Factors associated with caesarean section among primiparous adolescents in Brazil, 2011-2012

Fatores associados à cesariana entre primíparas adolescentes no Brasil, 2011-2012

Factores asociados a la cesárea en adolescentes primíparas en Brasil, 2011-2012

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Abstract

This paper presents the factors associated with caesarean section in primiparous adolescents in Brazil using data from a national hospital-based survey conducted between 2011 and 2012. Information was obtained from postpartum women through face-to-face and telephone interviews and a theoretical model with three levels of hierarchy was used to analyze associations with the dependent variable mode of delivery (caesarean or vaginal). The results show that the caesarean section rate among primiparous teenagers is high (40%). The most significant contributing factors for caesarean section were: considering this mode of delivery safer (OR = 7.0; 95%CI: 4.3-11.4); giving birth under the private health system (OR = 4.3; 95%CI: 2.3-9.0); being attended by the same health care professional throughout prenatal care and delivery (OR = 5.7; 95%CI: 3.3-9.0) and clinical history of risk and complications during pregnancy (OR = 10.8; 95%CI: 8.5-13.7). Adolescent pregnancy continues to be an important concern on the reproductive health agenda and the rates observed by this study are worrying given the effects of early exposure to caesarean section.

Cesarean Section; Pregnancy in Adolescence; Maternal and Child Health; Parturition

Resumo

Nesse artigo são apresentados os fatores associados à realização de cesariana em primíparas adolescentes no Brasil, utilizando-se dados de pesquisa nacional de base hospitalar realizada entre 2011 e 2012. As informações foram obtidas por meio de entrevista com a puérpera durante a internação hospitalar. Um modelo teórico conceitual foi estabelecido com três níveis de hierarquia e a variável dependente foi a via de parto – cesariana ou vaginal. Os resultados mostram proporção elevada de cesariana entre primíparas adolescentes (40%) e os fatores mais fortemente associados à cesariana foram considerar esta via de parto mais segura (OR = 7,0; IC95%: 4,3-11,4); parto financiado pelo setor privado (OR = 4,3; IC95%: 2,3-9,0); mesmo profissional de saúde assistindo pré-natal e parto (OR = 5,7; IC95%: 3,3-9,0) e apresentar antecedentes clínicos de risco e intercorrências na gestação (OR = 10,8; IC95%: 8,5-13,7). A gravidez na adolescência permanece em pauta no campo da saúde reprodutiva, sendo preocupante a proporção do parto cirúrgico encontrada nesse estudo, haja vista a exposição precoce aos efeitos da cesariana.

Cesárea; Gravidez na Adolescência; Saúde Materno-Infantil; Parto

Introduction

The proportion of caesarean sections performed in Brazil increased from 38% in 2000 to 52% in 2010. The excessive caesarean section rate is a phenomenon that affects women from all sectors of society regardless of socioeconomic status [1] and has become a major challenge for maternal and child health care in the country. Many reasons have been given for such a significant increase, mainly related to changes in obstetric practices [2].

Another important concern on Brazil's reproductive health agenda is the magnitude of the problem of teenage pregnancy. In 2010, births to mothers aged under 20 years accounted for almost 20% of total births in the country and these rates are higher in poorer regions of the country, such as the North (26.3%) and Northeast (22%) (http://www.datasus.gov.br, accessed on 28/Apr/2013).

Several authors have pointed out the maternal and child morbidity and mortality risks associated with caesarean sections [3,4,5,6,7] and these risks are substantially greater for elective caesarean sections compared to normal birth [8]. The possibility of complications in subsequent pregnancies is also greater following a caesarean, including anomalies of the placenta, stillbirths and neonatal morbidity and mortality [9,10], and such problems show a standard dose-response according to the number of previous caesarean sections [10,11].

In the case of adolescents, caesarean sections performed in the first birth can lead to greater complications, given the tendency to repeat the previous delivery mode in subsequent births [12], the longer period of reproductive life and increased parity in women who start motherhood early [13].

