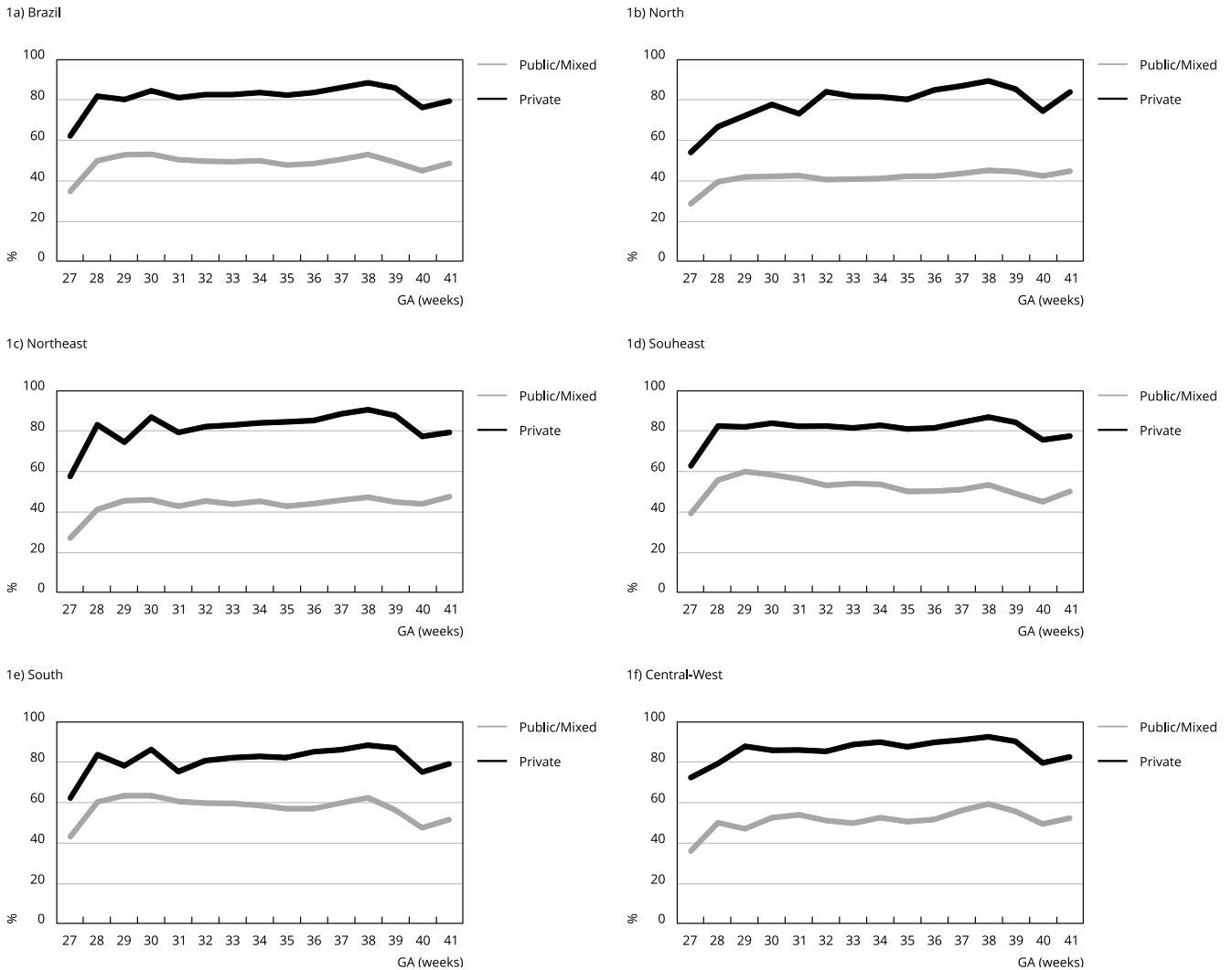
GA: gestational age.

