Prenatal care among adolescent women in the extreme South of Brazil: coverage and associated factors

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Abstract

Objectives: to evaluate coverage and identify factors associated with adequate prenatal care for adolescent mothers in Rio Grande, Southern Brazil, in a period of 13 years.

Methods: over the years 2007, 2010, 2013, 2016 and 2019, a single standardized questionnaire was applied to all mothers at hospital level in this municipality. The outcome consisted of the proportion of puerperae women who started prenatal care in the first trimester and performed 6+ medical visits, completed 2+ HIV, syphilis, and urine tests. Chi-square test was used for proportions, Poisson regression in the multivariate analysis and the prevalence ratio (PR) as measure of effect.

Results: among the 12,645 identified mothers, 2,184 (17.3%) were adolescents. Of this total, 35.2% (CI95%= 33.2%-37.2%) had received adequate prenatal care, ranging from 13.8% (10.8%-16.7%) in 2007 to 52,5% (46.8%-58.1%) in 2019. The adjusted analysis showed a higher PR for adequate prenatal care among those of older age and better schooling level, white/brown skin color, with a partner, never had an abortion, were primiparous and non-smokers.

Conclusion: there was substantial improvement in coverage of adequate prenatal care over the period studied, but there is still a long way to go. The increase in this coverage depends on reaching adolescents who are younger, less educated, black skin color, living without a partner, multiparous and smokers.

Key words *Prenatal care, Adolescents, Risk factors, Health services research*

Introduction

Prenatal care is essential for maternal and child well-being from pregnancy to the first years of life.[1] Guidance and care received during this period curb morbimortality in these population groups and contribute to the children's full growth and development.[1,2]

Maternal age is an important factor to be considered when performing prenatal care.[3] Adolescent mothers (<20 years old) are at greater risk for eclampsia, puerperal endometritis, and systemic infections than other mothers.[3,4] Moreover, low birth weight, prematurity, and severe neonatal conditions are much more frequent in their children.[3,4] Commonly, adolescents who become pregnant have a worse socioeconomic level.[3-6]

Most studies evaluating prenatal care place all adolescents in a single category and compare them to other ages. Generally, their indicators are always the worst, especially against those aged 20-29.[6-8]

Despite this and the fact that they account for almost 20% of births in Brazil,[8] it is rare to find a study evaluating prenatal care only among adolescents.[3,9,10] Generally, it does not matter if they are 12 or 19 years old as they end up being treated as if they were equal.[6-8]

Furthermore, the criteria used[11-13] to assess prenatal care adequacy must be simplified as they hindered health professionals' use at the primary health care (PHC) level. For this reason, an easy-to-apply criterion was created from the gestational age at the start of appointments, the number of appointments, and laboratory tests performed.

This article aims to estimate adequate prenatal care among adolescents in the extreme south of Brazil and identify factors associated with its occurrence over 13 years.

Methods

This article is nested in the regular surveys called Perinatal Studies in Rio Grande, RS, Brazil, conducted in this municipality every three years to monitor the pregnancy and childbirth care services offered there.[7] The first was conducted in 2007, followed by 2010, 2013, 2016, and, more recently, 2019.

Rio Grande is a coastal municipality located in the extreme south of Rio Grande do Sul, 300 km off Porto Alegre and 250 km from the border with Uruguay. Its population increased from 195 thousand to 211 thousand over these 13 years. Agribusiness and port activity continue to be the basis of its economy. However, it experienced a certain "economic boom" with the assembly of oil platforms in the 2008-13 period, an activity discontinued in 2016. The public health network comprises two hospitals, one completely public, four medical specialty outpatient clinics, and 36 primary health care (PHC) units.

The puerperae should reside in an urban or rural area of the municipality, have given birth between January 1 and December 31 of the years in which the surveys were conducted, and their child should have weighed at least 500 grams at birth, or 20 weeks of gestational age to be part of the perinatal studies. It is, therefore, a census study. When still in the hospital and within 48 hours after delivery, these puerperae answered a single questionnaire, divided into blocks, including everything from pregnancy planning to the immediate postpartum period.