Considering the current scenario and the importance of nationwide studies, this article aims to assess the factors associated with caesarean section among primiparous adolescents in Brazil in the years 2011 and 2012.

Methods

This study is part of the Birth in Brazil survey, a national hospital-based study of a sample of postpartum women and their newborns conducted between February 2011 and October 2012. Hospitals with 500 or more annual deliveries were selected and stratified according to region, location (state capital or non-capital city), and type of health care (private, public and mixed). A total of 90 postpartum women were interviewed in each of the 266 hospitals included in the sample, resulting in a total sample size of 23,940 subjects. Furthers details regarding sample design are provided by Vasconcellos et al. [14]. In the first phase of the study, face-to-face interviews were conducted with the postpartum women during their hospital stay and data was taken from the mother's and newborn's medical records and hand-held maternity notes were photographed. Telephone interviews were conducted before six months and at twelve months after birth to collect data on maternal and neonatal outcomes. Further details on data collection are given by do Carmo Leal et al. [15].

Data from single births to postpartum primiparous adolescents, defined as women experiencing childbirth for the first time, was analyzed using mode of delivery (vaginal or caesarean) as a dependent variable. Women who declared themselves as having "yellow" skin or being indigenous were excluded due to the small proportion of these participants in the sample.

A theoretical model with three levels of hierarchy (distal, intermediate and proximal) based on models described in current literature was used. Distal variables included the following sociodemographic characteristics: age (10 to 16 years and 17 to 19 years); race/ethnicity/skin color (white, black or brown); education level (adequate or not for age group); economic status based on the Brazilian Association of Research Companies (ABEP) categories (A/B, C or D/E); being in paid employment (yes or no); and marital status (with or without partner).

Intermediate variables included the following obstetric and prenatal characteristics: initial preference for mode of delivery (vaginal, caesarean section, or no preference); previous pregnancy (yes or no); information received on childbirth during prenatal care (vaginal delivery is safer, caesarean delivery is safer, both are safe, or unclear); presence of a companion during hospitalization (yes or no); and adequacy of prenatal care (adequate, more than adequate, or inadequate/partially adequate).

Proximal variables related to obstetric characteristics linked to childbirth included the following: clinical history of risks and complications during pregnancy and labor (yes or no); satisfaction with current pregnancy (satisfied or unsatisfied); private source payment (yes or no); and whether the same health professional provided prenatal and childbirth care (yes or no). It is important to note that the variable "private source payment" was ranked as a proximal variable to reflect the current model of care in the country, even though it may reflect the socioeconomic status of the adolescent. Adolescents

who delivered in public health care facilities and adolescents who delivered in mixed health care facilities that were not paid by health insurance plans were classified as "public source of payment". Adolescents whose delivery was paid by health insurance plan, and the delivery occurred in mixed or private hospitals, and adolescents who delivered in private facilities, regardless if the delivery had been paid or not by the health insurance plan, were classified as "private source of payment".

The criterion used for the variable "adequacy of education level" was number of years of schooling. Economic status was classified according to ABEP criteria which assess purchasing power of urban individuals and families based on asset ownership and the education level of the head of the family [16]. Individuals are classified into five categories ranging from A (highest ranking) to E (lowest ranking). Due to the small number of women in categories A and E, the categories were converted into three groups (A + B, C, D + E).

