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Racial and ethnic disparities in premature births among pregnant women in the NISAMI cohort, Brazil

Disparidades étnicas e raciais nos partos prematuros entre gestantes da coorte NISAMI, Brasil

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Abstract *The incidence of premature birth has increased worldwide, unequally distributed by race/ethnicity. Racism generates economic inequalities, educational disparities, and differential access to health care, which increases the risk of preterm birth. Thus, this study aimed to evaluate the factors associated with preterm birth and racial and ethnic disparities in premature birth among pregnant women attending prenatal care at the Brazilian Unified Health System health units in the urban area of Santo Antônio de Jesus, Bahia, Brazil. This study used data from 938 pregnant women aged between 18 to 45 years within the NISAMI prospective cohort. Premature birth prevalence was 11.8%, with a higher prevalence among black than non-black women (12.9% versus 6.0%, respectively). Maternal age between 18 and 24 years was the only factor associated with premature birth. A higher risk of premature birth was found among black women than non-black women (RR 3.22; 95%CI 1.42-7.32). These results reveal the existence of racial and social inequalities in the occurrence of premature birth.*

Key words *Premature, Health inequalities, Ethnicity and health, Cross-sectional studies, Prevalence*

Resumo *A incidência de parto prematuro tem aumentado em todo o mundo, distribuída de forma desigual por raça/etnia. O racismo gera desigualdades econômicas, disparidades educacionais e acesso diferenciado à saúde, o que aumenta o risco de parto prematuro. Assim, este estudo teve como objetivo avaliar os fatores associados à prematuridade e disparidades raciais e étnicas no parto prematuro entre gestantes atendidas durante o pré-natal em unidades de saúde do Sistema Único de Saúde na zona urbana de Santo Antônio de Jesus, Bahia, Brasil. Este estudo utilizou dados de 938 mulheres grávidas com idade entre 18 e 45 anos dentro da coorte prospectiva do NISAMI. A prevalência de prematuridade foi de 11,8%, sendo maior entre as negras do que entre as não negras (12,9% versus 6,0%, respectivamente). A idade materna entre 18 e 24 anos foi o único fator associado ao parto prematuro. Foi encontrado maior risco de prematuridade entre as mulheres negras do que entre as não negras (RR 3,22; IC95% 1,42-7,32). Esses resultados revelam a existência de desigualdades raciais e sociais na ocorrência do parto prematuro.*

Palavras-chave *Prematuro, Desigualdades em saúde, Etnicidade e saúde, Estudos transversais, Prevalência*

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Introduction

Premature birth is defined as birth occurring before the 37th week of pregnancy and represents a major cause of infant morbidity and mortality globally[1-3] and a significant contributor to childhood morbidities. Preterm infants are particularly vulnerable to complications due to impaired respiration, difficulty feeding, poor body temperature regulation, and a high risk of infection[4]. In addition, children born too soon may face a lifetime disability, including learning disabilities and visual and hearing problems[5].

A systematic review published in 2010, which aimed to analyze the rates and map the distribution of premature births globally, estimated that about 12.9 million births, or 9.6% of all births, were preterm. Of these, 85% were concentrated in Africa and Asia (10.9 million premature births), while in Europe and North America, there were 0.5 million premature births, and 0.9 million occurred in Latin America and the Caribbean[6].

Between 2013 and 2018, almost 2 million (11.1%) Brazilian babies were premature[7], which is very close to the prevalence reported in countries such as Indonesia (10.4%), Nigeria (11.4%), and Ethiopia (12.0%)[8]. Also, studies have demonstrated an increase in the rate of premature births over time in Brazil; in the state of Bahia, the prevalence of premature births increased from 10.9% in 2000 to 11.4% in 2011[9], and in the Rio Grande do Sul, preterm births increased from 5.8% in 1982 to 13.8% in 2015[10].

Preterm births cause a high social and financial cost to family members and society and often require infrastructure and highly technical staff, which are not always available. The causes of premature births are multifactorial[11] and can be related to the prenatal period and the delivery. Research has identified risk factors for premature birth, such as race/ethnicity, maternal age, education, socioeconomic conditions, smoking, maternal employment, nutritional state, and others[12].

There are evidence that racial/ethnic disparities can cause premature birth. A cohort study conducted in the United States showed that premature births among black women occurred independently of medical and maternal socioeconomic factors; additionally, a study of the epidemiology and causes of premature birth showed that women categorized as black or Afro-descendant had a higher risk of preterm delivery[13,14]. Furthermore, a systematic review and meta-analysis found an odds ratio of preterm birth of 1.99 (95%CI 1.83-2.16) among black women, whereas no significant associations were observed among Asian, Hispanic, and Caucasian women[15].