These questionnaires were always applied by four previously trained interviewers in the month before data collection. This application occurred through daily visits to maternity and nursing wards every day of the week, including weekends and holidays.

A physical questionnaire was used in the surveys from 2007 to 2013. On these occasions, the interviewers coded, revised, and delivered them to the study headquarters. The open-ended questions were coded, revised, and entered twice by different professionals in reverse order. This step was performed using Epi Data 3.1.[14] The comparison of databases and subsequent corrections were made using Epi Info.[15]

In the 2016 and 2019 surveys, data were entered simultaneously during the interview using tablets and the REDCap (Research Electronic Data Capture) application.[16] The questionnaires were downloaded to the central server and revised at each working day's end. Data were analyzed using the statistical package Stata version 12.[17]

This study's outcome consisted of adequate prenatal care, which included starting appointments in the first trimester of pregnancy, having six or more appointments, and undergoing at least two tests for HIV, syphilis, and qualitative urine. This information was retrieved from data provided by the mother or the Pregnant Woman's Card. Although most variables are self-explanatory, we should clarify that household income refers to the sum of amounts received by all its residents in the month immediately preceding the interview. These amounts were obtained in Brazilian reais and later, during the analysis, were converted into minimum wages. The interviewer classified skin color. According to the instruction manual, anyone who was not black or white was classified as brown. Schooling refers to the number of years of study completed.

Multivariate analysis was performed using Poisson regression, with robust variance adjustment[18] and following a previously established hierarchical model

(Table 1).[19] The measure of effect adopted was the prevalence ratio (PR) with its respective confidence interval of 95 % (CI95%). The adjusted analysis included all variables in the model with a p-value of up to 0.20 associated with the outcome. Thus, all variables with up to this p-value were kept in the model to adjust the next (higher) levels. Wald tests for heterogeneity or linear trend were used for ordinal exposures.[20]

All research protocols were approved by the Health Research Ethics Committee (CEPAS) of the Federal University of Rio Grande, linked to the National Research Ethics Committee (CONEP), under the following numbers: 2007 (Opinion 05369/2006); 2010 (Opinion 06258/2009); 2013 (Opinion 02623/2012); 2016 (Opinion 0030-2015); and 2019 (Opinion 278/2018).

Results

Table 2 shows that more than half of the adolescents were between 18 and 19, about two-thirds lived with a partner, were white, and had seven or more years of schooling. One in every seven had a household income of less than the monthly minimum wage (MMW) and engaged in paid work during pregnancy. At least three-quarters of them did not plan the pregnancy, were having a child for the first time, and received prenatal care in the public sector, and 15% (328) were classified as smokers. Approximately 20% (492) mentioned being treated for systemic arterial hypertension, diabetes mellitus, or depression, resulting or not from pregnancy, while the mean adequate prenatal care over these 13 years was 35.3% (770) (CI95%= 33.2%-37.2%), ranging from 13.8% (71) (10.8%-16.7%) in 2007 to 52.5% (159) (46.8%-58.1%) in 2019.

Table 3 shows that the prevalence of adequate prenatal care ranged from 19.7% (13) for those aged between 11 and 15 years to 41.6% (286) among those with nine years of schooling and over. In the adjusted analysis following a previously defined hierarchical model, variables maternal age, skin color, living with a partner, maternal education, previous abortion, parity, and smoking during pregnancy were significantly associated with the outcome. The PR

for adequate prenatal care among adolescents aged 18-19 and white compared to those aged 11-15 and Black was 1.78 (1.02-3.10) and 1.45 (1.13-1.85), respectively. Living with a partner and having nine years of schooling and over showed PR=1.32 (1.12-1.55) and 1.73 (1.22-2.46) compared to those without a partner and with up to four schooling years. The PR for adequate prenatal care among those who had an abortion reached 1.49 (1.15-1.95); on the other hand, it reached 1.72 (1.41-2.11) among primiparous women. The PR for adequate prenatal care was 1.36 (1.11-1.67) among non-smoking pregnant women against smokers.