To assess the adequacy of prenatal care, we considered the timing of prenatal care initiation and number of visits, adjusted for gestational age at delivery adopting the recommendations of the Prenatal Care and Birth Humanization Program (PHPN) implemented by the Ministry of Health [17]. This program advocates early prenatal care up to the 16th week of pregnancy and a minimum of six prenatal care visits: one in the first trimester, two in the second and three in the third trimester. Based on these criteria, prenatal care was classified as inadequate (prenatal care initiated after the 27th week of pregnancy or less than 50% of visits for gestational age at birth attended, regardless of gestational age at the first prenatal care visit); partially adequate (prenatal care initiated between the 16th and 27th week of pregnancy and at least 100% of visits for gestational age at birth attended); or prenatal care initiated before the 16th week of pregnancy and 50% to 99% of the visits for gestational age at delivery attended); adequate (prenatal care initiated before the 16th week of pregnancy and 100% to 149% of visits for gestational age at delivery attended); more than adequate (prenatal care initiated before the 16th week of pregnancy and ≥ 150% of visits for gestational age at delivery attended).

The variable "clinical history of risks and complications during pregnancy and labor" was elaborated based on data obtained from medical records, considering the presence of any of the following: pre-existing medical diseases, hypertensive disorders (chronic hypertension, preeclampsia, eclampsia, HELLP syndrome), diabetes (gestational or otherwise), HIV infection, non-cephalic presentation, intrauterine growth restriction (IUGR), oligohydramnios, polyhydramnios, isoimmunization, placenta previa, placental abruption, fetal distress, preterm labor, post-maturity, macrossomia, multiple pregnancy, severe congenital malformation, iterativity (two or more previous caesareans), induction of labor and complications during labor (cephalopelvic disproportion, dyskinesia, dystocia, uterine rupture, prolonged second stage of labor and uterine atony).

The relationship between the outcome variable caesarean section and the independent variables is shown in the theoretical model presented in Figure 1.

Variables with a significance level of < 0.20 were organized by level of proximity to the outcome, beginning with the distal variables only. Variables with a p value of < 0.05 were retained in the model for adjustment at the intermediate level. The same procedure was followed until the proximal variables were adjusted.

Based on a sample of 3,447 primiparous postpartum adolescents, the results were expressed as odds ratios with their corresponding 95% confidence interval (95%CI).

The analysis was carried out using the software package SPSS version 19 (IBM Corp., Armonk, USA). The program's Complex Sample module was also used to due to the complexity of the study design.

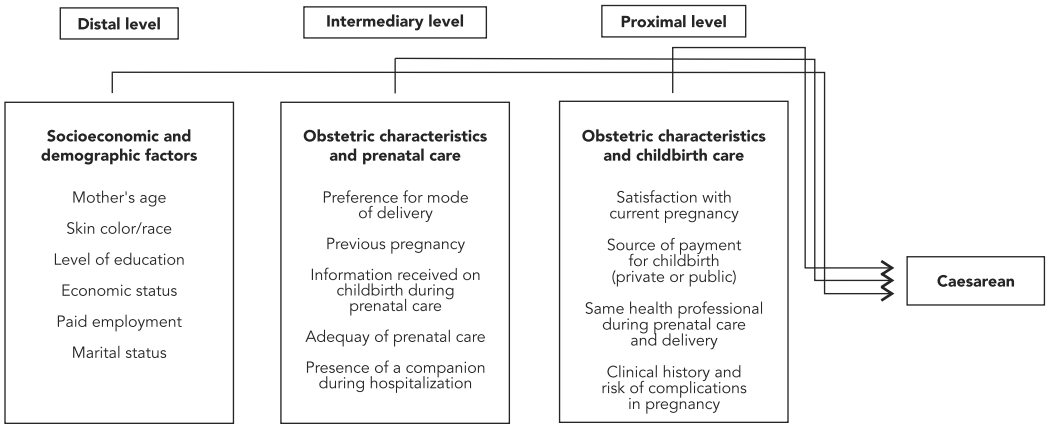
The study was approved by the Research Ethics Committee of the Sergio Arouca National School of Public Health of the Oswaldo Cruz Foundation (research protocol CEP/ENSP – 92/10). All participants signed a written informed consent form. The study followed the rules and guidelines of the National Health Council Resolution nº. 196/96.

