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# Is adolescent pregnancy a risk factor for low birth weight?

## Gravidez na adolescência é fator de risco para o baixo peso ao nascer?

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### ABSTRACT

**OBJECTIVE:** The objective of this study was to evaluate whether adolescent pregnancy is a risk factor for low birth weight (LBW) babies.

**METHODS:** This was a cross-sectional study of mothers and their newborns from a birth cohort in Aracaju, Northeastern Brazil. Data were collected consecutively from March to July 2005. Information collected included socioeconomic, biological and reproductive aspects of the mothers, using a standardized questionnaire. The impact of early pregnancy on birth weight was evaluated by multiple logistic regression.

**RESULTS:** We studied 4,746 pairs of mothers and their babies. Of these, 20.6% were adolescents (< 20 years of age). Adolescent mothers had worse socioeconomic and reproductive conditions and perinatal outcomes when compared to other age groups. Having no prenatal care and smoking during pregnancy were the risk factors associated with low birth weight. Adolescent pregnancy, when linked to marital status "without partner", was associated with an increased proportion of low birth weight babies.

**CONCLUSIONS:** Adolescence was a risk factor for LBW only for mothers without partners. Smoking during pregnancy and lack of prenatal care were considered to be independent risk factors for LBW.

**DESCRIPTORS:** Pregnancy in Adolescence. Infant, Low Birth Weight. Prenatal Care. Risk Factors. Socioeconomic Factors. Cross-Sectional Studies.

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## RESUMO

**OBJETIVO:** Avaliar a gravidez na adolescência como fator de risco para baixo peso ao nascer.

**MÉTODOS:** Estudo transversal incluído numa coorte de puérperas e seus respectivos recém-nascidos, nas quatro maternidades de Aracaju, SE, de março a julho de 2005. Os dados foram coletados consecutivamente durante quatro meses. Variáveis sociais, biológicas e assistenciais foram obtidas por meio de questionário padronizado. Foi realizada regressão logística múltipla, com controle de fatores de confusão e de modificação.

**RESULTADOS:** Foram estudados 4.746 pares de mães/recém-nascidos. Dessas, 20,6% eram adolescentes (< 20 anos). As mães adolescentes apresentaram piores condições socioeconômicas, reprodutivas e resultados perinatais mais adversos, quando comparadas com outros grupos etários. Foram identificados como fatores de risco associados ao baixo peso ao nascer a ausência de assistência no pré-natal e tabagismo na gestação. Identificou-se interação da idade materna com a situação conjugal: mães adolescentes sem companheiro tiveram maiores proporções de baixo peso ao nascer.

**CONCLUSÕES:** A adolescência mostrou-se fator de risco para baixo peso ao nascer entre as mães sem companheiro. Tabagismo durante a gestação e ausência de assistência pré-natal associam-se ao baixo peso ao nascer.

**DESCRIPTORIOS:** Gravidez na Adolescência. Recém-Nascido de Baixo Peso. Cuidado Pré-Natal. Fatores de Risco. Fatores Socioeconômicos. Estudos Transversais.

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## INTRODUCTION

Adolescence is chronologically defined by the World Health Organization (WHO) as the period from ten to 19 years old. It is characterized by profound and extensive changes in physical and psychological aspects, with individual, family, and social repercussions.<sup>16</sup>

Brazil is in a phase of demographic transition, characterized by a significant reduction in the fecundity rate associated with a corresponding dislocation of reproduction to older age ranges, especially in areas of greater development, similar to what has occurred in central, industrialized countries.<sup>3</sup> In Pelotas, Southern Brazil, there was an increase in the proportion of mothers at the extremes of reproductive life (< 20 years or ≥ 34 years) over a period of two decades (1982, 1993 and 2004). The percentage of adolescent mothers in 2004 was higher than in the two previous cohorts.<sup>19</sup>