* The repeated cesarean section rate was calculated considering the total number of multiparous women;

** Differences due to missing data.

Figure 1

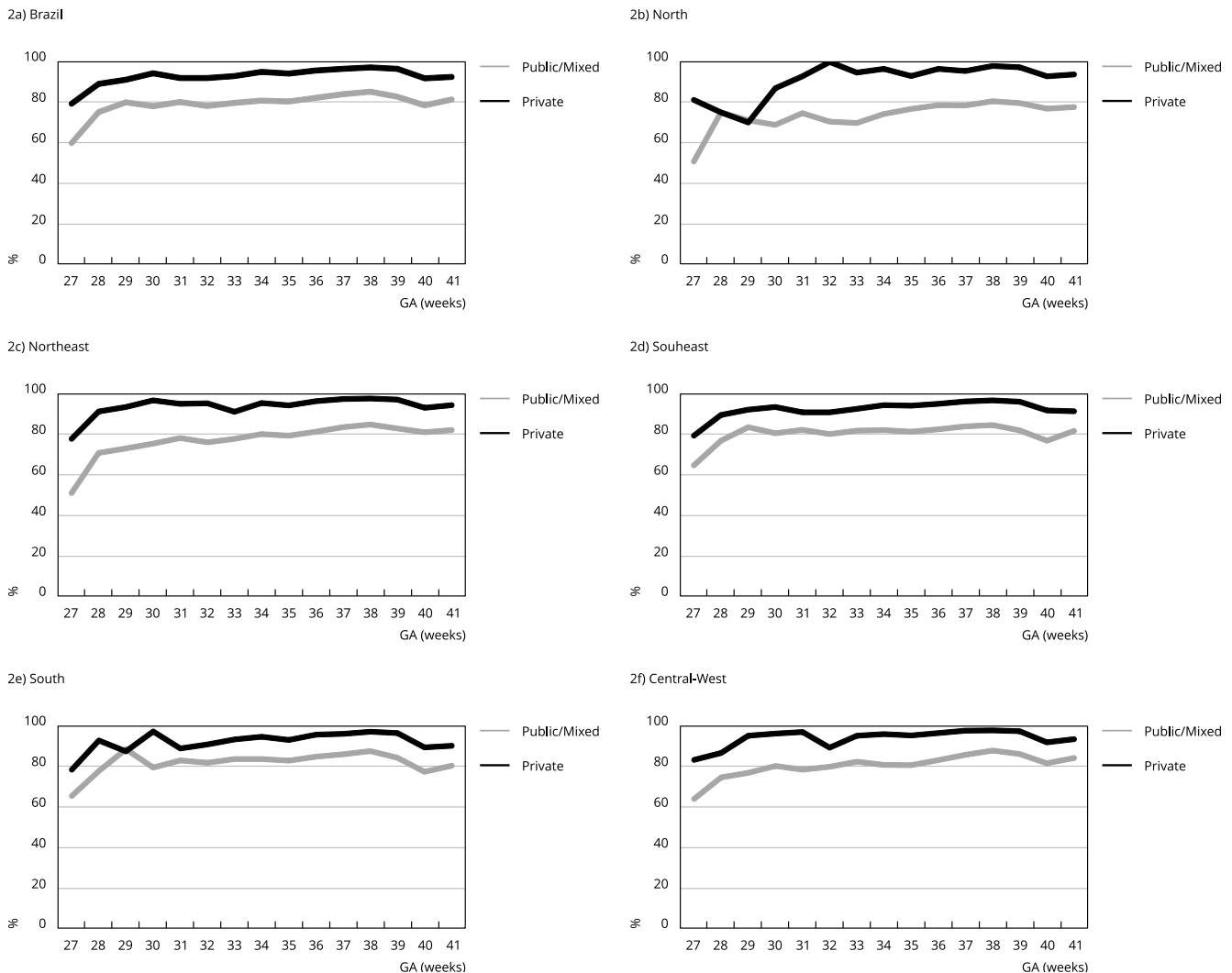
Overall cesarean section rates by type of hospital and gestational age (GA) at birth. Brazil, 2017.



