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INFANT AND MATERNAL DEATHS IN BRAZIL: A 10-YEAR ANALYSIS OF PREGNANCY IN ADOLESCENCE

MORTES INFANTIS E MATERNAS NO BRASIL: UMA ANÁLISE DE
10 ANOS DA GRAVIDEZ NA ADOLESCÊNCIA

MUERTES INFANTILES Y MATERNAS EN BRASIL: UN ANÁLISIS
DE 10 AÑOS DEL EMBARAZO EN LA ADOLESCENCIA

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ABSTRACT

The aim of this study was to evaluate the epidemiological profile of childhood and maternal-adolescent deaths in Brazil. This is a descriptive, quantitative study, based on data of births and data of infant and maternal deaths of adolescent mothers (aged ten up 19 years old), from the Department of Informatics of the Unified Health System, between 2010 and 2019. The analysis of live-births revealed that most of the adolescent mothers were single, attended for seven or more medical appointments and had a medium level of education of 11 years. Generally, the infants were born on term, from natural childbirth and were non-white. The infant-deaths predominated in the early neonatal period. Maternal deaths prevailed between 15 and 19 years-old, and most of it were from indirect obstetric nature. The decay of the infant mortality rate could not be verified. Maternal mortality rate presented a linear behavior on the studied period. Once teenage pregnancy represent a major challenge for formulators and managers of public health policies in Brazil, the adoption of educational actions is essential to prevent this social and medical issue.

KEYWORDS

Pregnancy in Adolescence; Infant Mortality; Maternal Mortality; Health Information Systems.

RESUMO

O objetivo deste trabalho foi avaliar o perfil epidemiológico das mortes infantis e maternas adolescentes entre 2010 e 2019, no Brasil. Trata-se de um estudo descritivo, quantitativo, a partir de dados referentes aos nascimentos e aos óbitos infantis e maternos de mães adolescentes (entre dez e 19 anos), do Departamento de Informática do Sistema Único de Saúde entre os anos de 2010 a 2019. Na análise dos nascidos vivos, as mães encontravam-se, em sua maioria, solteiras, haviam comparecido a sete ou mais consultas pré-natais, e tinham oito a 11 anos de instrução. Em geral, os infantes nasciam a termo, por via vaginal, e eram pardos. Os óbitos infantis predominaram na fase neonatal precoce. Já as mortes maternas, na faixa etária entre 15 e 19 anos, e a causa obstétrica direta foi o principal motivo do óbito. Não foi possível afirmar que ocorreu decaimento do coeficiente de mortalidade infantil. Verificou-se comportamento linear da razão de mortalidade materna no período estudado. Faz-se necessária a adoção de medidas educacionais para prevenção da gestação na adolescência, a qual constitui um grande desafio para os formuladores e gestores de políticas públicas do País.

PALAVRAS-CHAVE

Gravidez na Adolescência. Mortalidade Infantil. Mortalidade Materna. Sistemas de Informação em Saúde.

RESUMEN

El objetivo de este estudio fue evaluar el perfil epidemiológico de las muertes infantiles y maternas adolescentes entre 2010 y 2019 en Brasil. Se trata de un estudio descriptivo, cuantitativo, basado en datos referentes a nacimientos y muertes infantiles y maternas de madres adolescentes (entre diez y 19 años), del Departamento de Informática del Sistema Único de Salud entre los años 2010 a 2019. En el análisis de los nacidos vivos, la mayoría de las madres eran solteras, habían asistido a siete o más consultas prenatales y tenían de ocho a 11 años de educación. En general, los bebés nacían a término, por vía vaginal y eran mestizos. Las muertes infantiles predominaron en la fase neonatal temprana. Las muertes maternas, en el grupo de edad entre 15 y 19 años, y la causa obstétrica directa fue la principal causa de muerte. No fue posible afirmar que hubo una disminución en la tasa de mortalidad infantil. Hubo un comportamiento lineal de la razón de mortalidad materna en el período estudiado. Es necesario adoptar medidas educativas para prevenir el embarazo adolescente, lo cual constituye un gran desafío para los formuladores y gestores de políticas públicas en el país.

PALABRAS CLAVE

Embarazo Adolescente; Mortalidad infantil; Mortalidad maternal; Sistemas de Información en Salud.