Discussion

Coverage of adequate prenatal care among adolescents increased approximately fourfold over these 13 years, from 13.8% in 2007 to 52.5% in 2019. However, almost half of them do not receive adequate prenatal care. The highest prevalence ratios for adequate prenatal care were observed among those of older age, white/brown, living with a partner, with a higher level of education, who had an abortion, primiparous, and non-smokers.

Prenatal care has improved in Brazil, especially in the last two decades.[21] While its beginning is practically universal, the proportion of those who perform adequate prenatal care, regardless of the criteria used, has increased in different locations and regions. [6,8,21] This better outlook can be attributed, above all, to the expanded Family Health Strategy (ESF).[8] It has not been different in Rio Grande. In these 13 years, the number of ESF teams hiked from 10 to 26, and its implementation occurred mainly in rural areas and the city's suburbs, which certainly increased prenatal care coverage, including among adolescents.

In this study, the younger the age of the adolescent, the greater the probability of her not having adequate prenatal care. This is particularly serious in Rio Grande because births among those up to 15 years of age increased by 26% (from 9.7% to 12.2%) in this same period.[7] This situation favors the emergence of different intercurrences throughout pregnancy, delivery complications, low birth

Table 1

Hierarchical analysis model for performing adequate antenatal care among adolescent in Rio Grande (RS), Brazil, 2007–2019.

Determinants	Level	Characteristics	Variable
Distal	I	Demographics	Maternal age, skin color, and they live with a partner
		Socioeconomic	Maternal schooling, monthly family income, paid work during pregnancy, and whether the husband is employed
Intermediary	II	Reproductive	Previous miscarriage, parity, and whether the pregnancy was planned
		Use of health services	Place of prenatal care, whether gave birth by SUS
Proximal	III	Life habits	Smoked (before and during) and alcohol consumption during pregnancy
		Morbidity	High blood pressure, diabetes, depression, anemia, or self vaginal discharge
Outcome		Performing adequate prenatal care among adolescents	

SUS = *Sistema Único de Saúde* (Unified Health System).

Table 2

Distribution of postpartum adolescent according to some characteristics and prenatal care received. Rio Grande (RS), Brazil, 2007-2019.