Low birth weight (LBW, birth weight < 2,500 g) is particularly important among the problems associated with increased perinatal mortality and morbidity when the outcome of pregnancy is evaluated. It is also the most important independent indicator of infant

morbidity-mortality.<sup>2</sup> The LBW rate represented about 8% of all live births in Brazil in 2005,<sup>a</sup> as opposed to a mean 4 to 5% rate of all live births in developed countries.<sup>12</sup>

Higher percentages of LBW are observed in children of adolescent mothers, as was the case in the city of São Luís, Northeastern Brazil, 1997/98, with 13.2% and 11.7% rates among mothers < 18 and 18 to 19 years old, respectively.<sup>21</sup> The incidence of LBW among adolescents is more than double that in adult women, and neonatal mortality (zero to 28 days) is approximately three times higher, increasing the risk of morbidity-mortality during the first year of life.<sup>2</sup>

According to Strobino et al,<sup>22</sup> three different hypotheses can be raised to explain higher LBW rates among children of adolescent mothers in the United States: social disadvantage, biological immaturity and unhealthy behavior during pregnancy. However, after controlling for variables directly related to unfavorable living conditions, no differences in birth weight were observed between adolescent mothers and mothers of other age ranges.

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<sup>a</sup> Ministério da Saúde. Sistema de Informações sobre Nascidos Vivos – SINASC. Brasília (DF); 1990 [cited 2008 Jan 24]. Available from: <http://www.datasus.gov.br>

Despite the relevance of this topic, there are no recent studies in the literature investigating the effect of demographic transition on the outcome of pregnancy among adolescent mothers, especially in less developed areas of Brazil.

This study aimed to evaluate if adolescent pregnancy is a risk factor for LBW.

## METHODS

A cross-sectional study conducted from 3/8/2005 to 7/15/2005 at the four maternity hospitals of the municipality of the city Aracaju, Northeastern Brazil, on women residing in the metropolitan region of Aracaju (Greater Aracaju) who participated in a birth cohort of hospital deliveries of singleton babies.

The metropolitan area of Aracaju comprises four municipalities: Aracaju, capital of the state of Sergipe, Barra dos Coqueiros, Nossa Senhora do Socorro, and São Cristóvão. These municipalities together had a population of approximately 730,000 inhabitants in 2005, 491,127 concentrated in the capital.<sup>b</sup>

The births due to occur in 2005 in Aracaju, were estimated at 13,521 children. This number was projected based on the numbers of 2004, according to the Coordination of Health Information, State Health Secretariat of Sergipe. We study approximately 1/3 of all live births in a consecutive manner over a period of four months in 2005, considering a sample of 4,510 children/mothers.

We used a standardized questionnaire containing 114 open and closed questions divided into eight blocks: identification, data concerning the mother and father of the newborn, data regarding pregnancy, data regarding infant deaths, and obstetrical history.

Multiple births (53), stillbirths (74), incorrect data and refusals (0.2%) were excluded. Details of the methodology used are available in a previous publication.<sup>9</sup>

The following variables were collected: maternal age (< 18, 18 to 19, 20 to 34 and  $\geq$  35 years old), area of origin (urban and rural), self-reported skin color (white; non-white), maternal marital status (with; without a partner), maternal remunerated activity (yes; no), family income in minimum wages (< 3 and  $\geq$  3 minimum wages – MW), parity, corresponding to all previous pregnancies and including the current one (1, 2, 3 to 4 and  $\geq$  5), smoking during pregnancy (yes; no), weekly frequency of use of alcoholic beverages during pregnancy (none, < 2 and  $\geq$  2 units/week), category of

prenatal care (public and private), category of hospitalization (public; private), type of delivery (vaginal; cesarean), and low birth weight of the infant (yes; no), considered to be the weight measured immediately after birth, with an approximation of 50 g.

In the evaluation of maternal schooling, it was considered that, at the youngest age detected in the sample (13 years), the adequate number of years of study would be six years. Thus, this variable was categorized as < 6 and  $\geq$  6 years of study.

