Adolescent pregnancy in Cruzeiro do Sul, Acre, Brazil: socioeconomic characteristics, prenatal and obstetric care

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Abstract *The present study aimed to investigate the socioeconomic and obstetric characteristics of adolescent mothers and the complications they cause to maternal and neonatal health. This baseline data analysis of the MINA-Brazil birth cohort was conducted in the municipality of Cruzeiro do Sul, state of Acre, Brazil. The chi-square test was used to compare characteristics of adolescent and adult postpartum women, and multiple Poisson regression models with robust variance were used to assess associated factors. Among the postpartum women, 26.2% (95%CI: 24.0-28.4) were adolescents. Factors associated with childbirth in adolescence included: nine years or less of schooling (adjPR:1.36; 95%CI: 1.14-1.61), belongs to the lowest quartiles of the wealth index (1st quartile: adjPR:1.40; 95%CI: 1.08-1.80) (2nd quartile: adjPR:1.37; 95%CI: 1.08-1.74), primigravidae (adjPR:3.69; 95%CI: 2.98-4.57), low pre-pregnancy BMI (adjPR:1.28; CI95%: 1.04-1.57), urinary tract infection during pregnancy (adjPR:1.25; CI95%: 1.07-1.46) and less than six prenatal consultations (adjPR:1.42; 95%CI: 1.21-1.66). Poverty, little schooling, primigravidae, low pre-pregnancy BMI, urinary tract infection during pregnancy and few prenatal consultations were associated with childbirth during adolescence in a municipality in the Northern region of Brazil.*

Key words *Teenage pregnancy, Childbirth, Prenatal care*

Introduction

Adolescence is a transition phase between childhood and adulthood. The World Health Organization defines adolescence as an age group that ranges from 10 to 19 years[1]. It is an essential development phase marked by fast biological and psychosocial changes that affect all aspects of life, especially sexual and reproductive health[2].

Teenage pregnancy is considered a public health challenge. A large number of early pregnancies result in induced abortions that are performed under adverse conditions and may entail obstetric issues, contributing to a rise in maternal mortality among that age group[3]. In addition to the mentioned risks, there is an increase in the social and economic risk of pregnant adolescents[4].

According to the United Nations Population Fund, approximately 1 million girls under the age of 15, as well as 16 million girls aged between 15 and 19 give birth each year worldwide and 95% of these births occur in developing countries[5].

Despite being high, Brazil's teenage pregnancy rate has been decreasing in recent decades. In 2000, the fertility rate of adolescents aged between 15 and 19 was 81/1,000 adolescents[6]. More recent data from 2018 show a rate of 54/1,000 adolescents, which decreased to 48/1,000 in 2019. There are significant differences in teenage pregnancy rates among Brazilian regions. The Northern Region presents the highest teenage pregnancy rate and the slowest decrease in teenage pregnancies in the last two decades (2000 to 2019)[7].

In Rio Branco, state of Acre, which is part of the western Brazilian Amazon region, a cross-sectional, population-based study found that approximately 70% of all girls who became pregnant from 2007 to 2008 were under 20 years old[8]. A study by Costa et al. on abortion among pregnant adolescents in the state of Acre found another disturbing fact: from 2015 to 2019, 1349 hospitalizations of adolescents due to abortion were registered in the state, i.e., 18% of all hospitalizations due to abortion in that period, the majority of which took place in the capital, Rio Branco, (55.3%) and in the city of Cruzeiro do Sul (11%)[9].

Teenage pregnancy is related to several factors such as schooling, socioeconomic and health factors. However, lack of information on responsible sexuality and family planning are among the main risk factors[10]. According to the Brazilian Ministry of Health, adolescents have the right to reproductive planning assistance with the guarantee of privacy, secrecy and informed consent, free of any kind of discrimination. Health centers have to ensure the provision of that service even before the beginning of the sexual and reproductive activity to encourage prevention and self-care behavior[3].