subgroups. Similar patterns in correlations of cesarean section rates were observed in public/mixed and private hospitals, with higher correlations between the GA subgroups of 34-36 and 37-38 weeks and between 37-38 and 39-41 weeks. For repeated cesarean section, the overall rate was strongly correlated with the rates of 37-38 and 39-41 weeks in public/mixed hospitals, differing from private hospitals, which showed moderate correlations. Also, high correlations were observed between overall and repeated cesarean section rates in the subgroups of 37-38 and 39-41 weeks (Table 3).

Figure 2

Repeated cesarean section rates by type of hospital and gestational age (GA) at birth. Brazil, 2017.



Discussion

Overall cesarean and repeated cesarean section rates in Brazil were 55.3% and 85.3%, respectively. High of cesarean section rates were observed in all regions of the country, particularly in private hospitals, which accounted for over 80% of cesarean sections and over 90% of repeated cesarean sections, occurring predominantly between 34-36 and 37-38 weeks. Also, strong correlations were seen between overall cesarean section rates and the rates of GA subgroups.

In our study, cesarean section rates increased as the gestational age increased; however, higher rates were expected in extremely preterm infants, which should decline until full term. In contrast, a study by Delnord et al.²⁸ that analyzed aggregate data from European countries and the United States showed significant reduction in cesarean section rates up to 40 weeks of gestation, followed by an increase between 41 and 42 weeks. However, the authors identified increased rates around 38 weeks of gestation in some countries, such as Austria, Germany, and Malta²⁸.

Table 2

Overall and repeated cesarean section rates by type of hospital and groups of gestational age (GA) at birth. Brazil, 2017.

	Overall cesarean section (%)					Overall rate	Repeated cesarean section (%)					Overall rate
	GA (weeks)						GA (weeks)					
	≤ 33	34-36	37-38	39-41	≥ 42		≤ 33	34-36	37-38	39-41	≥ 42	
General												
Brazil	51.6	54.2	61.2	53.0	49.5	55.3	78.6	84.3	88.7	84.0	82.7	85.4
North	39.5	43.1	49.7	45.9	42.6	46.3	69.9	79.0	83.6	80.4	77.3	80.8
Northeast	43.9	47.9	54.4	48.8	47.4	50.0	74.9	82.8	87.8	84.0	82.9	84.8
Southeast	57.8	58.4	63.7	55.1	54.3	58.1	81.4	85.7	89.1	83.9	84.6	85.8
South	59.9	61.5	67.0	57.5	53.0	60.8	81.2	85.8	89.4	84.2	81.0	86.0
Central-West	54.2	59.5	68.7	59.6	57.7	62.3	80.8	85.7	91.2	87.2	86.3	88.4
Public/Mixed												
Brazil	47.7	48.5	52.2	47.5	47.6	48.8	76.3	81.4	84.9	81.2	81.4	82.2
North	39.3	41.9	44.6	43.7	43.2	43.6	68.1	77.2	79.9	78.4	76.6	78.4
Northeast	41.4	43.9	46.7	45.1	46.1	45.3	73.0	80.5	84.5	82.2	82.0	82.4
Southeast	52.4	50.8	52.7	47.6	50.7	49.5	78.9	82.1	84.5	80.2	83.0	81.7
South	57.5	57.3	61.5	52.6	51.3	55.8	80.2	84.0	87.2	81.8	79.9	83.7
Central-West	48.4	51.4	58.3	52.9	53.4	54.2	77.6	81.9	87.3	84.4	84.1	85.0
Private												
Brazil	79.3	83.4	87.9	83.1	82.5	84.9	90.8	95.2	97.1	95.5	95.9	96.1
North	76.8	83.1	88.8	82.7	75.6	84.5	91.1	95.6	97.4	96.2	92.4	96.5
Northeast	78.1	84.8	90.1	84.4	82.6	86.5	91.3	95.8	97.7	96.3	96.1	96.8
Southeast	79.1	81.6	86.3	81.7	81.7	83.5	90.2	94.8	96.7	95.1	95.8	95.7
South	78.7	84.1	88.0	84.0	86.5	85.5	90.7	95.0	96.9	95.1	97.2	95.8
Central-West	85.0	89.3	92.3	87.5	88.8	89.6	92.7	96.1	97.8	96.3	97.5	96.9