Results

Forty percent of the primiparous adolescents interviewed had a caesarean section. Table 1 shows the proportion of adolescents that underwent caesarean sections by socioeconomic and demographic characteristics. The results show that the caesarean section rate was higher among adolescents with an adequate level of education for their age and with a higher economic status (A and B). In this respect, rates decreased with decreasing social status revealing a social gradient in caesarean sections. It was also observed that teenagers who had no paid employment, those classified as white, and late adolescents (aged 17 to 19 years) were more likely to undergo a caesar-

Figure 1

Theoretical model of predictors of caesarean section in primiparous adolescents.



ean section. No association was found between marital status and type of delivery.

Table 2 shows that the caesarean section rate among adolescents who indicated an initial preference for this mode of delivery was higher than among those who preferred vaginal delivery (46% and 36%, respectively). No association was found between previous history of interrupted pregnancy and type of delivery. When the adolescents were questioned regarding which kind of delivery is safer for an uncomplicated pregnancy, almost 80% of those who replied that "caesarean was safer" ended up having a caesarean section, compared to 29.1% of those who answered that vaginal delivery was safer. With respect to adequacy of prenatal care, it was observed that the caesarean section rate was higher among adolescents who rated prenatal care as being adequate or more than adequate.

No association was found between satisfaction with the current pregnancy and type of delivery. The caesarean section rate of births under the private health system was more than double that of births using the Brazilian Unified National Health System (SUS). Similarly, the caesarean section rate was higher among adolescents treated by the same health professional during the course of pregnancy and childbirth (75%). The likelihood of undergoing a caesarean section was also greater among adolescent mothers who reported a history of clinical risk and/or complications during pregnancy and labor (Table 3).

To identify the factors associated with caesarean section we performed a multivariate logistic regression using a hierarchical model (Table 4). A significant association was found between the distal variables economic status and paid employment and these variables were therefore carried forward to the next level of analysis. Since the variable maternal age showed a borderline value (OR = 1.2; 95%CI: 1.0-1.4) this factor was also included. None of these variables lost significance at the intermediate level of analysis. It was also found that having a companion during hospitalization and receiving information during prenatal care confirming that caesarean section is safer than natural birth were positively associated with the surgical procedure.

The following contributing factors for caesarean section in primiparous adolescents in Brazil were observed after including the proximal variables in the model: having employment (distal variable), receiving information during prenatal care confirming that caesarean delivery is safer than natural birth (intermediate variable). With respect to the latter factor, adolescents that understood that caesarean section was safer than natural birth were seven times more likely to have a caesarean section than women who understood that vaginal delivery was safer. It was also found that adolescents who gave birth under the private health system, who were treated by the same health professional during the course of pregnancy and childbirth, and with a clinical history of risk and complications during pregnancy

Table 1

Mode of delivery by socioeconomic and demographic characteristics of primiparous adolescents. Brazil, 2011-2012 *.

	Mode of delivery		ρ-value **
	Vaginal (61.5%)	Caesarean (38.5%)	
Adequate level of educational for age			0.061
Yes	56.3	40.7	
No	63.8	36.2	
Economic status			< 0.001
Class D+E	68.3	31.7	
Class C	59.3	40.7	
Class A+B	52.0	48.0	
Paid employment			< 0.001
Yes	50.7	49.3	
No	62.9	37.1	
Skin colour/race			0.022
White	56.6	43.4	
Black	68.4	31.6	
Brown	62.7	37.3	
Marital status			0.515
No partner	61.7	38.3	
With partner	61.4	38.6	
Mother's age (years)			0.011
10-16	65.0	35.0	
17-19	59.6	40.4	

* Values are weighted according to sample design;

** Significance level based on Pearson's chi-square test.

Note: vaginal (n = 218,659); caesarean (n = 136,887).

and labor were 4.3, 5.7 and 10 times more likely to undergo a caesarean section.

Discussion

The results of this study show that socioeconomic factors and the type of health care received during pregnancy and childbirth are significant contributing factors for caesarean sections in adolescents experiencing childbirth for the first time.