The present study investigated the socioeconomic, prenatal and obstetric characteristics of pregnant adolescents and their complications on maternal and neonatal health among participants of a birth cohort called "Saúde e Nutrição Materno-Infantil do Acre" (MINA-Brasil) [Maternal and Child Health and Nutrition of Acre] in the city of Cruzeiro do Sul, Acre, Western Brazilian Amazon region, Brazil, to increase knowledge on the topic and to contribute to the planning of health actions aimed at adolescents.

Method

The present analysis is based on data from the MINA-Brasil study, a population-based birth cohort[11]. Between July 2015 and June 2016, pregnant women admitted for delivery at the maternity hospital of the analyzed region were invited to participate in the study. All research procedures were approved by the ethics committee of the Public Health Faculty of the University of São Paulo, Brazil (number 872.613, November 13, 2014).

The municipality of Cruzeiro do Sul, located in the west of the State of Acre, Brazil, is the second largest city of that state. It lies approximately 640 km from the state capital, Rio Branco, and counts just over 80,000 inhabitants, the majority of which (70%) lives in its urban area[12]. The city's only maternity hospital, Hospital da Mulher e da Criança do Juruá, performs all hospital births in the region.

During the study period, all childbirth-related admissions of women residing in Cruzeiro do Sul were surveyed by means of daily visits to the maternity ward. All mothers residing in the municipality were considered eligible, regardless of their area of residence (urban or rural). The research team visited the mothers in the first 24 hours after delivery, before hospital discharge, to explain the study protocol and invite them to participate in the survey, which was formalized by a consent form. Adolescents were asked to sign an assent form and their guardians a consent form.

Information was obtained through interviews with the mothers during hospitalization, from the medical records of the mothers and

their newborn children, and from their prenatal cards, which were photographed and transcribed into the database.

For the present analysis, all postpartum women younger than 20 years old were considered adolescents, following the classification of the World Health Organization[1].

The following covariates were evaluated: educational level of mothers (full years of formal education); self-reported skin color (the sample was composed of 11.8% white, 4.3% black, 77% brown, 1.4% indigenous and 5.5% yellow), which was classified as white or non-white for this analysis; living with a partner (yes/no); engaged in a paid occupation (yes/no); head of the household (yes/no); beneficiary of the Bolsa Família Program (yes/no); area of residence (rural/urban); primiparous (yes/no); previous abortion history (yes/no); current pregnancy was planned (yes/no); use of contraceptive method (yes/no). In addition, to evaluate the socioeconomic status of the participants' families, a wealth index was created using a principal component analysis according to the presence of household goods. Scores for each asset were summed, creating a household wealth index that was later divided into quartiles (the first quartile represents the poorest families and the fourth one the richest families)[13]. Prepregnancy weight and height of pregnant women was obtained from the pregnant women's primer. The pregestational Body Mass Index (BMI) was calculated by dividing the pregestational weight by the squared height and classified according to WHO criteria[14]: underweight (< 18.5 kg/m²), normal weight (18.5 to 24.9 kg/m²), overweight (25.0 to 29.9 kg/m²) or obese (≥ 30 kg/m²). For adolescents up to 19 years of age, the WHO's BMI classification was also used, which in a previous evaluation proved to be more adequate for use in Brazilian adolescents than the Child Growth Patterns[15].

Pregnancy and prenatal care characteristics were evaluated, such as smoking during pregnancy (yes/no), alcohol use during pregnancy (yes/no), self-reported chronic hypertension (yes/no), self-reported urinary tract infection during pregnancy (yes/no), number of prenatal consultations (< 6 or ≥ 6 consultations), start of prenatal care in the first quarter (yes/no) and malaria during pregnancy (yes/no). History of malaria during pregnancy was defined by combining prenatal diagnosis performed by microscopy of thick capillary blood smears according to epidemiological surveillance data (http://200.214.130.44/sivep_malaria/), with an evaluation by the research team in charge of species-specific real-time Polymerase Chain Reaction (PCR) performed on venous blood samples collected at the time of delivery, as described elsewhere[16].

Final gestational weight was obtained from medical records, which was measured moments before delivery by the nursing team of the maternity hospital, as detailed in a previous publication[17]. A scale by Welmy (Santa Bárbara d'Oeste, Brazil) was used, model W-200A LED, with a 200-kg capacity and a 0.05-kg variation. Total weight gain during pregnancy was the difference between the final gestational weight and the pregestational weight, which was then classified as insufficient, adequate or excessive, according to the recommendations by the Institute of Medicine[18].