Similarly, increases in cesarean section rates were observed at around 37-38 weeks of gestation in all regions of Brazil, in both private and public/mixed hospitals. It may be due to elective cesarean sections or actual recommendation of early delivery for maternal and neonatal benefit, or for both reasons²⁹. However, *Resolution n. 2,144/2016* issued by the Federal Council of Medicine (CFM) in 2016 established that cesarean sections in situations of habitual risk should be performed after 39 weeks, provided that the pregnant woman has received clear and detailed information about the methods of delivery in order to ensure the safety of the mother and the baby³⁰. This resolution is consistent with those of international organizations, such as the American College of Obstetricians and Gynecologists³¹ and the Royal College of Obstetricians and Gynaecologists³². However, these initiatives had a small effect on obstetric practice, due to the high rates of cesarean sections at 37-38 weeks that still persist in Brazil.

In addition, in specific situations it is important to consider the risks of interrupting the pregnancy before full term versus the risks of continuing with the pregnancy²⁵. In Brazil, most pregnancies with complications are interrupted by cesarean sections, also in spontaneous delivery. In developed countries, such as Denmark and Finland, the increase in births at 37-38 weeks was mainly due to clinical recommendation and by induction³³.

Differences in the distribution of cesarean section rates according to the regions of Brazil were also seen in this study, with a focus on the Southeast, South, and Central-West regions. These regions have the largest number of people with better socioeconomic conditions, who use private hospitals more often – facilities that present the highest cesarean section rates in the country^{7,9,34}. Previous studies also reported higher prevalence of cesarean sections in more developed regions of Brazil^{7,9,34,35,36}. Hopkins et al.³⁵, when assessing data from the *Brazilian National Household Sample Survey* (PNAD),

Table 3

Spearman correlation coefficients for overall and repeated cesarean section rates according to subgroups of payment type and groups of gestational age (GA) at birth. Brazil, 2017.