Higher caesarean section rates were generally associated with factors related to higher socioeconomic status, such as an education level adequate for the age group and having health insurance. A social gradient related to skin color was also observed, showing that caesarean section rates were higher in white people.

The high proportion of caesarean sections found in this sample reflects the interventionist approach to child birth adopted in Brazil in recent decades. The caesarean section rate among this group was lower than the average rate for the overall study sample (56%), reflecting the low socioeconomic status of the majority of the adolescents in the sample (55.5% in class C and 32.7% in classes D and E.

Teenage pregnancy is a problem, not only due to the adverse effects on the newborn, but also because of a number of other negative effects on the young mother's well-being, such as missing school, low chances of insertion into the formal labor market and social inequality in access to health services [13].

In Canada, where adolescent births account for only 3% of total births, falling behind at school is highlighted as one of the main disadvantages for adolescent mothers [18].

A study carried out in a municipality of the State of São Paulo in 2007 observed many differences between the characteristics of adolescents using the public health system and those using the private system. Those using the public health system attended fewer prenatal visits, had a lower education level, higher parity and were

Table 2

Mode of delivery by obstetric and prenatal characteristics of primiparous adolescents. Brazil, 2011-2012 *.

	Mode of delivery		p-value **
	Vaginal (61.5%)	Caesarean (38.5%)	
Initial preference for mode of delivery			0.007
Vaginal	63.4	36.6	
Caesarean	54.0	46.0	
No preference	58.8	41.2	
Previous pregnancy			0.438
Yes	61.7	38.3	
No	59.0	41.0	
Previous information about safety of mode of delivery			< 0.001
Normal birth is safer for the mother	70.9	29.1	
Caesarean section is safer for the mother	23.4	76.6	
Both normal birth and caesarean sections are safe for the mother	41.2	58.8	
Unclear	55.5	44.5	
Adequacy of prenatal care			0.012
Adequate/more than adequate	58.9	41.1	
Inadequate/partially adequate	64.9	35.1	

* Values are weighted according to sample design;

** Significance level based on Pearson's chi-square test.

Table 3

Mode of delivery by obstetric characteristics and delivery care among primiparous adolescents. Brazil, 2011-2012 *.

	Mode of delivery		p-value **
	Vaginal (61.5%)	Caesarean (38.5%)	
Satisfied at the beginning of pregnancy			0.292
Yes	60.8	39.2	
No	63	37	
Private childbirth			< 0.001
Yes	23.3	76.7	
No	63.8	36.2	
Same health professional provides prenatal care and childbirth			< 0.001
Yes	24.5	75.5	
No	64.7	35.3	
Companion present during hospital admission			0.002
Yes	59.5	40.5	
No	68.4	31.6	
Clinical history and risk of complications in the current pregnancy			< 0.001
Yes	18.3	81.7	
No	64.9	35.1	

* Values are weighted according to sample design;

** Significance level based on Pearson's chi-square test.

Table 4

Factors associated with caesarean delivery in primiparous adolescents. Brazil, 2011-2012 *.

Variable/Category	OR adjusted	95%CI
Distal model		
Adequate level of education for age		
Yes	1.1	0.9-1.3
No	1.0	-
Economic status **		
Class A+B	1.7	1.3-2.3
Class C	1.4	1.1-1.7
Class D+E	1.0	-
Paid employment		
Yes	1.5	1.1-1.9
No	1.0	-
Skin color/race		
White	1.2	0.9-1.5
Black	0.8	0.5-1.2
Brown	1.0	-
Mother's age (years) **		
17-19 vs. 10-16	1.2	1.0-1.4
10-16	1.0	-
Intermediary model ***		
Initial preference for the mode of delivery		
Caesarean	1.1	0.8-1.4
No preference	1.0	0.7-1.4
Vaginal	1.0	-
Prior information on safety of mode of delivery		
Caesarean is safer	7.7	4.8-12.3
Both are as safe as the other	3.7	2.7-5.0
Unclear	2.0	1.5-2.7
Normal birth is safer	1.0	-
Adequacy of prenatal care		
Adequate or more than adequate	1.2	0.9-1.4
Inadequate or partially adequate	1.0	-
Companion during hospitalization **		
Yes	1.4	1.1-1.8
No	1.0	-
Proximal model #		
Clinical history and risk of complications in the current pregnancy		
Yes	10.8	8.5-13.7
No	1.0	-
Source of payment for childbirth care		
Private	4.3	2.1-9.0
Public (SUS)	1.0	-
Same health professional during prenatal care and childbirth		
Yes	5.7	3.6-9.0
No	1.0	-