Brazil also has a disparity in premature birth, which is related to race/ethnicity. The prevalence was higher in pregnant women indigenous race/skin color (14.4%), when compared to other ethnicities. Black pregnant women had a higher prevalence compared to white and brown categories[7].

Structural racism produces practices, beliefs, behaviors, and prejudices that favor avoidable and unfair inequalities between social groups by obstructing access to goods, resources, services, and opportunities[16], enforcing forms of discrimination such as neighborhood deprivation, economic inequalities, educational disparities, and differential access to health care. Consistently, these factors increase the risk for preterm birth and infant mortality[17]. However, the association between racial/ethnic disparities and premature birth is still not completely understood[18-20]. Thus, there is a need for more comprehensive studies on maternal influences and racial/ethnic disparities in gestational outcomes[21,22], especially in South American countries, where direct research on this question is sparse.

In this context, the current study aimed to evaluate the factors associated with preterm birth and racial and ethnic disparities in premature birth among pregnant women attending prenatal care at the Brazilian Unified Health System in the urban area of Santo Antônio de Jesus, Bahia, Brazil.

Methods

This study used data from the prospective cohort "Maternal risk factors of low birthweight, premature birth, and intrauterine growth restriction in the Recôncavo of Bahia", conducted by the Maternal and Child Health Research Center (NISAMI) of the Center of Health Sciences at the Federal University of the Recôncavo of Bahia. The population of this study consisted of pregnant women receiving prenatal care at the Unified Health System (SUS) basic health units in the urban area of Santo Antônio de Jesus, Bahia, Brazil, between 2011 and 2015.

The city of Santo Antônio de Jesus is in the Recôncavo of Bahia, 187 km from the capital city of Salvador[23]. The average number of live births from 2003-2012 was 1,371.6 per year, and 5.26% were premature[24]. The provision of health services took place in 26 primary care units (18 in the ur-

ban area and 8 in the rural area), 38 clinics/specialty centers, five hospitals, and two polyclinics.

This study was conducted across all the SUS's primary care clinics (basic health units) in the urban area of the municipality. The primary care clinics of the rural area were excluded due to difficulties in access, as well as women with multiple pregnancies (twins or triplets). Thus, all pregnant women aged 18 and older residing and domiciled in the urban area of the municipality – regardless of gestational age – registered in the Monitoring System of Humanization of Prenatal and Births (SISPRENATAL) and who had attended at least one prenatal visit participated in this study.

Two sources of information were used for data collection: a survey given to puerperal women and the registry of live births. The first data source assessed information related to the independent variable and covariates using a structured interview. Data relating to premature births were analyzed from the second data source. All the study instruments were reviewed and tested by a team of supervisors. Validation was conducted by comparing data obtained by the survey in relation to data registered on the prenatal cards. Field supervisors revisited twenty percent of the pregnant women interviewed and partially reapplied the interview. The data collected were then compared with the original interview to evaluate quality, aiming to identify any imprecision, systematic error, or fraud.

The program OpenEpi was used to determine the study's sample size, based on a frequency of premature birth of 7.83 among those not exposed and a relative risk of 2.27[14]. The following parameters were also used: 80% power, a significance level of 5%, and adding 20% for loss to follow-up. The required sample size for this study was therefore calculated as 938 women.

The dependent variable was defined as the dichotomous variable of premature birth, evaluated using the definition adopted by the WHO (1961) of delivery before the 37th week of gestation[25]. All infants born whose gestation was less than 37 weeks were considered preterm, and the reference group was those live births whose gestational age was equal to or greater than 37 weeks according to the date of last menstruation.

Race/ethnicity was the independent variable and was assessed in the following manner: "In your opinion, how do you define your race/ethnicity?". This information was collected by self-assessment based on the categories used by the Brazilian census (IBGE): white, black, brown (mixed race), Asian, and Brazilian indigenous. For this analysis, the variable was dichotomized into black and non-black women, where the category of black included all women who self-identified as black or brown. The variable race/ethnicity was analyzed as a social-historical construct.

The exposure covariates were defined using risk factors for premature birth, including socioeconomic variables, lifestyle, and obstetric history.