	Overall rate	Cesarean section GA (weeks)					Repeated cesarean section GA (weeks)				
		≤ 33	34-36	37-38	39-41	≥ 42	≤ 33	34-36	37-38	39-41	≥ 42
General											
Cesarean section (GA – weeks)											
≤ 33	0.75 *	1.00									
34-36	0.91 *	0.73 *	1.00								
37-38	0.97 *	0.71 *	0.89 *	1.00							
39-41	0.99 *	0.70 *	0.88 *	0.94 *	1.00						
≥ 42	0.87 *	0.61 *	0.78 *	0.83 *	0.86 *	1.00					
Repeated cesarean section (GA – weeks)											
≤ 33	0.52 *	0.63 *	0.48 *	0.50 *	0.49 *	0.42 *	1.00				
34-36	0.69 *	0.43 *	0.73 *	0.66 *	0.67 *	0.55 *	0.41 *	1.00			
37-38	0.82 *	0.51 *	0.72 *	0.84 *	0.80 *	0.67 *	0.46 *	0.60 *	1.00		
39-41	0.88 *	0.57 *	0.77 *	0.85 *	0.89 *	0.76 *	0.47 *	0.65 *	0.78 *	1.00	
≥ 42	0.61 *	0.36 *	0.52 *	0.58 *	0.60 *	0.66 *	0.31 *	0.43 *	0.54 *	0.59 *	1.00
Public/mixed hospital											
Cesarean section (GA – weeks)											
≤ 33	0.68 *	1.00									
34-36	0.89 *	0.69 *	1.00								
37-38	0.97 *	0.64 *	0.87 *	1.00							
39-41	0.99 *	0.63 *	0.85 *	0.94 *	1.00						
≥ 42	0.86 *	0.55 *	0.74 *	0.81 *	0.84 *	1.00					
Repeated cesarean section (GA – weeks)											
≤ 33	0.47 *	0.61 *	0.43 *	0.45 *	0.44 *	0.37 *	1.00				
34-36	0.65 *	0.34 *	0.72 *	0.62 *	0.62 *	0.50 *	0.35 *	1.00			
37-38	0.82 *	0.42 *	0.68 *	0.85 *	0.79 *	0.63 *	0.40 *	0.54 *	1.00		
39-41	0.89 *	0.48 *	0.72 *	0.84 *	0.90 *	0.73 *	0.42 *	0.60 *	0.78 *	1.00	
≥ 42	0.57 *	0.27 *	0.46 *	0.54 *	0.56 *	0.64 *	0.25 *	0.37 *	0.49 *	0.56 *	1.00
Private hospital											
Cesarean section (GA – weeks)											
≤ 33	0.57 *	1.00									
34-36	0.74 *	0.47 *	1.00								
37-38	0.90 *	0.49 *	0.67 *	1.00							
39-41	0.94 *	0.48 *	0.65 *	0.77 *	1.00						
≥ 42	0.61 *	0.35 *	0.45 *	0.54 *	0.58 *	1.00					
Repeated cesarean section (GA – weeks)											
≤ 33	0.41 *	0.57 *	0.35 *	0.37 *	0.38 *	0.22 *	1.00				
34-36	0.51 *	0.40 *	0.55 *	0.47 *	0.48 *	0.36 *	0.34 *	1.00			
37-38	0.62 *	0.39 *	0.50 *	0.66 *	0.59 *	0.43 *	0.36 *	0.47 *	1.00		
39-41	0.66 *	0.38 *	0.53 *	0.58 *	0.70 *	0.48 *	0.33 *	0.46 *	0.51 *	1.00	
≥ 42	0.31 *	0.17 *	0.24 *	0.29 *	0.31 *	0.41 *	0.18 *	0.27 *	0.29 *	0.31 *	1.00

* p-value < 0.01.

identified a 45% higher chance of cesarean section among women living in the Southeast Region, a 65% higher chance among women living in the South Region, and a 73% higher chance among women living in the Central-West Region of Brazil. The explanations for variations in cesarean section rates are complex, involving medical, economic, social, cultural, and organizational aspects^{37,38}.

Another relevant finding referred to repeated cesarean section rates, which were as high as previously reported in developed countries, such as the United States (86.7%)², France (65.2%)³⁹, and Denmark (59.1%)⁴⁰. Repeated cesarean section rates found in our study are probably mostly comprised of elective repeat cesarean sections. A study conducted by Nakamura-Pereira et al.⁸ in Brazil, when analyzing cesarean section rates using Robson classification, found an overall cesarean section rate of 51.9%; however, the cesarean section rate in multiparous women with prior cesarean section and cephalic presentation ≥ 37 weeks corresponded to 83.6%. The authors also observed high repeated cesarean section rates in this group in public hospitals (78%) and private hospitals (98%)⁸, which were similar to the rates found in our study (82.1% in public/mixed hospitals versus 96.1% in private hospitals).

In general, strong correlations were found between overall cesarean section rates and rates in GA subgroups, suggesting cesarean sections are not only influenced by gestational age. Also, weak correlations between rates were observed in private hospitals, unlike public and mixed hospitals. High correlations found in public and mixed hospitals may be related to obstetric risk, although it was not possible to assess it in this study. Nakamura-Pereira et al.⁸ found statistically higher cesarean section rates among women at high obstetric risk (67.7%) in public hospitals, while in private hospitals, high cesarean sections rates were observed in women at high and low obstetric risk (86.6% and 92.8%), without significant differences between them⁸.