Characteristics	Perinatal inquiry (%)					Mean
	2007	2010	2013	2016	2019	2007-2019
Maternal age (years) (*p*=0.371)						
11 to 15	3.3 (17)	3.6 (16)	2.8 (13)	2.4 (11)	3.0 (09)	3.0% (66)
16 to 17	46.3 (239)	42.0 (187)	43.8 (203)	43.2 (197)	40.0 (112)	43.0% (930)
18 to 19	50.4 (260)	54.5 (242)	53.5 (248)	54.4 (248)	60.1 (182)	54.0% (1180)
Mean (Standard deviation)	17.3 (1.4)	17.4 (1.5)	17.4(1.4)	17.5 (1.4)	17.5(1.5)	17.4 (1.4)
Living with a partner (*p*=0.005)	65.1 (336)	68.1(303)	75.4 (350)	65.8 (300)	69.3(93)	68.6% (1499)
Skin Color (*p*=0.006)						
White	66.7 (344)	65.6 (292)	59.3 (275)	62.7 (286)	73.3 (222)	65.0% (1419)
Brown	19.8 (102)	23.6 (105)	27.4 (127)	25.0 (114)	18.5 (53)	22.9% (501)
Black	13.6(70)	10.8 (48)	13.4 (62)	12.3 (56)	9.2 (28)	12.1% (264)
Mother's schooling years (*p*<0.001)						
1 to 4	8.9 (46)	7.4 (33)	7.3 (34)	3.5 (16)	3.0 (09)	6.3% (138)
5 to 8	59.7 (308)	64.9 (289)	64.0 (297)	65.6 (299)	54.5 (165)	62.2% (1358)
9+	31.4 (162)	27.6 (123)	28.7 (133)	30.9 (141)	42.6 (129)	31.5% (688)
Mean (Standard deviation)	7.3(2.3)	7.4 (2.2)	7.4 (2.2)	7.8 (2.1)	8.1 (2.1)	7.6 (2.2)
Monthly family income in minimum wages (*p*<0.001) (n=2015)						
<1	19.2(95)	16.1 (6.5)	5.0 (22)	11.0 (43)	16.4 (47)	13.5% (272)
1 to 1.9	43.2 (214)	47.5 (192)	46.9 (206)	49.9 (195)	53.2 (152)	47.6% ((959)
2 to 3.9	29.1 (144)	30.0 (121)	41.2 (181)	31.5 (123)	28.3 (81)	32.3% (650)
4+	8.5 (42)	6.4 (26)	6.8 (30)	7.8 (30)	2.1 (06)	6.7% (134)
Median	1.4	1.5	1.9	1.7	1.4	1.6
Performed paid work during pregnancy (*p*=0.014)	13.2 (68)	18.0 (80)	15.7 (73)	17.5 (80)	13.2 (40)	15.6% (341)
Whether the partner was employed (*p*<0.001) (n=2032)	24.4 (151)	19.1 (111)	9.5 (66)	31.0 (164)	24.9 (205)	78.4% (1594)
Smoked (before and during) pregnancy (*p*<0.001)	21.1 (109)	18.4 (82)	14.0 (65)	9.9 (45)	8.9 (27)	15.0% (328)
Unplanned pregnancy (*p*=0.015)	72.7 (375)	74.4 (331)	75.9 (352)	73.5 (335)	82.4 (251)	75.3% (1644)
Parity (*p*=0.002)						
1	76.6 (395)	76.6 (341)	85.6 (397)	78.5 (358)	75.9 (230)	78.8% (1721)
2+	23.4 (121)	23.4 (104)	14.4 (67)	21.5 (98)	24.1 (73)	21.2% (463)
Previous miscarriage (*p*=0.082)	8.3 (43)	5.6 (25)	5.0 (23)	4.6 (21)	4.9 (15)	5.8% (127)
Performed prenatal care in: (*p*=0.001)						
Public sector	79.8 (394)	79.1 (334)	77.4 (350)	82.1 (368)	89.6 (259)	81.0% (1705)
Private sector	20.2 (100)	20.9 (88)	22.6 (102)	17.9 (80)	10.4 (30)	19.0% (400)
Performed adequate prenatal care* (*p*<0.001)	13.8 (71)	31.9 (142)	43.8 (203)	42.8 (195)	54.5 (159)	35.3% (770)
Total (n)	23.6 (516)	20.4 (445)	21.3 (464)	20.9 (456)	13.9 (303)	100.0% (2184)

* Initiated prenatal care in the first trimester of pregnancy, had six or more consultations and at least two tests for HIV, syphilis, and a common urine test.

weight, prematurity, and hospitalizations in the immediate postpartum period.[4,6,22,23]

White and brown adolescents had a PR of approximately 40% greater adequate prenatal care than Black ones. The worst coverage observed among Black puerperae has been denounced for a long time.[24,25] Generally, Black pregnant women start prenatal care later and have fewer appointments, clinical procedures, and laboratory tests. This situation holds even after adjusting for demographic, socioeconomic, reproductive, behavioral, and nutritional characteristics.[6,8,26,27] Public policy managers need to tackle this problem more effectively, from program design to training those who deliver care to the client.[25]

The proportion of Rio Grande do Sul puerperae living with a partner is very similar to that observed in several other locations in Brazil, around 75%-80%.[6,8] In Rio Grande, living with a partner favored adequate prenatal care. The presence of a partner was beneficial for adequate

Table 3

Prevalence by category and crude and adjusted analysis for factors associated with performing adequate prenatal care among postpartum adolescents in the municipality of Rio Grande (RS), Brazil, 2007-2019.