The program EPI-DATA version 3.0 was used to enter data, and Stata version 12.0 was used to conduct the statistical analysis. For the analysis, the population was first characterized according to the principal independent variable and the covariates of the study, using the Pearson Chi-square test (X^2) and a p-value of ≤0.05 for the significant association.

The bivariate analysis was then conducted to assess the association between the covariates and the occurrence of premature birth, using the Risk Ratio (RR) as the outcome measure with a 95% confidence interval (95%CI) estimated through Poisson regression with robust error variance. First, variables with a p-value less than or equal to 0.20 in the crude analysis were included in the multivariate Poisson regression analysis. Next, these variables were introduced in the model using a backward stepwise procedure. Finally, variables that remained significant, those with a p-value≤0.05, were kept in the model.

The project "Maternal risk factors of low birthweight, premature birth, and intrauterine growth restriction in the Recôncavo of Bahia" was submitted and approved by the Ethics and Research Committee of the Faculdade Adventista de Fisioterapia da Bahia (FAFIS), under protocol number 4369.0.000.070-10 and opinion number 050/2010.

Results

From 2011 to 2015, 1,091 pregnant women met the initial study selection criteria. Overall, data from gestational age at delivery was available for 938 (86.0%) pregnant women within the NISAMI Cohort, which were included in the present study.

Concerning socioeconomic characteristics and obstetric history, this sample ranged in age from 18-45 years, with a mean of 25.8 years (SD±8.48); a higher proportion of women were aged 25-34 years (50.9%). Regarding socio-demographics, 43% of the women had a high school education, 47.6% had a household income of 2-4 times the minimum wage, and 83.1% lived with a

partner. Cesarean section was the most common type of delivery (63.7%), non-induced labor was more frequent than induced labor (78.1%), and the majority of women (74.9%) began prenatal care in the first trimester of pregnancy (Table 1).

Regarding lifestyle, 60.1% of the women reported that they stopped using alcohol, 64.3% never smoked cigarettes, more than 95% never used other kinds of drugs, and over 90% reported that they did not participate in any kind of physical activity. Among the sample, 84% self-identified their race/ethnicity as black or brown. Only household income was statistically significantly associated when comparing socioeconomic characteristics, lifestyle, and obstetric history by maternal race/ethnicity.

Analyses showed a statistically significant positive association between the occurrence of premature birth and the age group of 18-24 years (RR1.72; 95%CI 1.18-2.50) (Table 2).

The prevalence of premature birth in this study was 11.8% (n=111; 95%CI 9.9-14.1%): 12.9% (n=102) among black and 6.0% (n=9) among non-black women. There was a statistically significant association between maternal race/ethnicity and premature birth in the crude analysis, revealing a 2.16 times higher risk of premature birth among black women compared to non-black women (95%CI 1.12-4.17) (Table 3).

In the multivariable analysis, newborns of the female sex, Cesarean section delivery, and the onset of prenatal care during the first trimester were no longer associated with premature birth according to maternal race/ethnicity. Additional analysis showed a higher risk of premature birth among women who had induced labor.

Maternal race/ethnicity maintained a positive association with premature birth even after controlling for covariates in the final model, in which black women have a 3.22 higher risk of premature birth than non-black women (95%CI 1.42-7.32) (Table 3).

Discussion

The results of this study show difference in premature birth by maternal race/ethnicity, where black women have almost three times the risk of premature birth than non-black women. These findings corroborate results from studies of the United States and the United Kingdom. A study using data from vital statistics on births to primiparous women in the State of Nebraska, in the United States, from 2005 to 2014 found that black women had a 1.33 times higher risk of premature birth than white women[26]. A cross-sectional study also conducted in the United States evaluated racial/ethnic differences in preterm births in 2016 birth certificate data and concluded that premature birth has 1.46 times higher odds of occurring in black women than in white women[27]. Similarly, a population-based study using routinely collected and linked national data on all singleton live births in England and Wales between 2006 and 2012 observed higher risks of premature birth among the black Caribbean and African women compared to white British women[28].

Regarding studies conducted in Brazil, a cohort study from the state of São Paulo, showed that race is an independent risk factor for premature birth, even after adjusting for household income and maternal education[29]. Racial differences in premature birth can be explained by the socioeconomic disadvantages experienced by black women since these women face greater social and economic challenges than white women[30,31]. Yet these differences can be influenced by other factors, such as difficulty in accessing prenatal care caused by institutional racism[32]. Institutional racism is the weakness of institutions in providing adequate services to people by their race, culture, racial origin, or ethnicity, placing them in a disadvantageous situation in accessing benefits generated by the State or other organized institutions[33].