Gestational age (GA) was evaluated based on the date of last menstrual period (DLMP) provided by the mother. When the mother did not remember the day but remembered the month, day 15 of that month was standardized for the calculations. When the day and month of last menstrual period were unknown, the Capurro score was used for GA calculation (evaluated by the pediatrician who cared for the child). The duration of gestation was considered in complete weeks:  $\leq$  32, 33 to 36 and  $\geq$  37.

An Index for the Evaluation of Prenatal Care was constructed using as reference the Adequacy of Prenatal Care Utilization (APNCU)<sup>16</sup> but considering the guidelines of the Ministry of Health of Brazil. These guidelines recommend a minimum of six prenatal visits for low risk pregnancies for a term pregnancy, or a smaller number of visits according to GA: five for 33-36 weeks, four for 29-32 weeks, three for 24-28 weeks, and two for < 24 weeks.<sup>c</sup> Prenatal care was considered adequate when based on the criteria described or inadequate when it was not based on these criteria, adjusted for GA, or absent (no prenatal care).

The Chi-square test was used to compare proportions between the general characteristics of the sample, with the level of significance set at 0.05. Multiple logistic regression was used to calculate the odds ratios and 95% confidence interval for low birth weight, with the variables entered in the model being those that had obtained a Chi-square value of  $p < 0.25$ . The variables with  $p < 0.05$  remained in the final adjusted model. The duration of gestation was entered in this model as a numerical variable. Interactions were studied by analyzing the effect of each variable on each level of the other.

All mothers received detailed information about the objective of the research. The interviews were held after delivery, with the mothers in good physical condition. The research satisfied all required ethical principles and was approved by the Research Ethics Committee of the *Universidade Federal de Sergipe*, Northeastern Brazil (Process nº 138/2004).

<sup>b</sup> Instituto Brasileiro de Geografia e Estatística. Censos Demográficos e Contagem Populacional IBGE. Estimativas preliminares dos totais populacionais, estratificadas por idade e sexo pelo MS/SE/Datasus. Brasília; 2009.

<sup>c</sup> Ministério da Saúde. Secretaria de Atenção à Saúde. Pré-natal e puerpério: atenção qualificada e humanizada. Manual Técnico. Brasília (DF); 2005.

## RESULTS

Of the 4,746 mother-child pairs included, 20.6% involved adolescent mothers, 9.6% of them being mothers < 18 years and 11% mothers aged 18 to 19 years. The mean (SD, standard deviation) age of adolescent mothers was 17.3 (SD 1.43 years). Almost all of these mothers (92.1%) were from the urban area and 88.7% self-reported their color as non-white.

A greater proportion of adolescent mothers had no partner and had low schooling, especially those younger than 18 years compared to the remaining age groups. Remunerated activity was almost six times less frequent among adolescents than among older mothers ( $\geq 35$  years). A family income  $\geq 3$  MW and smoking during pregnancy were less frequent among adolescents than among the other age groups. There was no difference between age ranges regarding the consumption of alcoholic beverages (Table 1).

About 1.5% of the women studied reported receiving no prenatal care; this proportion among adolescent mothers was twice that for the other mothers. Similarly, adolescent mothers presented a higher rate of inadequate prenatal care. Low birth weight occurred in 7.2% of

births and the rate was about two times higher among adolescents < 18 years than among mothers of the other age groups, and was approximately 30% higher among adolescents aged 18 and 19 years. Preterm births were also more frequent among adolescents than among mothers aged 20 to 34 years. Adolescents more frequently received care during delivery at the Brazilian Unified Health System (SUS) and had lower rates of cesarean delivery, i.e., about half the rate observed for the remaining women (Table 2).