The following characteristics regarding delivery and newborns were evaluated: type of delivery (vaginal or cesarean section), hemorrhage at delivery (yes/no), maternal anemia (yes/no), prematurity (gestational age at birth was classified as premature if > 21 and < 37 weeks of gestation), 1minute APGAR score (< 7 or ≥ 7), need for newborn resuscitation (yes/no), breastfeeding in the first hour of life (yes/no). Birth weight was measured by a team of maternity professionals using a Toledo Junior digital pediatric medical scale (Toledo do Brasil Indústria de Balanças Ltda., São Bernardo do Campo, SP, Brazil), with a capacity of 15 kg and a variation of 0.005 kg. These scales were checked on a daily basis by the research team to ensure accurate calibration. Birth weight of newborns was classified as follows: low birth weight (< 2500 g), adequate weight (≥ 2,500 g and < 4,000 g), macrosomia (> 4,000 g)[19]. Head circumference was classified according to sex by Z-score, considering the following cut-off points for its classification: microcephaly (Z-score < -2), adequate (Z-score ≥ -2 and Z < +2) and macrocephaly (Z-score ≥ +2)[20].

The Stata statistical package (StataCorp, CollegeStation, TX, USA) version 12.0 or higher was used to perform all analyses. The categorical variables were described by means of simple frequency distribution and 95% confidence intervals (95%CI). To compare categorical variables, Pearson's chisquare test or Fisher's exact test were applied, when appropriate.

Adjusted prevalence rates (adjPR) were estimated by multiple Poisson regression models with robust variance selecting initially independent variables according to a hierarchical model of determination. Initially, independent variables with a value of $p < 0.20$ were selected and a the-

oretical model of multiple adjustment by level of determination was applied, inserting first those of the distal level with sociodemographic and economic characteristics (mothers' education, living with a partner, head of the household, engaged in a paid occupation, beneficiary of the Bolsa Família Program, family wealth index and area of residence), followed by the intermediate level with health characteristics of the pregnant women (first pregnancy, history of abortion, planned pregnancy, use of contraceptive method, and pre-gestational BMI), and proximal with characteristics of pregnancy and childbirth (weight gain during pregnancy, smoking during pregnancy, urinary tract infection during pregnancy, number of prenatal consultations, beginning of prenatal care in the first quarter of pregnancy, type of delivery, hypertensive disorder at delivery, and maternal anemia at delivery). Covariates with a p-value < 0.10 remained at each determination level, and the significance level p < 0.05 was adopted for the final multiple-adjusted model. Missing data were included into the various models by creating missing value categories.

Results

During the data collection period, 1,753 live births occurred. Of these, 184 mothers refused to participate and 18 were not contacted before discharge from the maternity ward. Of the total of 1551 births, 13 pairs of twin pregnancies were excluded from the present analysis, which finally included 1525 postpartum women and their eligible newborns (Figure 1). Their age ranged from 13 to 45 years, 26.2% (95%CI: 24.0-28.4) were adolescents, 9.5% (95%CI: 8.0-11.0) were younger than 17 years of age and 16.7% (95%CI: 14.8-18.6) were aged between 17 and 19 years. Among the total number of postpartum women (1525) evaluated, 42% had a history of previous pregnancy during adolescence.