A Brazilian cross-sectional study with 5,289 women that evaluated the influences of the race on adverse obstetric and neonatal outcomes found that most black women were young, possessed lower levels of education, and lived at the minimum wage compared to white women[34]. Similar results were observed in our study, demonstrating that the maps of poverty can be superimposed on the distribution of race/ethnicity. In Brazil, black people occupy the less qualified and lower-compensated positions in the labor market, have lower levels of education, and live in areas that offer fewer services, less basic infrastructure, and suffer greater restrictions in access to healthcare services that, when received, are of worse quality and lower resolution[35].

Maternal age was an important factor associated with premature birth in the present study, with a higher proportion of the outcome (15.4%) among women between 18 and 24 years. This finding differs from previous Brazilian studies, in which a higher prevalence of preterm birth was observed among pregnant adolescents[36] and those aged 40 years or older[37].

Table 1. Socio-demographic characteristics, lifestyle, and obstetric history of the population studied, according to race/ethnicity. Santo Antônio de Jesus, Bahia, Brazil, 2011-2015.

Variables	Total		Race				p-value
			Black		Non-Black		
	n	%	n	%	n	%	
N	938	100.0	788	84.0	150	16.0	
Age group (n=833)							0.773
18-24 years	331	39.7	281	40.2	50	37.3	
25-34 years	424	50.9	352	50.4	72	53.7	
≥35 years	78	9.4	66	9.4	12	9.0	
Marital status (n=930)							0.524
Without a partner	157	16.9	129	16.5	28	18.7	
With a partner	773	83.1	651	83.5	122	81.3	
Education (n=928)							0.763
Illiterate	339	36.5	279	35.9	60	40.0	
Elementary/Middle School	136	14.7	114	14.7	22	14.7	
High School	399	43.0	340	43.7	59	39.3	
Post-secondary	54	5.8	45	5.8	09	6.0	
Employment (n=920)							0.738
Active	436	47.4	364	47.2	72	48.7	
Inactive	484	52.6	408	52.8	76	51.3	
Household income (n=885)							0.037
≤1 minimum wage	201	22.7	177	23.7	24	17.4	
2-4 times minimum wage	421	47.6	360	48.2	61	44.2	
≥5 times minimum wage	263	29.7	210	28.1	53	38.4	
Alcohol Use (n=930)							0.779
Yes	115	12.4	98	12.6	17	11.3	
Stopped	559	60.1	465	59.6	94	62.7	
No	256	27.5	217	27.8	39	26.0	
Smoking (n=922)							0.962
Yes	28	3.0	24	3.1	04	2.7	
Stopped	301	32.6	252	32.6	49	33.1	
No	593	64.3	498	64.3	95	64.2	
Drug use (n=905)							0.853
Yes	11	1.2	09	1.2	02	1.4	
No	894	98.8	750	98.8	144	98.6	
Physical Activity (n=874)							0.798
Yes	74	8.5	63	8.6	11	7.9	
No	800	91.5	672	91.4	128	92.1	
Type of delivery (n=935)							0.797
Cesarean	596	63.7	499	63.6	97	64.7	
Natural	339	36.3	286	36.4	53	35.3	
Induced labor (n=928)							0.779
Yes	203	21.9	170	21.7	33	22.8	
No	725	78.1	613	78.3	112	77.2	
Sex of newborn (n=934)							0.278
Male	480	51.4	409	52.2	71	47.3	
Female	454	48.6	375	47.8	79	52.7	
Onset of prenatal care (n=887)							0.886
1st trimester	665	74.9	559	75.2	106	73.6	
2nd trimester	202	22.8	167	22.5	35	24.3	
3rd trimester	20	2.3	17	2.3	03	2.1	
History of premature birth (n=380)							0.120
Yes	50	13.2	39	12.0	11	19.6	
No	330	86.8	285	88.0	45	80.4	

Source: Authors.

Table 2. Association between premature birth and study covariates. Santo Antônio de Jesus, Bahia, Brazil, 2011-2015.