Level	Characteristic	Prevalence of adequate prenatal care (%)	Prevalence ratio and CI95%	
			Crude	Adjusted
I	Maternal age (years)	*p*<0.001	*p*<0.001	*p*=0,022
	11 to 15	19.7(13)	1.00	1,00
	16 to 17	30.9 (290)	1.57 (0.96-2.58)	1,55 (0,89-2,72)
	18 to 19	39.6 (467)	2.01 (1.23-3.29)	1,78 (1,02-3,10)
	Skin color	*p*<0.001	*p*<0.001	*p*=0,008
	White	37.4 (531)	1.54 (1.23-1.93)	1,42 (1,09-1,85)
	Brown	34.9 (175)	1.44 (1.13-1.84)	1,45 (1,13-1,85)
	Black	24.2 (64)	1.00	1,00
	Living with a partner	*p*<0.001	*p*<0.001	*p*=0,001
	Yes	39.4 (590)	1.50 (1.30-1.72)	1,32 (1,12-1,55)
	No	26.3 (180)	1.00	1,00
	Maternal schooling (years)	*p*<0.001	*p*<0.001	*p*=0,002
	0 to 4	23.2 (32)	1.00	1,00
	5 to 8	33.3 (452)	1.43 (0.89-1.73)	1,47 (1,04-2,06)
	9+	41.6 (286)	1.79 (1.15-2.18)	1,73 (1,22-2,46)
	Monthly family income in minimum wages	*p*=0.174	*p*=0.174	*p*=0,383
	<1	30.5 (83)	1.00	1,00
	1 to 3.9	35.6 (573)	1.17 (0.96-1.41)	1,09 (0,89-1,33)
	4+	38.8 (52)	1.27 (0.96-1.68)	1,14 (0,86-1,52)
	Whether they performed paid work during pregnancy	*p*=0.556	p=0.552	p=0,478
	Yes	36.7 (125)	1.05 (0.90-1.22)	0,94 (0,80-1,11)
	No	35.0 (645)	1.00	1,00
	Whether the partner was employed	*p*=0.008	*p*=0.011	*p*=0,088
	Yes	37.9 (604)	1.22 (1.05-1.42)	1,16 (0,98-1,37)
	No	31.1 (136)	1.00	1,00
II	Previous miscarriage	*p*=0.670	*p*=0.666	*p*=0,003
	Yes	37.0 (47)	1.05 (0.83-1.33)	1,49 (1,15-1,95)
	No	35.1 (723)	1.00	1,00
	Parity	*p*<0.001	*p*<0.001	*p*<0,001
	1	38.1 (656)	1.54 (1.31-1.84)	1,72 (1,41-2,11)
	2+	24.6 (114)	1.00	1,00
	Planned pregnancy	*p*=0.003	*p*=0.002	*p*=0,334
	Yes	40.6 (219)	1.21 (1.07-1.37)	0,94 (0,83-1,07)
	No	33.5 (551)	1.00	1,00
	Performed prenatal care in:	*p*=0.317	*p*=0.311	*p*=0,345
	Public sector	36.1 (615)	1.00	1,00
	Private sector	38.7 (155)	1.07 (0.94-1.23)	0,93 (0,81-1,08)

III	Smoked before and during pregnancy	*p*<0.001	*p*=0.008	*p*=0,004
	Yes	24.2 (80)	1.00	1,00
	No	37.2 (690)	1.55 (1.26-1.89)	1,36 (1,11-1,67)
	Alcohol consumption duringpregnancy	*p*=0.021	*p*=0.034	*p*=0,074
	Yes	24.2 (23)	1.00	1,00
	No	35.8 (747)	1.47 (1.03-2.12)	1,38 (0,97-1,95)
	Where being treated for at least an illness during pregnancy*	*p*=0.786	*p*=0.322	*p*=0,414
	No	32.3 (592)	1.00	1,00
	Yes	36.3 (178)	1.06 (0.94-1.19)	1,05 (0,93-1,18)
	Total	35.3 (770/2184)		

*Have been treated for at least one of these conditions during pregnancy: high blood pressure, diabetes, depression, anemia, and self vaginal discharge.