Regarding socioeconomic and reproductive characteristics, the percentage of adolescent mothers who had 9 years or less of schooling (56%), who did not live with a partner (36%), were not the head of the household (97%), did not have a paid job (94%), belonged to the first (31%) and second (31%) quartiles of the family wealth index, lived in rural areas (24%), were primigravidae (76%), had no history of abortion (92%), had an unplanned pregnancy (65%), did not use a contraceptive method (63%) and who had a low pre-gestational BMI (15%) was higher
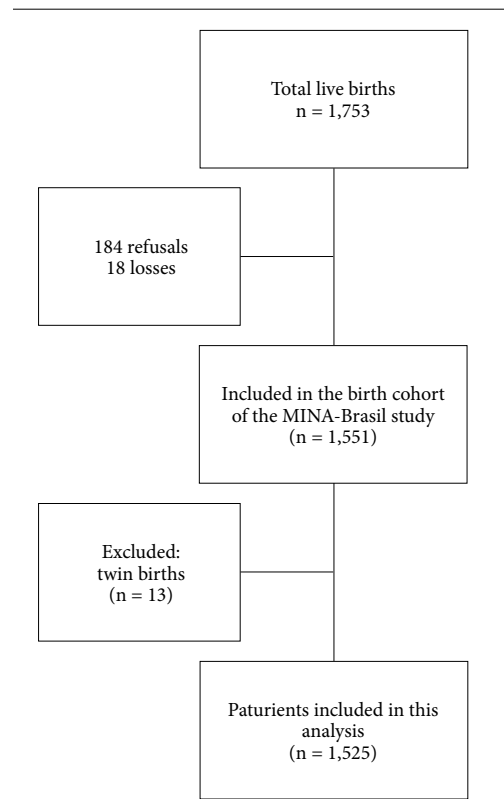
Figure 1. Selection flowchart of eligible parturients chosen from the participants of the longitudinal study MINA-Brasil.

Source: Authors.

when compared to adults, which was statistically significant (p < 0.05) (Table 1).

The characteristics of pregnancy, prenatal care and delivery are shown in Table 2. Pregnant adolescents showed a higher frequency of insufficient weight gain during pregnancy (40%), did not smoke during pregnancy (97%), had fewer than 6 prenatal care consultations (38%), started prenatal care in the first quarter (60%), had vaginal delivery (62%), had anemia at delivery (48%) and had no hypertensive disorder at delivery (91%) when compared to adults, which was statistically significant (p < 0.05) (Table 2).

Regarding the characteristics of the newborns, babies of adolescent postpartum women had a higher occurrence of low weight (10%), microcephaly (9%) and prematurity (10%) when compared to babies of adult postpartum women, which was statistically significant (p < 0.05) (Table 3).

Table 1. Prevalence of childbirth by age group according to sociodemographic and economic characteristics and health history in the MINA-Brazil birth cohort (N = 1,525).

Variables*	Total N (%)	Adults N = 1,125 (73.8%)	Adolescents (≤ 19 years old) N = 400 (26.2%)	p**
Self-reported skin color				
White	172 (11.8)	129 (12)	43 (11.3)	0.707
Non-white	1287 (88.2)	948 (88)	339 (88.7)	
Years of schooling				
≤ 9 years	616 (42.3)	400 (37.1)	216 (56.7)	< 0.001
10 to 12 years	626 (42.9)	466 (43.3)	160 (42)	
> 12 years	216 (14.8)	211 (19.6)	5 (1.3)	
Lives with a partner				
No	313 (21.5)	176 (16.3)	137 (35.9)	< 0.001
Yes	1146 (78.5)	901 (83.7)	245 (64.1)	
Puerperal woman is head of household				
No	1255 (86)	882 (82)	373 (97.6)	< 0.001
Yes	204 (14)	195 (18)	9 (2.4)	
Engaged in a paid occupation				
No	1062 (72.8)	703 (65.3)	359 (94)	< 0.001
Yes	374 (27.2)	374 (34.7)	23 (6)	
Bolsa Familia beneficiary				
No	831 (57)	626 (58.1)	205 (53.7)	0.130
Yes	628 (43)	451 (41.9)	177 (46.3)	
Household wealth index				
1st quartile (lowest)	364 (24.9)	244 (22.7)	120 (31.4)	< 0.001
2nd quartile	362 (24.8)	243 (22.6)	119 (31.1)	
3rd quartile	363 (24.9)	283 (26.3)	80 (20.9)	
4th quartile (highest)	370 (25.4)	307 (28.5)	63 (16.5)	
Residencial area				
Urban	1224 (80.3)	922 (82)	302 (75.5)	0.005
Rural	301 (19.7)	203 (18)	98 (24.5)	
Primiparous				
No	877 (60.1)	785 (72.9)	92 (24.1)	< 0.001
Yes	582 (39.9)	292 (27.1)	290 (75.9)	
Abortion history				
No	1188 (81.4)	834 (77.4)	354 (92.7)	< 0,001
Yes	271 (18.6)	243 (22.6)	28 (7.3)	
Planned pregnancy				
No	874 (59.9)	623 (57.8)	251 (65.7)	0.007
Yes	585 (40.1)	454 (42.1)	131 (34.3)	
Use of contraceptive method				
No	669 (45.8)	426 (39.5)	243 (63.6)	< 0.001
Yes	790 (54.2)	651 (60.5)	139 (36.4)	
Pre pregnancy BMI				
Low weight	95 (7.3)	46 (4.7)	49 (15)	< 0.001
Eutrophy	754 (58.2)	528 (54.4)	226 (69.5)	
Overweight/obesity	447 (34.5)	397 (40.9)	50 (15.4)	