Unadjusted analysis (Table 3) showed that maternal age, adequacy of prenatal care, family income, marital status, maternal schooling, smoking during pregnancy, alcohol intake during pregnancy, prenatal category and preterm birth were statistically significant factors for infant LBW ( $p < 0.05$ ).

Persisting risk factors for LBW after adjusting for confounding factors (Table 4) were: mothers who did not receive prenatal care (OR 2.35; 95%CI 1.10;5.05) and smoking during pregnancy (OR 2.04; 95%CI 1.28;3.25). Each week of increased gestational age represented a 47% reduction of the risk of LBW (OR 0.53; 95%CI 0.49;0.56). There was interaction between maternal age and marital status, with the

**Table 1.** Demographic, socioeconomic and behavioral characteristics according to maternal age range. Aracaju, Northeastern Brazil, 2005.

Demographic and socioeconomic characteristics	Maternal age (years)									
	13 to 17 (n = 457)		18 to 19 (n = 523)		20 to 34 (n = 3,334)		> 35 (n = 432)		Total (n = 4,746)	
	n	%	n	%	n	%	n	%	n	%
Marital status <sup>a</sup>										
With no partner	138	30.2	115	22.0	592	17.8	84	19.6	929	19.6
With a partner	319	69.8	408	78.0	2,740	82.2	348	80.4	3,815	80.4
Schooling (years) <sup>a</sup>										
$\leq 6$	239	53.3	205	39.6	1,135	34.2	148	34.3	1,727	36.7
> 6	209	46.7	313	60.4	2,180	66.8	283	65.7	2,985	63.3
Family income (MW) <sup>a</sup>										
< 3	384	84.6	434	83.5	2,183	65.8	268	62.2	3,269	69.2
$\geq 3$	70	15.4	86	16.5	1,135	34.2	163	37.8	1,454	30.8
Remunerated activity <sup>a</sup>										
No	426	93.2	471	90.2	2,135	64.2	224	52.2	3,256	68.8
Yes	31	6.8	51	9.8	1,191	35.8	205	47.8	1,478	31.2
Maternal smoking <sup>a</sup>										
Yes	26	5.7	26	5.0	163	4.9	36	8.4	251	5.3
No	431	94.3	497	95.0	3,170	95.1	395	91.6	4,493	94.7
Use of alcoholic drinks during pregnancy (weekly)										
< 2 times	93	20.4	105	20.1	685	20.6	85	19.7	968	20.4
2 or more times	1	0.2	4	0.8	8	0.2	2	0.5	15	0.3
No use	363	79.6	413	79.0	2,640	79.2	344	79.8	3,760	79.3

<sup>a</sup>  $p < 0.05$  (Chi-square test)

MW: minimum wages

**Table 2.** Characteristics of prenatal care and delivery, duration of pregnancy and low birth weight according to maternal age range. Aracaju, Northeastern Brazil, 2005.

Characteristics	Maternal age									
	< 18 (n = 457)		18 and 19 (n = 523)		20 to 34 (n = 3,334)		> 35 (n = 432)		Total (n = 4,746)	
	n	%	n	%	n	%	n	%	n	%
Adequacy of prenatal care <sup>a</sup>										
No prenatal care	15	3.4	15	3.0	38	1.2	7	1.7	75	1.5
Inadequate	210	47.8	198	39.0	955	30.0	102	24.3	1,465	32.2
Adequate	214	48.8	294	56.0	2,194	68.8	310	74.0	3,012	66.3
Duration of gestation (weeks) <sup>a</sup>										
≤ 32	10	2.2	7	1.3	37	1.1	7	1.6	61	1.3
33 to 36	42	9.2	39	7.5	179	5.4	30	6.9	290	6.1
≥ 37	382	83.6	456	87.2	2,945	88.3	378	87.6	4,161	87.7
No information	23	5.0	21	4.0	173	5.2	17	3.9	234	4.9
Type of hospital <sup>a</sup>										
Public	431	94.5	491	94.4	2,789	83.8	330	76.6	4,041	85.3
Private	25	5.5	29	5.6	540	16.2	101	23.4	695	14.7
Type of delivery <sup>a</sup>										
Vaginal	373	81.6	430	82.2	2,194	65.8	250	57.9	3,247	68.4
Cesarean	84	18.4	93	17.8	1,139	34.2	182	42.1	1,498	31.6
Low birth weight <sup>a</sup>										
Yes	61	13.4	47	9.0	201	6.0	31	7.2	340	7.2
No	394	86.6	474	91.0	3,122	94.0	400	92.8	4,390	92.8