Unfortunately, cesarean section rates in Brazil are well above those recommended by the World Health Organization (WHO) (10-15%)⁴¹. Organization of obstetric care, mother's preference for cesarean section, experience with prior gestation, and fear of labor are factors that increase the number of cesarean sections, in Brazil and other countries^{1,7,37}.

Considering the above, efforts have been made to limit cesarean sections without clinical recommendation, including the *Parto Adequado Project*, created in 2014 through an agreement of technical cooperation involving the Brazilian Regulatory Agency for Private Health Insurance and Plans (ANS), the Institute for Healthcare Improvement (IHI), and Israeli Hospital Albert Einstein (HIAE), with the support of the Brazilian Ministry of Health⁴². This project supports the implementation of actions based on scientific evidence to reduce the percentage of unnecessary cesarean sections and increase the quality and safety of childbirth care in the supplementary health sector⁴². Other initiatives, such as the *Guidelines for Pregnant Women Care: The Cesarean Section*²³ and the *Brazilian National Guidelines for Normal Childbirth Care*⁴³ were developed in order to guide Brazilian women, health professionals and administrators, both in public and private sectors, addressing aspects related to delivery methods, recommendations, and practices based on available scientific evidence.

Encouraging vaginal delivery after cesarean section is also important since it has been associated with reduced maternal morbidity rates and lower risk of complications in future pregnancy^{44,45,46}. However, despite these benefits, repeated caesarean section rates remain high even in women eligible for trial of labor. Data from the *Birth in Brazil* survey show the rate of elective repeat cesarean section was 66.1% among women eligible for trial of labor, with even higher rates in private hospitals (95.8%) and hospitals outside the capital (69.9%)⁴⁵. These data are alarming and reinforce that cesarean sections in Brazil are not based on clinical reasons.

Among the limitations of this study are possible errors in gestational age estimates, which are more frequent among births with GA estimated by the LMP. Also, it was not possible to analyze the cesarean section rates according to obstetric risk as such information was missing and, therefore, future studies are required to assess it in the Brazilian scenario. In addition, the sources of secondary data are prone to data entry errors and certain variables may have missing information, which could have influenced the calculations of cesarean rates.

These limitations do not invalidate the results achieved due to the size of the sample and the number of live births by cesarean sections in the country. In addition, coverage and quality of SINASC data have improved in recent years⁴⁷ and, therefore, using it as a data source is a strong population health tool supporting the formulation of public policies.

Conclusions

Our study reported high rates of cesarean sections in Brazil, especially in the private health sector. Also, an increase in cesarean section rates in the gestational period of 37-38 weeks was observed in all regions of the country, especially in the Central-West. Similar results were also found for repeated cesarean section, with even higher rates. These high rates of cesarean sections in Brazil are a reason for concern, as they can cause unnecessary damage to the health of mother and baby if performed without clinical justification. Considering the above, strengthening and implementation of public policies to reduce cesarean sections have been increasingly necessary in health services. In addition, important measures to reduce cesarean section rates, especially in the private health sector, include providing guidance to pregnant women about birth plans and delivery methods during prenatal visits, helping pregnant women handle fear and insecurity, providing good conditions for vaginal and cesarean deliveries through admission and labor protocols, offering labor analgesia, and using non-pharmacological methods for pain management.

Contributors

B. A. S. Dias contributed to study design and planning, data analysis and interpretation, and article writing. M. C. Leal contributed to study design and planning, data interpretation and article review. A. P. Esteves-Pereira contributed to data analysis and interpretation, and article review. M. Nakamura-Pereira contributed to data interpretation and article review. All authors approved the final version to be published.

Additional informations

ORCID: Barbara Almeida Soares Dias (0000-0001-8656-1391); Maria do Carmo Leal (0000-0002-3047-515X); Ana Paula Esteves-Pereira (0000-0002-0236-2043); Marcos Nakamura-Pereira (0000-0002-4231-0205).

Acknowledgments

Support from the Brazilian Graduate Studies Coordinating Board (CAPES; Funding Code 001).