Variables	Total		Gestational age				RR	95%CI
			Preterm		At Term			
	n	%	n	%	n	%		
N	938	100.0	111	11.8	827	88.2		
Age group								
18-24 years	331	39.7	51	15.4	280	84.6	1.72	1.18-2.50
25-34 years	424	50.9	38	9.0	386	91.0	1.00	
≥35 years	78	9.4	07	9.0	71	91.0	0.76	0.37-1.58
Marital Status								
Without a partner	157	16.9	23	14.6	134	85.4	1.30	0.85-1.99
With a partner	773	83.1	87	11.3	686	88.7	1.00	
Education								
Illiterate	339	36.5	44	13.0	295	87.0	1.16	0.81-1.66
Elementary/Middle School	136	14.7	21	15.4	115	84.6	1.37	0.89-2.13
High School	399	43.0	39	9.8	360	90.2	0.73	0.50-1.05
Post-secondary	54	5.8	06	11.1	48	88.9	1.00	
Employment								
Active	436	47.4	48	11.0	388	89.0	0.87	0.61-1.25
Inactive	484	52.6	61	12.6	423	87.4	1.00	
Household income								
≤1 minimum wage	201	22.7	27	13.4	174	86.6	1.25	0.83-1.90
2-4 times minimum wage	421	47.6	45	10.7	376	89.3	0.90	0.62-1.31
≥5 times minimum wage	263	29.7	28	10.6	235	89.4	1.00	
Alcohol Use								
Yes	115	12.4	16	13.9	99	86.1	1.22	0.74-2.00
Stopped	559	60.1	63	11.3	496	88.7	0.91	0.64-1.30
No	256	27.5	30	11.7	226	88.3	1.00	
Smoking								
Yes	28	3.0	04	14.3	24	85.7	1.23	0.49-3.10
Stopped	301	32.6	30	10.0	271	90.0	0.79	0.53-1.18
No	593	64.3	74	12.5	519	87.5	1.00	
Drug use								
Yes	11	1.2	01	9.1	10	90.9	0.78	0.12-5.11
No	894	98.8	104	11.6	790	88.4	1.00	
Physical activity								
Yes	74	8.5	13	17.6	61	82.4	1.00	
No	800	91.5	88	11.0	712	89.0	0.63	0.37-1.07
Type of delivery								
Cesarean	596	63.7	68	11.4	528	88.6	0.92	0.64-1.32
Natural	339	36.3	42	12.4	297	87.6	1.00	
Induced labor								
Yes	203	21.9	16	7.9	187	92.1	0.62	0.37-1.03
No	725	78.1	92	12.7	633	87.3	1.00	
Sex of newborn								
Male	480	51.4	54	11.2	426	88.8	1.00	
Female	454	48.6	57	12.6	397	87.4	1.12	0.79-1.58
Onset of prenatal care								
1st trimester	665	74.9	70	10.5	595	89.5	1.00	
2nd trimester	202	22.8	23	11.4	179	88.6	1.07	0.69-1.66
3rd trimester	20	2.3	03	15.0	17	85.0	1.40	0.48-4.04
History of premature birth								
Yes	50	13.2	06	12.0	44	88.0	1.1	0.49-2.48
No	330	86.8	36	10.9	294	89.1	1.00	

Source: Authors.

Table 3. Risk Ratio (RR) and 95% Confidence Interval (95%CI) obtained by Poisson regression of the association between maternal race/ethnicity and premature birth in the studied population (n=938). Santo Antônio de Jesus, Bahia, Brazil, 2011-2015.

Models	PR	95%CI	p-value
Crude	2.16	1.12-4.17	0.015
Adjusted*	3.22	1.42-7.32	0.005

*Adjusted for age group (18 to 24 years), low birthweight, and induced labor.

Source: Authors.

Also, a population-based cross-sectional study using the California Office of Statewide Health Planning and Development linked birth cohort data from 2008 to 2012 found higher premature birth rates among women younger than 15 years and 40 years or older[38]. Immaturity of the uterus or the blood supply of the cervix in teenage pregnancy can increase the risk of subclinical infection and production of prostaglandins, triggering an increased risk of preterm delivery. At the same time, in late pregnant women, prematurity is associated with urinary tract infection, chronic diseases, and pregnancy complications, which are more frequent in pregnant women over 40 years[39,40].

Social determinants of health, the non-medical factors that influence health outcomes, are the conditions in which people are born, grow, work, live, and age, which influence health inequities[41]. As stated before, racism enforces discrimination, generating educational disparities, economic inequalities, neighborhood deprivation, and differential health care access, which may increase the risk for premature birth[17]. As a result, preterm birth disproportionately affects black and poor infants. Although healthcare quality and access improvements help decrease these disparities, they are not sufficient to eliminate them[42].