<sup>a</sup> p < 0.05 (Chi-square test)

chance of mothers < 18 years with no partner having LBW babies being about three times (OR 3.11; 95%CI 2.00;4.84) that of mothers aged 20 to 24 years old. If the adolescent was 18 or 19 years, this ratio was reduced approximately two-fold (OR 1.95; 95%CI 1.22;3.12). There was no association of maternal age with LBW among the mothers who reported living with a partner. There was no interaction between maternal age and the remaining variables in the adjusted model.

## DISCUSSION

The LBW rate observed in Aracaju was similar to that observed in the city of Ribeirão Preto, Southeastern Brazil, almost 30 years before the present study (1978/79), and also similar to that observed in the city of São Luís, Northeastern Brazil, almost ten years before (1997/98).<sup>20</sup> The present study shows that pregnancy during adolescence is still associated with unfavorable outcomes such as LBW, but this outcome was linked to social vulnerability since it was only observed among adolescents without a partner. Shorter gestational age, absence of prenatal care and smoking during pregnancy also had an independent effect on LBW rates in Aracaju.

The percentage of deliveries among adolescent mothers in Greater Aracaju was 20.6%, a lower rate than that

reported for Brazil as a whole:<sup>c</sup> 25.4% for 2005. A greater proportion (29.4%) was detected in the municipality of the city of São Luís,<sup>21</sup> also a capital city in the Brazilian Northeastern, in a population study conducted in 1997/1998. The rates observed in Brazil are higher than those of developed countries even when considering the types of investigation, the population structures, the behavioral patterns and the year of the study. In the United States, there has been a 24.0% reduction in the rate of pregnancies among women aged ten to 19 years since 1990, with a rate of 8.7% being reached between 1995 and 2000.<sup>8</sup>

The occurrence of unfavorable outcomes among adolescent mothers is attributed to biological immaturity, especially regarding low weight<sup>21</sup> and preterm birth.<sup>7</sup> Recent data from the United Kingdom indicate that the rate of small for gestational age babies born to adolescent mothers who were still growing did not differ from that of adult women and that these mothers gave birth to heavier babies and to a greater proportion of large for gestational age babies.<sup>10</sup> The authors attributed this finding to the greater weight gain and higher IGF-1 (insulin-like growth factor) levels among growing pregnant women even after controlling for confounding factors. However, data on healthy adolescents from developed countries cannot be extrapolated to developing countries where poverty,

**Table 3.** Distribution of liveborns with and without low weight according to the demographic, reproductive, prenatal care and delivery variables. Aracaju, Northeastern Brazil, 2005.