* Number of observations differ due to lack of information. ** Pearson chi-square test.

Source: Authors.

After multiple adjustment, the factors that remained associated with a higher prevalence of childbirth in adolescence were: 9 years or less of schooling (adjPR:1.36; 95%CI: 1.14-1.61),

Table 2. Characteristics of pregnancy, prenatal care and delivery of parturients according to the occurrence of childbirth in adolescence in the MINA-Brazil birth cohort (N = 1,525).

Variables*	Total N (%)	Adults N = 1,125 (73.8%)	Adolescents (≤ 19 years old) N = 400 (26.2%)	P**
Weight gain during pregnancy				
Insufficient	434 (33.5)	303 (31.2)	131 (40.4)	0.010
Regular	452 (34.9)	352 (36.3)	100 (30.9)	
Excessive	408 (31.5)	315 (32.5)	93 (28.7)	
Smoking during pregnancy				
No	1371 (94)	998 (92.7)	373 (97.6)	< 0.001
Yes	88 (6)	79 (7.3)	9 (2.4)	
Alcohol consumption during pregnancy				
No	1216 (83.3)	903 (83.8)	313 (81.9)	0.390
Yes	243 (16.7)	174 (16.2)	69 (18.1)	
Urinary tract infection during pregnancy – self-reported				
No	544 (35.7)	416 (37)	128 (32)	0.074
Yes	981 (64.3)	709 (63)	272 (68)	
Malaria infection in pregnancy				
No	1404 (92.1)	1032 (91.7)	372 (93)	0.421
Yes	121 (7.9)	93 (8.3)	28 (7)	
Number of prenatal consultations (PN)				
< 6	415 (27.6)	264 (23.8)	151 (38.4)	< 0.001
>= 6	1088 (72.4)	846 (76.2)	242 (61.6)	
Start of prenatal care in the first quarter				
No	741 (52.3)	594 (56.6)	147 (39.9)	< 0.001
Yes	677 (47.7)	456 (43.4)	221 (60.1)	
Type of delivery				
Vaginal	856 (56.1)	607 (54)	249 (62.2)	0.004
Cesarean	669 (43.9)	518 (46)	151 (37.7)	
Hypertensive disorder at birth				
No	1357 (89)	990 (88)	367 (91.7)	0.040
Yes	168 (11)	135 (12)	33 (8.3)	
Maternal hemorrhage at birth				
No	1441 (94.5)	1067 (94.8)	374 (93.5)	0.311
Yes	84 (5.5)	58 (5.2)	26 (6.5)	
Maternal anemia at birth				
No	835 (57.8)	637 (60)	198 (51.7)	0.005
Sim	610 (42.2)	425 (40)	185 (48.3)	

*Number of observations differ due to lack of information. ** Pearson chi-square test.