95%CI: 95% confidence interval; SUS: Brazilian Unified National Health System.

* Values are weighted according to sample design;

** Lost significance in the proximal level;

*** Adjusted for paid employment, maternal age and social status;

Adjusted for paid employment, maternal age, social status, prenatal information on safe childbirth and companion during hospitalization.

more likely to give birth via vaginal delivery, while those using the private system attended more prenatal care visits, had a higher education level, were generally primiparous and were more likely to give birth via caesarean section [19].

Other countries have identified a relationship between source of childbirth payment and caesarean section rates. In Australia, which has recently experienced a growth in caesarean births, a study shows that this trend is a result of private health insurance incentive policy reforms [21]. In a study carried out in Italy in 2011, Kambale [22] demonstrated that social factors are strong predictors of caesarean section. Similar results were observed in Uruguay [23], where the caesarean section rate in the private health sector is twice as high as that in the public health system. Authors draw attention to the effects of the doctor remuneration system in the private sector where fees are related to medical procedures, compared to the public system where doctors receive a fixed fee. Following trends in other countries, the likelihood of women in Thailand to undergo a caesarean in the private health sector is 9.4 times higher than in the public health system [24].

The results for primiparous adolescents are of even greater concern since early exposure to surgical delivery is likely to result in a caesarean section in the next delivery. Almost a century ago, Cragin [25] (p. 1) said: "*once a caesarean section always caesarean section*". This theory was followed by the Association of Obstetrics and Gynecology in the United States strongly reflecting the approach to childbirth in women who have had a previous caesarean section in a number of countries.

A study in the United States carried out in 2001 showed that the chance of a woman not belonging to a risk group having a primary caesarean section was 50% higher than in 1996 [26]. Similar results were also observed by a study performed in private hospitals in Rio de Janeiro, Brazil [27].

Some authors claim that one of the reasons women undergo unnecessary caesarean sections is lack of information about the possible consequences of this procedure during pregnancy [27,28], thus undermining their power of choice [12].

The positive effect of prenatal care on the mode of delivery identified by a number of studies [12,29,30] were not corroborated by this study, since adolescents who attended a greater number of prenatal care visits were more likely to have a caesarean section. This finding is probably related to the fact that having a greater number of appointments with medical professionals gives the professional a greater opportunity to convince the patient of the best mode of delivery, especially when the delivery is carried out by the same professional.

This finding is reinforced by the fact that adolescents are especially susceptible and open to information regarding the safety of caesareans provided during prenatal care. This variable proved so important as a contributing factor that the association remained significant even after adjusting for other variables in the hierarchical model.

Although the variable age group was not retained in the final model, another result that deserves attention is that the caesarean section rate was higher among late adolescents (aged 17 to 19 years) highlighting once again the lack of criteria involved in indicating this mode of delivery, since if the criteria were purely clinical rates would likely be higher in younger teenagers as they are more vulnerable [31].

As expected, clinical history and risk of complications in pregnancy were also contributing factors for caesarean section. In general, complications during pregnancy and childbirth are less common in adolescents (less macrossomia, less twin pregnancies, fewer hypertensive disorders and diabetes etc.) than in adult women [32]. However, more than 35% of adolescents underwent a caesarean section with no specified indication, while almost 20% of those with a specified indication gave birth vaginally, highlighting once again the lack of criteria for determining the mode of delivery [20,27,33].