Variable	Low weight		No low weight		Total	p <sup>a</sup>
	n	%	n	%		
Maternal age (years)						
< 18	61	13.4	394	86.6	455	< 0.001
18 and 19	47	9.0	474	91.0	521	
20 to 34	201	6.1	3,122	93.9	3,323	
> 35	31	7.2	400	92.8	431	
Adequacy of prenatal care						
No prenatal care	20	26.7	55	73.3	75	< 0.001
Inadequate	116	7.9	1,345	92.1	1,461	
Adequate	186	6.2	2,818	93.8	3,004	
Skin color						
Non-white	287	7.1	3,765	92.9	4,052	0.480
White	53	7.8	623	92.2	676	
Family income (minimum wages)						
<1	55	9.8	508	90.2	563	0.024
1 < 3	190	7.0	2,508	93.0	2,698	
≥ 3	91	6.3	1,355	93.7	1,446	
Marital status						
No companion	135	14.7	786	85.3	921	< 0.001
With a companion	205	5.4	3,602	94.6	3,807	
Maternal schooling (years)						
≤ 6	145	8.4	1,577	91.6	1,722	0.010
> 6	191	6.4	2,783	93.6	2,974	
Smoking during pregnancy						
Yes	35	14.0	215	86.0	250	< 0.001
No	305	6.8	4,173	93.2	4,478	
Use of alcohol during pregnancy						
Yes	90	9.2	886	90.8	976	0.0006
No	250	6.7	3,502	93.3	3,752	
Type of delivery						
Vaginal	241	7.5	2,994	92.5	3,235	0.270
Cesarean	98	6.6	1,396	93.4	1,494	
Prenatal category						
No prenatal care	20	27.4	55	72.6	75	< 0.001
SUS (public)	251	7.0	3,345	93.0	3,596	
Private	68	6.5	985	93.5	1,053	
Category of hospitalization						
SUS	298	7.4	3,731	92.6	4,029	0.216
Private	42	6.1	649	93.9	691	
Preterm birth						
Yes	159	45.8	178	54.2	347	< 0.001
No	166	4.0	3,988	96.0	4,154	
Total	340	7.2	4,390	92.8	4,730	

The total differs in each variable due to imprecise information about the characteristic analyzed

SUS: Brazilian Unified Health System

<sup>a</sup>p calculated by the Chi-square test

**Table 4.** Adjusted odds ratio (OR) and 95% confidence intervals (95%CI) for low birth weight. Aracaju, Northeastern Brazil, 2005.

Variable	OR	95%CI
Duration of pregnancy (weeks)	0.53	0.49;0.56
Adequacy of prenatal care		
No prenatal care	2.35	1.10;5.05
Inadequate	1.16	0.88;1.56
Adequate	1	-
Maternal smoking during pregnancy		
Yes	2.04	1.28;3.25
No	1	-
Age x marital status interaction		
Age of mothers without a companion		
< 18	3.11	2.00;4.84
18 and 19	1.95	1.22;3.12
20 to 34	1	-
≥ 35	1.03	0.57;1.84
Age of mothers with a companion		
< 18	0.86	0.45;1.65
18 and 19	0.63	0.30;1.33
20 to 34	1	-
≥ 35	1.03	0.41;2.15

low educational level and limited access to health care result in significant differences for adolescents, with different challenges to their health.

The adolescent mothers in the present study, especially those < 18 years, had higher proportions of more unfavorable socioeconomic indicators, showing that the adolescent group was not homogeneous and that younger mothers may be more exposed to risks.<sup>15</sup> These mothers were from families of lower income and were less involved in remunerated activities. They had less access to adequate prenatal care, fewer admissions to private hospital institutions and a lower frequency of cesarean sections, as also demonstrated by Papamicheal et al,<sup>17</sup> facts that may be related to an underprivileged social situation.

Almeida et al<sup>1</sup> pointed out a very close relationship between inadequacy of prenatal care and low family income and low schooling. The inadequacy or absence of prenatal care may occur in the adolescent group due to the difficulty of these young women in identifying and accepting their pregnancy, in addition to specific difficulties related to health services such as restricted access and prejudice. In Finland, Raatikainen et al<sup>18</sup> observed that inadequate prenatal care was associated with behavioral risk factors such as maternal single status, low educational level, young age, as well as smoking and alcohol consumption during pregnancy.