Source: Authors.

belong to the lowest quartiles of the wealth index (1st quartile: adjPR:1.40; 95%CI: 1.08-1.80) (2nd quartile: adjPR:1.37; 95%CI: 1.08-1.74), primigravidae (adjPR: 3.69; 95%CI: 2.98-4.57), low prepregnancy BMI (adjPR:1.28; 95%CI: 1.04-1.57), urinary infection during pregnancy (adjPR:1. 25; 95%CI: 1.07-1.46) and less than 6 prenatal consultations (adjPR:1.42; 95%CI: 1.21-1.66). Mothers who lived with their partner (adjPR:0.82; CI95%: 0.70-0.95), are the head of the household (adjPR:0.24; CI95%: 0.13-0.46), have a paid job (adjPR:0.32; CI95%: 0.22-0.47), use a contraceptive method (adjPR:0.83; CI95%: 0.71-0.98), whose pre-gestational BMI was classified as overweight and/or obesity (adjPR:0.62; CI95%: 0.47-0.81) and who had a hypertensive

Table 3. Characteristics of births and newborns of parturients according to the occurrence of childbirth in adolescence in the MINA-Brazil birth cohort (N = 1,525).

Variables*	Total N (%)	Adultas N = 1.125 (73,8%)	Adolescentes (≤ 19 anos N = 400 (26,2%)	P**
Weight at birth/kg				
≥ 2,500 to < 4,000	1325 (86.9)	979 (87.1)	346 (86.5)	
< 2,500	106 (7)	64 (5.7)	42 (10.5)	< 0.001
≥ 4,000	93 (6.1)	81 (7.2)	12 (3)	
Head circumference				
Microcephaly	87 (5.7)	49 (4.4)	38 (9.6)	< 0.001
Regular	1252 (82.6)	923 (82.4)	329 (83.3)	
Macrocephaly	176 (11.6)	148 (13.2)	28 (7.1)	
Prematurity				
No	1405 (92.1)	1048 (93.2)	357 (89.2)	0.013
Yes	120 (7.9)	77 (6.8)	43 (10.8)	
Neonatal ICU admission				
No	1446 (94.8)	1072 (95.3)	374 (93.5)	0.166
Yes	79 (5.2)	53 (4.7)	26 (6.5)	
Neonate resuscitation				
No	1450 (95.1)	1068 (94.9)	382 (95.5)	0.653
Yes	75 (4.9)	57 (5.1)	18 (4.5)	
APGAR at the first minute				
≥ 7	1469 (96.6)	1086 (96.6)	383 (96.7)	0.926
< 7	51 (3.4)	38 (3.4)	13 (3.3)	
Breastfed within the first hour after birth				
No	162 (11.3)	114 (10.7)	48 (12.7)	0.305
Sim	1276 (88.7)	946 (89.3)	330 (87.3)	

*Total number of observations differs due to lack of information. ** Pearson chi-square test.

Source: Authors.

disorder at birth (ARPj:0.77; CI95%: 0.60-0.98) had a lower prevalence of childbirth in adolescence (Table 4).

Discussion

In this study, 26% of all puerperal women were adolescent and 9% were aged under 17 years. Factors associated with childbirth in adolescence were: nine years or less of schooling, belong to the lowest quartiles of the wealth index, primigravidae, low prepregnancy BMI, urinary tract infection during pregnancy and fewer than six prenatal consultations. Neonatal complications such as prematurity, low birth weight and microcephaly were more prevalent among adolescents.

According to the WHO, babies born to teenage mothers represent approximately 11% of all births worldwide[21]. In the present study, a high prevalence of births among teenage mothers was found (26%). A survey performed in Brazil assessed maternal age at first pregnancy and found a prevalence of 46.7% of teenage pregnancies. Analysis by regions showed that Brazil's northern region accounted for the highest percentage (58.2%)[22]. Our study did not include all adolescents who became pregnant during the period, only those who went through childbirth. It is known that teenage pregnancies show a higher risk of abortion and in 2008 alone, an estimated 3 million unsafe abortions were performed in girls between 15 and 19 years old[21]. In the state of Acre, 18% of all abortion hospitalizations are adolescents[9].

Studies have shown that teenage pregnancy is more common among women of lower socioeconomic status. Latin America and the Caribbean show the second highest adolescent fertility rate in the world, i.e., 66.5 births per 1,000 adoles-

Table 4. Crude and adjusted Poisson regression analysis for factors associated with childbirth in adolescence, among participants of the MINA-Brazil birth cohort (N = 1,438).