1 INTRODUCTION

It is estimated that around 11% of births worldwide are from adolescent mothers between the ages of 15 and 19, and more than 90% of these births occur in low and middle-income countries (UNICEF, 2021). On Brazil, the Statute of Children and Adolescents considers an adolescent any individual between 12 and 18 years-old. The World Health Organization (WHO), on the other hand, extends adolescence to the second decade of life - from ten to 19 years (BRASIL, 2007).

Adolescence is considered an inappropriate period for pregnancy due to the association between early pregnancy and social, economic, educational and behavioral factors (FUHRMANN *et al.*, 2015). Furthermore, adolescence must be understood as a transitional stage in which individuals are more vulnerable, given that this stage of life is marked by behavioral changes, construction of values and social integration (SAWYER *et al.*, 2012).

Not only affected by individual characteristics, teenage pregnancy can also be influenced by economic, social and educational factors in the community in which the young woman lives (GOLD *et al.*, 2001). On this context, geographic location plays a fundamental role in understanding the development of adolescence (GAMA *et al.*, 2002).

The implementation of strategies to prevent teenage pregnancy (health education, correct use of condoms and contraceptives etc) and the improvement of health care are essential to reduce adverse outcomes during birth (GANCHIMEG *et al.*, 2014). Furthermore, births during adolescence not only represent a risk factor for adverse pregnancy outcomes, but also have a negative impact on the future well-being of the mother and infant (WHO, 2007). The aim of the present study was to evaluate the epidemiological profile of infant and adolescent mother deaths, between 2010 and 2019, in Brazil.

2 MATERIALS AND METHODS

A descriptive study, of quantitative approach, was carried out using public data available at the Department of Informatics of the Unified Health System (DATASUS) (BRASIL, 2021). The deterministic linkage method was applied between the Mortality Information System (SIM) and the Live Birth Information System (SINASC). Deterministic matching is based on the selection of variables common to two or more different databases, with the aim of finding the same individual in the paired databases (MOODY, 2015).

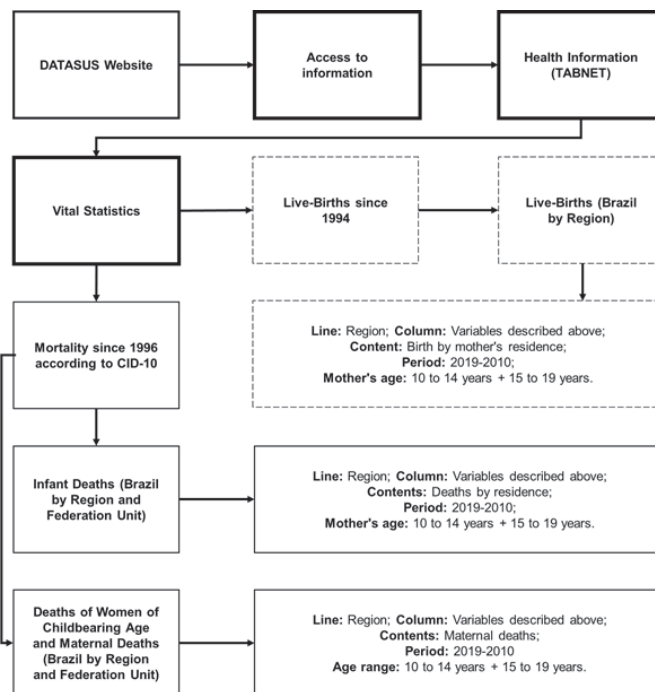
Firstly, data related to live births per mother's residence, of adolescents aged ten up 19 years, from

SINASC, were selected. Simultaneously, information about infant deaths per mother's residence and data of maternal deaths of mothers of the aforementioned age stratum were also collected at SIM. After crossing these data, the infant mortality rate was calculated using the number of infant deaths as numerator and the number of live births as denominator, then, this fraction was multiplied by one thousand. The maternal mortality ratio (MMR) was also acquired by multiplying the fraction of maternal deaths per live births per 100 thousand. All coefficients were approximated to two decimal places.

In this context, the present epidemiological analysis aimed to understand the factors involved in the death of the mother-child binomial. All infant deaths – those between 0 and 364 days of life, interval adopted by DATASUS – from adolescent births of the five Brazilian regions (North, Northeast, Midwest, South and Southeast) were included. This present study also analyzed all births and deaths of mothers aged ten up 19 years occurred between 2010 and 2019 in Brazil.