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Resumo

O objetivo deste estudo foi descrever as taxas de cesariana e cesariana recorrente no Brasil segundo a idade gestacional (IG) ao nascer e o tipo de hospital. Trata-se de um estudo ecológico, utilizando dados do Sistema de Informação sobre Nascidos Vivos e do Cadastro Nacional de Estabelecimentos de Saúde de 2017. As taxas de cesariana geral e recorrente foram calculadas e analisadas de acordo com a IG, região de residência e tipo de hospital. Foram realizadas correlações de Spearman entre as taxas de cesariana e cesariana recorrente por subgrupos de IG ao nascer (≤ 33 , 34-36, 37-38, 39-41 e ≥ 42 semanas), analisadas segundo o tipo de hospital. Verificaram-se taxas de cesariana geral e recorrente de 55,1% e 85,3%, respectivamente. Mais de 60% dos recém-nascidos entre 37-38 semanas ocorreram via cesariana. Os hospitais privados de todas as regiões concentraram as maiores taxas de cesariana, sobretudo os do Centro-oeste, com mais de 80% em todas as IG. A taxa geral de cesariana foi altamente correlacionada com todas as taxas de cesariana dos subgrupos de IG ($r > 0,7$, $p < 0,01$). Quanto à cesariana recorrente, verificou-se forte correlação com as taxas de 37-38 e 39-41 semanas no hospital público/misto, diferindo do hospital privado, que apresentou correlações moderadas. Isso indica que a decisão pela cesariana não é pautada em fatores clínicos, o que pode causar danos desnecessários à saúde da mulher e do bebê. Conclui-se que mudanças no modelo de atenção ao parto, fortalecimento de políticas públicas e maior incentivo do parto vaginal após cesárea em gestações subsequentes são estratégias importantes para a redução das cesarianas no Brasil.

Cesárea; Nascimento Vaginal Após Cesárea; Saúde Materno-Infantil; Sistemas de Saúde

Resumen

El objetivo de este estudio fue describir las tasas de cesárea y de cesárea recorrente en Brasil según la edad gestacional (EG) al nacer y el tipo de hospital. Estudio ecológico a partir de los datos del Sistema de Información de Nacidos Vivos y del Registro Nacional de Establecimientos de Salud 2017. Se calcularon y analizaron las tasas de cesárea general y recorrente según EG, región de residencia y tipo de hospital. Se aplicaron las correlaciones de Spearman entre las tasas de cesárea y de cesárea recorrente por subgrupos de EG al nacer (≤ 33 , 34-36, 37-38, 39-41 y ≥ 42 semanas) y se analizaron según el tipo de hospital. Las tasas de cesárea general y recorrente fueron del 55,1% y 85,3%, respectivamente. Más del 60% de los recién nacidos entre 37-38 semanas nacieron por cesárea. Los hospitales privados de todas las regiones concentraron las tasas más altas de cesáreas, especialmente los del Centro-Oeste, con más del 80% en todas las EG. En general, la tasa general de cesáreas estuvo altamente correlacionada con todas las tasas de cesáreas de los subgrupos de EG ($r > 0,7$, $p < 0,01$). En cuanto a la cesárea recorrente, se encontró que la tasa general se correlacionó fuertemente con las tasas de 37-38 y 39-41 semanas en el hospital público/mixto, a diferencia del hospital privado que mostró correlaciones moderadas. Esto indica que la decisión de hacer la cesárea no se basa en factores clínicos, lo que puede causar daños innecesarios a la salud de la mujer y del bebé. Por lo tanto, los cambios en el modelo de asistencia al parto, el fortalecimiento de las políticas públicas y una mayor promoción del parto vaginal en los embarazos posteriores de la cesárea se encuentran entre las estrategias importantes para reducir esta práctica en Brasil.

Cesárea; Parto Vaginal Después de Cesárea; Salud Materno-Infantil; Sistemas de Salud

Submitted on 18/Mar/2021

Final version resubmitted on 04/Apr/2022

Approved on 14/Apr/2022