Variables	PR (95%CI)*	Adjusted PR (95%CI)**	P***
Years of schooling			
> 9 years	Ref.	Ref.	0.001
≤ 9 years	1.79 (1.50-2.13)	1.36 (1.14-1.61)	
Lives with a partner			
No	Ref.	Ref.	0.007
Yes	0.49 (0.41-0.58)	0.82 (0.70-0.95)	
Puerperal woman is head of household			
No	Ref.	Ref.	< 0.001
Yes	0.14 (0.08-0.28)	0.24 (0.13-0.46)	
Engaged in a paid occupation			
No	Ref.	Ref.	< 0.001
Yes	0.17 (0.11-0.26)	0.32 (0.22-0.47)	
Household wealth index			
4th quartile (highest)	Ref.	Ref.	
3rd quartile	1.29 (0.96-1.74)	1.17 (0.91-1.49)	0.210
2nd quartile	1.93 (1.47-2.53)	1.37 (1.08-1.74)	0.008
1st quartile (lowest)	1.94 (1.48-2.53)	1.40 (1.08-1.80)	0.010
Primiparous		p of trend	0.002
No	Ref.	Ref.	
Yes	4.75 (3.85-5.86)	3.69 (2.98-4.57)	< 0.001
Use of contraceptive method			
No	Ref.	Ref.	0.026
Yes	0.48 (0.40-0.58)	0.83 (0.71-0.98)	
Pre-pregnancy BMI			
Low weight	1.72 (1.38-2.15)	1.28 (1.04-1.57)	0.015
Eutrophy	Ref.	Ref.	
Overweight/obesity	0.22 (0.11-0.44)	0.62 (0.47-0.81)	< 0.001
		p of trend	< 0.001
Urinary tract infection during pregnancy - self-reported			
No	Ref.	Ref.	
Yes	1.08 (0.99-1.17)	1.25 (1.07-1.46)	0.006
Number of prenatal consultations (PN)			
>=6	Ref.	Ref.	
< 6	1.61 (1.37-1.90)	1.42 (1.21-1.66)	< 0.000
Hypertensive disorder at birth			
No	Ref.	Ref.	
Yes	0.73 (0.53-0.99)	0.77 (0.60-0.98)	0.033

* Unadjusted prevalence ratio with a respective 95% confidence interval. ** Adjusted prevalence ratio with a respective 95% confidence interval. *** Multiple model p-value.

Source: Authors

cents aged 15-19 years (from 2010 to 2015) compared to a worldwide rate of 46 births per 1,000 adolescents of this age group, second only to African countries[23]. The present study showed that women who belonged to the lowest wealth index quartiles had a higher prevalence of childbirth in adolescence. The socioeconomic context contributes to teenage pregnancy, i.e., in some cases, adolescents may be pressured to marry and have children early or have very limited educational or work prospects. In other cases, they do not know how to avoid pregnancy or how to access contra-

ceptive methods. In addition, child marriage and child sexual abuse put girls at increased risk of teenage pregnancy[21].

Puerperal women with nine or less full years of schooling had a higher prevalence of childbirth in adolescence. The average number of schooling years among adolescents was nine years (SD 2.2), i.e., 56% of the adolescents had less than 10 schooling years. Studies have shown that adolescents with less education are more likely to become pregnant, but it is essential to take into account the various factors related to social vulnerability that interfere in this process[5].

In our study, puerperal women who lived with their partner showed a lower prevalence of childbirth in adolescence. However, the percentage of adolescents who lived with a partner was 64%. Early marriage puts adolescents at risk of pregnancy, but early sexual practice and risky sexual behavior, regardless of marital status, is an important factor of teenage pregnancy[23].

Lack of autonomy, as well as economic and social dependence are factors that may contribute to teenage pregnancy[4]. This may be an explanatory factor for the results of this study, which state that postpartum women who are the head of the household and have a paid job, i.e., those who seem to enjoy greater autonomy and are busier, showed a lower prevalence of teenage pregnancy.

In the present study, the ratio of primigravidae was higher among adolescents than among adult women. Despite being an expected result, data point to an important issue regarding the occurrence of the first pregnancy in adolescence, i.e., three quarters of girls with a first childbirth at 14 years of age or younger had a second childbirth before turning 20, and 40% of those who already had two children had a third childbirth before the age of 20[24]. This shows how crucial it is to provide guidance on teenage pregnancy and to identify factors that may contribute to its unplanned occurrence.