The variables from the live birth certificate analyzed were: mother age, mother's level of education, mother's marital status, number of prenatal appointments, esteems, nature of delivery and color/race. Among the infant deaths, the aspects of mother's age, age stratum of the infant and color/race were studied. Finally, the number, color/race of the mother and the obstetric cause of maternal deaths among adolescent mothers were evaluated. The scheme in Figure 1 illustrates the steps followed in the data collection.

Figure 1 – Steps of data collection



Source: Elaborated by the authors.

The information was organized in a database and analyzed in Microsoft Office Excel. Subsequently, the results were exposed through illustrative representations and the discussion was carried out according to the information available in the scientific literature. Since data of public domain were used, it was not necessary to submit the research for approval by the Research Ethics Committee, according to resolution 466/12 of the National Council for Ethics in Research. However, all rules regarding copyright were respected.

3 RESULTS

A total of 5,201,510 deliveries of teenage mothers were included in the study period. The region with the highest number of births was the Northeast (1,734,051). Regarding the characteristics of the mother, in all Brazilian regions, the predominant age group were between 15 and 19 years old, as well as the average level of maternal education were between eight and 11 years and the most prevalent marital status were single.

As for prenatal care, most mothers attended seven or more consultations, with the exception of the North region, where mothers had an average of four to six consultations. Throughout the national territory, the most prevalent gestational age was at term – between 37 and 41 weeks – and the most common route of delivery was vaginal. As for color/race, brown (non-white) was the most predominant in Brazil, with the South region being the only exception to this pattern, with a majority of white live births (Table 1).

Table 1 – Characteristics of adolescent mothers and their live births according to Brazilian macro-region, 2010-2019.

	North	Northeast	Southeast	South	Midwest	Brazil
Live-Births (N)	788,150	1,734,051	1,679,798	588,665	410,846	5,201,510
Mother's age (%)						
10-14 years	6.52	5.87	4.05	4.15	5.04	5.11
15-19 years	93.88	94.46	96.11	96.01	95.21	95.14
Total	100.00	100.00	100.00	100.00	100.00	100.00
Maternal schooling (%)						
None	1.06	0.39	0.11	0.10	0.36	0.37
1-3 years	4.74	3.93	1.43	1.53	2.13	2.83
4-7 years	38.18	38.34	25.89	31.26	26.84	32.59
8-11 years	52.52	53.05	69.15	63.98	66.28	60.45

	North	Northeast	Southeast	South	Midwest	Brazil
12 or more years	1.62	1.54	2.05	2.67	3.15	1.97
Ignored	1.88	2.75	1.37	0.46	1.24	1.79
Total	100.00	100.00	100.00	100.00	100.00	100.00
Marital status (%)						
Single	57.25	60.02	76.07	67.53	63.49	65.91
Married	5.75	8.20	9.83	9.59	10.71	8.71
Widow	0.05	0.07	0.04	0.05	0.05	0.05
Divorced	0.09	0.11	0.12	0.13	0.14	0.11
Stable union	35.50	29.65	13.03	22.08	24.29	23.89
Ignored	1.36	1.95	0.91	0.62	1.32	1.32
Total	100.00	100.00	100.00	100.00	100.00	100.00
Prenatal appointments (%)						
None	4.60	3.12	1.69	1.41	2.25	2.62
1-3 appointments	17.25	11.52	7.09	6.55	8.96	10.19
4-6 appointments	41.37	38.29	27.21	24.68	32.59	33.19
7 or more	35.91	46.31	63.14	67.00	55.56	53.24
Ignored	0.86	0.76	0.87	0.37	0.64	0.76
Total	100.00	100.00	100.00	100.00	100.00	100.00
Gestational weeks (%)						
< 22 weeks	0.07	0.09	0.07	0.06	0.07	0.08
22-27 weeks	0.55	0.63	0.71	0.62	0.62	0.64
28-31 weeks	1.27	1.26	1.23	1.09	1.14	1.22
32-36 weeks	11.26	10.31	9.80	9.27	10.05	10.15
37-41 weeks	77.84	77.94	84.31	85.55	83.04	81.25
42 or more weeks	4.50	4.74	2.39	2.37	3.04	3.54
Ignored	4.52	5.03	1.47	1.04	2.04	3.12
Total	100.00	100.00	100.00	100.00	100.00	100.00