A limitation of this study is the possibility of recall bias or change of opinion about an event in the past due to some recent experience, which is a common problem experienced by cross-sectional studies. Another limitation is the variable source of payment. As the instrument used did not allow the identification of women who gave birth paid by direct disbursement, it is possible that some women had their delivery assisted in mixed health care facilities and were classified as having public source of payment, having paid for their delivery care. However, as these women had very similar socioeconomic characteristics of women attending public hospitals, it is likely that misclassification occurred in a few cases. As it is a non-differential misclassification with respect to the outcomes studied, it is expected that there has been attenuation of the magnitude of the observed associations.

In conclusion, the caesarean section rate observed by this study was relatively high, especially considering that the sample was made up of primiparous adolescents. The decision to use this mode of delivery goes beyond clinical criteria and women's preference, and affects the reproductive future of adolescents due to the

greater likelihood of undergoing caesarean sections in subsequent births. Caesarean section is influenced by the type of prenatal care, the type of health system used for childbirth (public or private) and other socioeconomic factors, suggesting that caesarean delivery in Brazil has become a commodity.

Resumen

En este artículo se propone el estudio de los factores asociados a la cesárea en adolescentes primíparas en Brasil, utilizando los datos de una encuesta de base hospitalaria, realizada en 2011 y 2012. La información se obtuvo mediante entrevistas con mujeres después del parto, durante la hospitalización. Se estableció un modelo conceptual teórico con tres niveles de jerarquía, donde la variable dependiente fue el tipo de parto: cesárea o vaginal. Los resultados muestran una alta proporción de cesáreas en adolescentes primíparas (40%) y los factores más fuertemente asociados a la cesárea son: la consideraban más segura (OR = 7,0; IC95%: 4,3-11,4); era un parto financiado por el sector privado (OR = 4,3; IC95%: 2,3-9,0); o el hecho de que un mismo profesional de salud prestara atención en el periodo prenatal y parto (OR = 5,7; IC95%: 3,3-9,0), así como la historia clínica de los riesgos y complicaciones (OR = 10,8; IC95%: 8,5-13,7). El embarazo adolescente sigue estando en la agenda de la salud reproductiva, siendo preocupante la proporción de partos operatorios encontrados en este estudio, teniendo en cuenta la exposición temprana a los efectos de la cesárea.

Cesárea; Embarazo en Adolescencia; Salud Materno-Infantil; Parto

Contributors

S. G. N. Gama participated in study conception and in all stages of the production of this article and was responsible for drafting the article and final approval of the version to be published. E. F. Viellas participated in the critical revision of relevant intellectual content, data interpretation and drafting the article and final approval of the version to be published. A. O. C. Schilithz participated in data analysis and interpretation, and drafting the methodology and final approval of the version to be published. M. M. Theme Filha and M. L. Carvalho participated in data analysis and final approval of the version to be published. K. R. O. Gomes and M. C. O. Costa participated in the critical revision of relevant intellectual content, in drafting the introduction and in the final approval of the version to be published. M. C. Leal participated in the final approval of the version to be published.

Acknowledgments

We are grateful to the regional and state coordinators, supervisors, interviewers and study team and to the mothers who participated and made this study possible. To Graduate Coordinating Board for their support on the Postdoctoral Program in the State of Rio de Janeiro.

Funding

National Council for Scientific and Technological Development (CNPq); Science and Tecnology Department, Secretariat of Science, Tecnology, and Strategic Inputs, Brazilian Ministry of Health; National School of Public Health, Oswaldo Cruz Foundation (INOVA Project) and the Research Support Foundation of the State of Rio de Janeiro (Faperj).

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Submitted on 10/Aug/2013
Final version resubmitted on 03/Dec/2013
Approved on 13/Dec/2013