The socioeconomic position is reproducibly associated with an increased risk of preterm birth, and higher income is associated with improving this outcome[42]. In our study, household income was not associated with maternal race/ethnicity. This contrasts with findings from a previous Brazilian cohort study, where the authors observed that women with lower income are at greater risk of having preterm infants than women with higher income[43]. Additionally, lack of or low income may influence access to services, nutrition, and emotional issues, and increase stress during pregnancy[43], which is associated with premature birth[17].

Maternal employment did not have a statistically significant association with premature birth, although a Brazilian cross-sectional study showed lower rates of premature birth among pregnant women who were not employed[44]. However, women employed, mainly as domestic workers, may have working hours that contribute to inadequate prenatal care regarding the number of appointments, which can increase the frequency of premature birth[45].

Income and race are correlated with aspects such as where people live, and the interactions among race, education, income, and neighborhood can lead to health care access disparities. Also, psychosocial stress in pregnancy, such as violence and discrimination, can result from where people live, leading to premature birth[42].

The odds of a baby born prematurely were 2.5 times higher among women with a partner than those without a partner. This finding differs from a Brazilian case-control study, which found that the absence of a stable partner increased by 7.92% the chances of premature birth[46]. In addition, the lack of a partner increases the difficulties and responsibilities[47]. Despite the findings of the present study, it is believed that single mothers have an increased risk of adverse birth outcomes, including the occurrence of prematurity[48], as marriage can increase access to health services, financial security and social support.

Smoking, alcohol use, and other drugs are amply studied in the literature. They are associated with pregnancy complications since substances ingested during pregnancy cross the placental barrier. Therefore, the fetus is exposed to these substances in the blood, increasing the risk of premature birth[49,50]. However, in this study, none of these factors presented a statistically significant relationship with premature birth. These findings diverge from a study conducted in the United States, which observed that low-intensity smoking during pregnancy was associated with an increased risk of premature birth[51].

Regarding the previous history of preterm birth, this study found no relationship with preterm birth in the study period. As long as the occurrence of births at term reduces the risk of premature births in subsequent pregnancies[52], this possibly influenced the low number of women with a history of preterm births in the study sample.

Concerning the type of delivery, most women had a Cesarean section. Even though in 1985

the WHO showed that a rate of Cesarean of more than 15% is medically unjustifiable, the high rates of Cesareans are almost universal[53]. Moreover, type of delivery is a risk factor for premature birth[54] which corroborates the findings of this research where those who had a Cesarean section had 3.11 times the chance of premature birth among black women.

The present study has limitations related to the possible biases inherent to epidemiologic investigations, that is, information bias since secondary data were used which can cause underestimation of the prevalence of the outcome; prevalence bias, since data were only collected in the national health services. To minimize these problems, procedures were adopted, such as using a standardized and tested questionnaire, a well-trained team, and standardization in data collection and validation of data by comparing to information obtained. Furthermore, since this research only involved pregnant women in the urban area assisted by the SUS, this may limit the generalization of our findings.

The use of race/ethnicity categories used by IBGE, which the subject self-selects, thus minimizes the bias between the exposed and non-exposed in the study. It is important to emphasize the importance of developing a study on a theme of such relevance but so little studied in the scientific community in Brazil.

The prevalence of premature birth found in this study could be reduced by creating health education programs aimed at prevention and promoting women's health. Actions such as adequate prenatal visits during pregnancy, health education to clarify the questions of the pregnant women, and controlling risk factors that are already known, among other health promotion initiatives, can reduce the rate of premature births and improve the quality of life of women and newborns. These initiatives should be created universally and equitably to avoid the exclusion of segments of the population and reduce identified racial differences.

In conclusion, this study shows a statistically significant association between maternal race/ethnicity and premature birth. In this context, the existence of racial and social inequalities in the occurrence of premature birth is evident, including the overlap of black women in poverty and lack of access to education[35]. Therefore, studies addressing the issue of race/ethnicity are of great importance in eliminating inequalities in health.

Furthermore, given the evidence found, it is important to state that knowledge about the risk factors associated with the occurrence of prematurity among live births is essential for healthcare management to train the clinicians for preventive actions regarding premature births, as well as to subsidize the planning of measures to promote the health of women of childbearing age. The findings of this study also point to the importance of adequately equipped health services, including the implementation of neonatal ICUs to ensure better survival and quality of life for newborns.

Collaborations

KA Oliveira, DB Santos, and EM Araújo conceived the study and contributed to the study design, data analysis, and data interpretation. KA Oliveira, CT Castro, M Pereira, DB Santos, and EM Araújo were involved in drafting and revising the manuscript critically. All authors read and approved the final manuscript.

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