	North	Northeast	Southeast	South	Midwest	Brazil
Delivery (%)						
Vaginal	64.60	63.52	58.76	55.17	53.61	60.42
Cesarean	35.25	36.26	41.12	44.77	46.28	39.43
Ignored	0.16	0.23	0.12	0.06	0.11	0.15
Total	100.00	100.00	100.00	100.00	100.00	100.00
Color/race of the newborn (%)						
White	7.16	9.54	39.47	77.44	21.50	27.48
Black	1.87	4.14	6.88	4.13	3.32	4.61
Yellow	0.19	0.28	0.29	0.14	0.49	0.27
Brown	84.76	80.01	50.63	16.27	64.23	62.78
Indigenous persons	4.48	0.56	0.20	0.77	3.12	1.26
Ignored	1.55	5.47	2.54	1.25	7.34	3.60
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Elaborated by the authors based on data from DATASUS (2021).

Infant deaths were concentrated in the Northeast, with 25,034 deaths, being this number approximately 4.4 times greater than the one found at the Midwest region, which had the lowest number of deaths – 5,709. Most deaths occurred in children of mothers aged between 15 and 19 years. In the entire territory, the deaths predominated at the early neonatal period, between zero and six days of life (56.10%), in infants of brown color - except in South and Southeast where the white race were predominant. As for maternal deaths, the Northeast region (848) had a value 5.2 times higher than the Midwest, region with the lowest records (162). In addition, the predominant age group was between 15 and 19 years old and the color with the most deaths was the brown, except in the South region where the majority was white. Throughout the Brazilian territory the indirect nature of obstetric maternal death predominated (69.76%) (Table 2).

Table 2 – Characteristics of infant and maternal deaths of adolescent mothers according to Brazilian macro-region, 2010-2019.

	North	Northeast	Southeast	South	Midwest	Brazil
Infant Deaths						
Number of deaths	12,644	25,034	21,886	7,531	5,709	72,804

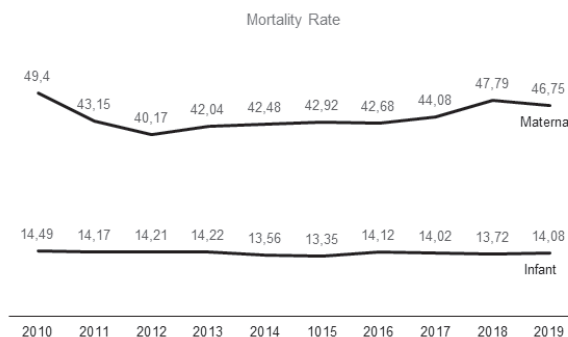
	North	Northeast	Southeast	South	Midwest	Brazil
Mother's age (%)						
10-14 years	8.45	8.14	6.20	6.65	8.18	7.46
15-19 years	91.55	91.86	93.80	93.35	91.82	92.54
Total	100.00	100.00	100.00	100.00	100.00	100.00
Infant age group (%)						
0-6 days	55.78	60.75	52.68	51.60	55.47	56.10
7-27 days	15.02	15.36	18.72	17.59	16.87	16.66
28-364 days	29.19	23.89	28.60	30.81	27.64	27.24
Ignored	0.01	-	-	-	0.02	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00
Color/race of the infant (%)						
White	16.26	14.30	48.48	84.49	36.45	33.92
Black	1.12	1.75	3.32	1.89	1.05	2.07
Yellow	0.09	0.14	0.11	0.09	0.19	0.12
Brown	68.92	68.86	40.82	9.39	50.27	52.83
Indigenous persons	7.97	0.69	0.21	1.27	6.62	2.34
Ignored	5.63	14.26	7.06	2.87	5.41	8.72
Total	100.00	100.00	100.00	100.00	100.00	100.00
Maternal Deaths						
Number of deaths	452	848	653	180	162	2.295
Age (%)						
10-14 years	7.74	9.08	4.90	4.44	8.02	7.19
15-19 years	92.26	90.92	95.10	95.56	91.98	92.81
Total	100.00	100.00	100.00	100.00	100.00	100.00
Color/race of the mother (%)						
White	12.61	16.86	29.71	75.56	25.93	24.92
Black	4.20	6.72	16.08	6.11	6.17	8.80
Yellow	-	0.12	0.15	-	-	0.09