Studies conducted in Brazil have underscored the heterogeneity of the group of adolescent mothers. Although biological immaturity can be considered to be a factor predisposing them to unfavorable pregnancy outcomes,<sup>4,7,21</sup> differences in the frequency of these outcomes are observed when socioeconomic factors are considered. In the city of Ribeirão Preto, Southeastern Brazil, adolescent mothers from the underprivileged class had greater proportions of unfavorable outcomes than mothers of the upper social class and the latter, in turn, had proportions of these outcomes similar to those of adult mothers.<sup>6</sup> In the present study, living without a partner represented a risk factor for LBW for the adolescents and an even greater risk for younger mothers, probably due to the socioeconomic and psychological peculiarities faced by adolescent pregnant girls during this period of life. Results similar to these were reported by Kilsztajn et al<sup>13</sup> in a study conducted in the state of São Paulo, Southeastern Brazil, in which mothers < 20 years were found to be categories of risk for LBW and prematurity.

Other social and economic factors such as family income, maternal schooling, marital status and category of prenatal care were initially found to be significantly associated with LBW in unadjusted analysis. However, after adjustment, the category of prenatal care and the modifying effect of marital situation on maternal age regarding LBW continued to be associated with this outcome.

The prevalence of maternal smoking during pregnancy was similar to that observed in the 1997/98 birth cohort of São Luís,<sup>21</sup> Northeastern Brazil, and lower than that observed in the city of Ribeirão Preto, Southeastern Brazil, in 1994<sup>7</sup> and in Pelotas in 2004.<sup>20</sup> The adolescent mothers of Aracaju smoked less than the mothers aged 35 years and over. Smoking was an independent factor for LBW, as also observed in a study that compared the findings for the cohorts of the city of São Luís, in 1997/98, and of the city of Ribeirão Preto, in 1994.<sup>21</sup>

Alcohol is teratogenic and its effects include miscarriage, restricted growth, birth defects, and mental retardation.<sup>11</sup> In Germany,<sup>5</sup> 14% of the mothers consumed alcoholic beverages during pregnancy, 1% on a regular basis. In the present study, the behavior of the adolescents regarding alcohol consumption during pregnancy was similar to that of mothers of the other age ranges. In unadjusted analysis, alcohol intake during pregnancy, without considering quantity, was a risk factor for LBW; however, this association did not persist after adjustment for confounding variables. The low prevalence of alcohol consumption and the small amount consumed (0.3% of the mothers who reported alcohol intake two or more times per week) may possibly explain in part the lack of association of this consumption with LBW.



Although the coverage of prenatal care has increased significantly in Brazil over the last few years, its effectiveness in preventing unfavorable pregnancy outcomes is questioned. Most of the prenatal care provided is inadequate according to the parameters of the Ministry of Health of Brazil, as well as unequal, since patients in less favorable conditions end up receiving inferior prenatal care in terms of both quality and quantity. Adolescent mothers were the group with the highest proportion of lack of care and lack of adequate prenatal care. The absence of prenatal care was associated with LBW even after adjusting for the remaining confounding variables, proving to be a risk factor for this outcome independent of other conditions, including maternal age.

This is a population-based epidemiological study involving a representative sample of pregnant women residing in Aracaju, which consists of more than  $\frac{1}{3}$  of the population of Sergipe. This state is located in a poor region of the country where few similar studies have been conducted, the present one being the second. Few studies of this nature take into account plausible

interactions between independent variables in the determination of outcome. In the present study it was possible to identify the modifying effect of marital status according to maternal age on LBW, showing that mothers were at higher risk for this outcome only when they had no partner, confirming the social characteristic of this association.

A limitation of the study was the lack of inclusion of variables that might be associated with LBW, such as calorie consumption and weight gain during pregnancy.

Maternal age represented a risk for LBW among adolescent mothers who had no partner. Maternal smoking during pregnancy and absence of prenatal care were also factors associated with the outcome under study. It is necessary to expand access to health services to provide care for women in this phase, improving their quality of life in order to include stop smoking strategies. Support networks including families and health services are particularly important for adolescent mothers who can not rely on a stable family structure.

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