Adjusted model:

Level I: Adjusted for: maternal age, skin color, living with a partner, maternal schooling, monthly family income in minimum wages, whether they performed paid work during pregnancy, whether the partner was employed.

Level II: Adjusted for: maternal age, skin color, living with a partner, maternal schooling, monthly family income in minimum wages, whether the partner was employed, previous miscarriage, parity, planned pregnancy, performed prenatal care in public or private sector, smoked before and during pregnancy, alcohol consumption during pregnancy and were being treated for an illness during pregnancy.

Level III: Adjusted for: maternal age, skin color, living with a partner, maternal schooling, monthly family income in minimum wages, whether the partner was employed, previous miscarriage, parity, smoked before and during pregnancy, alcohol consumption during pregnancy and were being treated for an illness during pregnancy.

prenatal care and reducing the incidence of low birth weight[6], greater supplementation with folic acid[28] and ferrous sulfate.[29] Thus, regarding prenatal care, having a partner benefits maternal and child health.

No important maternal and child health outcome is exempt from the influence of maternal schooling.[30] Generally, the higher the mother's schooling level, the better her health indicators and those of her offspring.[7,29,30] Although the effect of schooling on the adequacy of prenatal care is more evident when it includes older mothers, therefore with higher education, the results obtained here show that this is already found in adolescence, even with few study years.

Adolescents who suffered an abortion showed a greater PR for adequate prenatal care. We did not find, even for pregnant women of any age, a single study evaluating the possible effect of previous (spontaneous or induced) abortions on performing adequate prenatal care (or not), not even outside Brazil. Almost all studies that evaluate prenatal care only control for demographic, socioeconomic, lifestyle, and behavior characteristics and type of service (public or private) and include only parity when showing reproductive ones.[31-33] It is quite possible that because these women have suffered a traumatic situation, including a potential risk of death, when pregnant again, they take more and better care of themselves, which ends up resulting in better quality prenatal care.

The PR for adequate prenatal care among primiparous women was substantially higher than the others. This result can be attributed to the first delivery's clinical condition, which is a risk situation, but also due to the concern, anxiety, and novelty of the parturient and family members.

After this moment, one would assume that subsequent pregnancies, especially if the first one was successful, which occurs in most cases, demand less concern and, thus, multiparous women have a lower PR for adequate prenatal care.

Non-smoking adolescents showed a higher PR for adequate prenatal care. A similar result was observed in Aracaju (SE), where the PR of not performing adequate prenatal care among smokers reached 2.25 (CI95% = 1.69-2.99) compared to non-smoking mothers.[33] This result suggests that some risk behaviors are important factors associated with inadequate use of health services, in this case, prenatal care.

Like so many other studies addressing the subject, at least one limitation needs to be mentioned about how to retrieve the information. Most information derives from the mother's report, not medical or hospital records. Data from the Pregnant Woman's Card were copied, but only half were in possession. Even so, they needed to be more complete, mainly regarding procedures and laboratory tests performed. Some forgetfulness or inaccuracy for one or another referred value may have occurred. If, on the one hand, this does not provide exact information, it at least ensures comparability with other studies, especially population-based ones, invariably affected by this problem.

This study shows that adequate prenatal care among adolescents has improved considerably in the municipality. However, there is still much to be done for their benefit since half of them have not yet reached this condition. It also showed that the factors that most contributed to achieving this condition are not the same as those observed regarding older pregnant women and that, even among

adolescents, the magnitude of the effect varies because they are different. Thus, treating them as if they were equal does not seem reasonable because it diminishes the potential impact of interventions and perpetuates inequalities. We need to prioritize the most vulnerable, or we will continue living with high levels of maternal and child morbimortality in an economically thriving country with a universal health system but unequal access.

Author's contribution

Cesar JA: study design, data analysis, drafting of the manuscript. Saavedra JS and Marmitt LP: assisted in data analysis and interpretation, drafting of the manuscript. Mendoza-Sassi RA: assisted in data interpretation, drafting of the manuscript. The authors approved the final version of the article and declare no conflict of interest.

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