	North	Northeast	Southeast	South	Midwest	Brazil
Brown	73.89	69.10	50.69	13.33	58.64	59.69
Indigenous persons	7.74	1.18	0.15	2.78	7.41	2.75
Ignored	1.55	6.01	3.22	2.22	1.85	3.75
Total	100.00	100.00	100.00	100.00	100.00	100.00
Nature of obstetric maternal death (%)						
Direct	77.21	70.52	65.08	70.56	62.96	69.76
Indirect	20.13	27.59	30.93	22.22	33.33	27.06
Unspecified	2.65	1.89	3.98	7.22	3.70	3.18
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Elaborated by the authors based on data from DATASUS (2021).

The national scenario was analyzed in the period between 2010 and 2019. There were oscillations in the infant mortality coefficient, and it was not possible to say that there was a linear decay. In 2015, the lowest infant mortality rate (13.35) was registered, and there was an increase's rate in the following year, to 14.12. Furthermore, the mortality rate seems to be increasing in 2019. As for the maternal mortality ratio, there was a nearly linear behavior in the period studied (Figure 2).

Figure 2 – Variations in the infant mortality rate of children of adolescent mothers and the adolescent maternal mortality rate in Brazil, 2010-2019.



Source: Elaborated by the authors based on data from DATASUS (2021).

The North region had the highest infant mortality rates in all years of the study period. Despite this, there was an approximately linear decrease until 2014, when the lowest coefficient in the region was observed (15.42). After this year, the mortality rate for 1,000 live births increased again, reaching the value of 16.12 in 2019.

In the Northeast, there were several increases and decreases, therefore, was not possible to affirm that the mortality coefficient decreased, despite the comparison between the extremes (14.72 in 2010 to 14.47 in 2019). Until 2012, the Southeast region had the lowest mortality rates in the country, however, between 2013 and 2019, fluctuations in decreases and increases occurred. The analysis of the extremes of 2010 and 2019 evidences a general upward trend in the Southeast region.

The South had lower mortality rates for most years (between 2013 and 2019), consequently a decrease in the coefficient could be observed. Finally, when analyzing the Midwest region, increases and decreases can be observed over the years, however, when analyzing the extremes, an increase between the rates can be observed – from 13.65 to 13.81 (Table 3).

Table 3 – Infant mortality rate of children of adolescent mothers, according to region, in Brazil, 2010-2019.

Region	Years										Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
North	16.62	16.11	16.13	15.70	15.42	15.87	16.23	16.06	16.25	16.12	16.04
Northeast	14.72	14.11	14.78	14.88	14.03	14.09	14.78	14.54	13.96	14.47	14.44
Southeast	13.29	13.28	12.96	13.45	12.79	12.09	13.00	13.18	13.04	13.30	13.03
South	15.05	14.52	13.44	12.52	12.30	11.43	11.98	12.06	11.79	12.08	12.79
Midwest	13.65	13.90	14.60	14.53	13.23	13.51	14.86	13.91	12.82	13.81	13.90
Brazil	14.49	14.17	14.21	14.22	13.56	13.35	14.12	14.02	13.72	14.08	14.00

Source: Elaborated by the authors based on data from DATASUS (2021).

4 DISCUSSION

The Northeast region concentrated the majority of teenage pregnancies and also of deaths – infant and maternal. Martinez and Roza (2019) found the predominance of pregnant adolescents in the North. Both regions have characteristics in common that can explain the observed phenomenon: lower level of education, lower gross domestic product, low per capita income and high social vulnerability (IBGE, 2013).

Most adolescent mothers were aged between 15 and 19 years, to the detriment of the age group between 10 and 14 years. A study conducted in Bangladesh between 1996 and 2017 showed similar proportions, with the majority of adolescents between the ages of 16 and 19 (NGUYEN *et al.*, 2021). Furthermore, the present study also showed that neonatal deaths were predominant among mothers of the aforementioned age. This fact occurs because adolescence is characterized as a time of greater vulnerability for pregnancy, according to a study by Fonseca and collaborators (2016), which revealed

that both the children of adolescents and those of older women had higher neonatal mortality rates, with values close to twice the rate of mothers between 20 and 34 years of age.