The use of contraceptive methods is essential to avoid unwanted pregnancies. Our results show that puerperal women who used some kind of contraception had a lower prevalence of teenage pregnancy. Adolescents need to have access to a variety of contraceptive options and health professionals must provide care based on human rights and work with adolescents in such a way that they may choose a contraceptive method that best meets their biopsychosocial needs and are able to use it properly[25].

In our study, low pregestational BMI during pregnancy was more prevalent in the group of adolescent puerperal women, while prepregnancy BMI classified as overweight and/or obese was less prevalent among adolescents when compared to adult puerperal women. Another study showed similar results, since the occurrence of low pre-gestational weight was higher among pregnant adolescents than among adult women (OR: 4.15; 95%CI: 2.01-8.54). Adolescent pregnant women are vulnerable to nutritional deficiencies due to the increased demand for nutrients resulting from pregnancy and to their own growth and development needs[26]. Thus, correct nutritional monitoring during the prenatal period is extremely important so that their pregnancy may develop as appropriate for both mother and child.

Regarding health issues during pregnancy, the present study found that urinary infection was higher among adolescents. In line with our results, a multicentric cross-sectional study performed in Brazil found that urinary infection was the most common issue among pregnant adolescents[27]. Educational activities for pregnant adolescents about preventive care and adequate treatment of urinary infection should be emphasized during prenatal care.

However, the occurrence of hypertensive disorders during childbirth was lower among adolescents. This result is in line with those found in the literature. Older women are more likely to develop atherosclerosis, which affects small arteries, such as those of kidneys and uterus, leading to hypertension and eventually to the development of hypertensive disorders during pregnancy[28].

The Brazilian Ministry of Health recommends starting prenatal care in the first quarter of pregnancy and having at least six follow-up consultations[29]. The present study found that having less than six prenatal consultations was more prevalent among adolescents than among adults. Only 60% of the surveyed adolescents started prenatal care in the first quarter and adherence to routine consultations was not sufficient to achieve the minimum number of consultations. Prenatal care teams need to ensure comprehensive care of pregnant adolescents by encouraging attendance at consultations and participation of partners[3].

Analysis of newborns showed that prematurity, low birth weight and microcephaly were the most prevalent complications among adolescent mothers. A population-based study performed in developing countries concluded that prematurity, low birth weight and neonatal and perinatal mortality were the negative outcomes associated with teenage pregnancy, including an increased

risk level in adolescents younger than 15 years old[30]. Evaluating neonatal complications requires considering other typical factors of adolescence that may contribute to negative outcomes. A Japanese multicenter research trial identified an increased risk of premature birth (RR: 1.17; 95%CI: 1.08-1.27) and low birth weight (RR: 1.08, 95%CI: 1.01-1.15) among adolescent women compared to women aged 20-24 years and it verified the mediating effect of height, suggesting that maternal physical immaturity contributes to the association between teenage pregnancy and adverse outcomes in childbirth[31].

Our study is the first population-based survey performed in Cruzeiro do Sul, Acre, that investigated factors associated with the characteristics of childbirth in adolescence and its results are an important contribution to that topic. This study is limited insofar as the analysis did not include pregnant adolescents who had an abortion, considering that we used data from a birth cohort.

Conclusions

The studied population showed a high prevalence of childbirth in adolescence. Poverty, low educational level, first pregnancy, pregestational BMI, urinary tract infection during pregnancy and the number of prenatal consultations were associated with childbirth in adolescence. The most prevalent neonatal complications among adolescent mothers were prematurity, low birth weight and microcephaly. Results show the need for actions and public policies aimed at the health of adolescents, related to family planning and guidance on sexual and reproductive health, as well as adequate prenatal care. The typical features of adolescents should be taken into account by health professionals, whose care practice should ideally include all aspects of health promotion and prevention of injuries of adolescents and their children.

Collaborations

AAA Damasceno: data collection, analysis and interpretation; draft preparation and review. MA Cardoso: data design, collection, analysis and interpretation; Draft review and approval of final version.

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