A Nigerian study showed that adolescent mothers who died had a mean age of 17,15 years \pm 1,35, and minimum and maximum values of 14 and 19 years (NWOBODO; PANTI, 2012), results that corroborate those found in the present study.

Low schooling combined with teenage pregnancy tends to generate higher infant mortality rates. Fonseca and collaborators (2016), in their cohort study using logistic regression, also theorized about the fact that children of mothers with less than four years of schooling have a greater chance of neonatal death, regardless of age stratum. In this way, the level of education becomes a risk factor for unpleasant outcomes for the mother-child binomial. In the present study, most of the live births were born to adolescent mothers with eight to 11 years of education, a number greater than the cut-off education level defined by Fonseca and collaborators (2016), but similar to the multicenter study of the World Health Organization (WHO), which revealed that adolescents up to 17 years old had, for the most part, seven to nine years of education (GANCHIMEG *et al.*, 2014).

Ganchimeg and collaborators (2014) showed that, when compared to women between 20 and 24 years of age, pregnant adolescents were more likely to be single, a condition that was also found in the present study. On the other hand, Nwobodo and Panti (2012), when researching about maternal mortality, noticed that all adolescents were married and housewives, a situation that reflects geographic differences, given that the study was carried out in Nigeria. Also in the Nigerian study, all teenage mothers who died had not have access to prenatal care. In the present study, most adolescents attended seven or more consultations, meeting the minimum number of six consultations defined by the WHO (BRASIL, 2012).

The present study found that adolescent mothers' deliveries usually occurred at term, that is, in most cases the risk factor prematurity was not detected. A case-control study carried out in 27 Brazilian capitals observed that low birth weight and prematurity are risk factors for infant mortality (MAIA *et al.*, 2020). Regarding the type of delivery, 60.42% of young Brazilians gave birth vaginally. Other studies have also demonstrated a tendency towards normal delivery in adolescents (GANCHIMEG *et al.*, 2014; NWOBODO; PANTI, 2012).

Regarding color/race, the brown-collar was the most predominant in both live births and deaths -infant and maternal. Maia and collaborators (2020) also found a higher proportion of non-white adolescent mothers. As for the predominance of whites in the South, it can be inferred the relevance of the sociodemographic characteristics of the region, which have a considerably higher proportion of whites (IBGE, 2013).

The present study observed a predominance of deaths in the early neonatal phase. Infant mortality is a health priority in several international and national pacts, such as the Millennium Goals for 2015 and the Sustainable Development Goals for 2030. In Brazil, it is in the early component of neonatal mortality – between zero to six days of life – that more than 70% of deaths are concentrated, with about 41.2% of them occurring in the first 24 hours of life (MAM *et al.*, 2013).

To reach the fifth Millennium Goal, Brazil should have reached a MMR equal to or less than 35 deaths per 100,000 live births by 2015 (BRASIL, 2012). In this study, only the ratio of adolescent maternal deaths was analyzed, and in all the years studied, the MMR was greater than 35, consequently

it can be inferred that mortality from direct obstetric causes did not present the necessary reduction to impact the MMR. The proportion of young woman who die from obstetric causes is alarming. According to data from the Health Surveillance Department, between 1990 and 2007, maternal mortality in adolescence varied between 13% and 16% of all maternal deaths (IPEA, 2010).

Direct obstetric deaths are consequences from complications arising during pregnancy, childbirth or puerperium – a period comprehended until 42 days after delivery – resulting from interventions, omissions, incorrect treatment or a chain of events associated with any of these factors (BRASIL, 2012). In the present study, the majority of maternal deaths resulted from direct causes, and, probably, because of this, the MMR did not reduced.

It is essential to identify the conjecture of the most affected adolescent mothers in order to devise strategies to expand access to effective health services for these vulnerable social groups, from the perspective of women and their babies. The findings of the present study reinforce the need to adopt educational measures to prevent teenage pregnancy, which is a major challenge for formulators and managers of public policies in the country.

5 CONCLUSION

The epidemiological profile of teenage pregnancy in Brazil demonstrated single mothers, with a level of education between eight and 11 years, and, in general, the infants were not white. Infant deaths predominated in the early neonatal period. Furthermore, it was not possible to affirm that there was a decline in the infant mortality rate during the study period. Since infant deaths also occur as health system failures, their reduction depends on direct actions defined by public policies.

As for the regional analysis, the Northeast region concentrated the majority of teenage pregnancies and deaths - infant and maternal. In this sense, the intrinsic relationship between geographic and social determinants and teenage pregnancy is perceived. Regarding the maternal mortality ratio, there was a stationary behavior, with no reductions, a worrying fact in view of the high values found.

REFERENCES

BRASIL. Ministério da Saúde. Banco de dados do Sistema Único de Saúde. **DATASUS. Informações de Saúde (TABNET)**. Brasília: MS. 2021. Available in: <https://datasus.saude.gov.br/informacoes-de-saude-tabnet/>. Accessed: 23 dec. 2021.

BRASIL. Ministério da Saúde. **Cadernos de atenção básica: atenção ao pré-natal de baixo risco**. Brasília: MS. 2012.

BRASIL. Ministério da Saúde. **Marco legal: saúde, um direito de adolescentes**. Brasília, DF: Editora MS. 2007.

FONSECA, S. C. *et al.* Maternal education and age: inequalities in neonatal death. **Rev Saúde Públ**, v. 51, p. 94, 2016.

FUHRMANN, D. *et al.* Adolescence as a sensitive period of brain development. **Trends Cogn Sci**, v. 19, n. 10, p. 558-566, 2015.

GAMA, S. G. N. *et al.* Pregnancy in adolescence, associated factors, and perinatal results among low-income post-partum women. **Cad. Saúde Públ**, v. 18, n. 1, p. 153-161, 2002.

GANCHIMEG, T. *et al.* Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. **BJOG Int J Obstet Gynaecol**, v. 121, n. 1, p. 40-48, 2014.

GOLD, R. *et al.* Ecological analysis of teen birth rates: association with community income and income inequality. **Matern Child Health J**, v. 5, n. 3, p. 161-167, 2001.

IBGE. Instituto Brasileiro de Geografia e Estatística. **Desigualdades sociais por cor ou raça no Brasil**. Rio de Janeiro: IBGE. 2013. Available in: <https://www.ibge.gov.br/estatisticas/sociais/populacao/25844-desigualdades-sociais-por-cor-ou-raca.html?t=sobre>. Accessed: 23 dec. 2021.

IPEA. Instituto de Pesquisa Econômica Aplicada. **Objetivos de desenvolvimento do milênio: relatório nacional de acompanhamento**. Brasília: IPEA. 2010.

MAIA, L.T.S. *et al.* Determinantes individuais e contextuais associados à mortalidade infantil nas capitais brasileiras: uma abordagem multinível. **Cad. Saúde Públ**, v. 36, n. 2, e00057519. 2020.

MAM, G. *et al.* Óbito neonatal precoce e tardio: perfil das mães e dos recém-nascidos. **Rev Gaúcha Enferm**, v. 34, p. 91-97, 2013.

MARTINEZ, Z. E.; ROZA, D. L. Ecological analysis of adolescent birth rates in Brazil: Association with Human Development Index. **Women Birth**, v. 33, n. 2, p. 191-198, 2019.

MOODY, J. **Data integration manual**. 2. ed. Wellington: New Zealand Government 2015. Available in: <https://www.stats.govt.nz/>. Accessed: 21 dec. 2021.

NGUYEN, P. H. *et al.* Adolescent birth and child undernutrition: an analysis of demographic and health surveys in Bangladesh, 1996-2017. **Ann N Y Acad Sci**, v. 1500, n.1, p. 69-81, 2021.

NWOBODO, E.L.; PANTI, A. Adolescent maternal mortality in North-west Nigeria. **West Afr J Med**, v. 31, n. 4, p. 224-226, 2012.

SAWYER, S. M. *et al.* Adolescence: a foundation for future health. **Lancet**, v. 379, n. 9826, p. 1630-1640, 2012.

UNICEF. World Health Organization & United Nations Children's Fund. **Helping adolescents thrive toolkit: strategies to promote and protect adolescent mental health and reduce self-harm and other risk behaviours**. Geneva: WHO. 2021. Available in: <https://apps.who.int/iris/handle/10665/341327>. Accessed: 23 dec. 2021.

WHO. World Health Organization. **Global accelerated action for the health of adolescents (AA-HÁ!): guidance to support country implementation**. Geneva: WHO. 2007. Available in: <https://apps.who.int/iris/handle/10665/255415>. Accessed: 24 dec. 2021.

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