

Gestational risk and social inequalities: a possible relationship?

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Abstract *This study aims to analyze the association between social inequalities and gestational risk in administrative regions of the state of Espírito Santo. This is a cross-sectional study based on two administrative regions of the state of Espírito Santo. The sample consisted of 1,777 women who underwent prenatal care in the municipalities of the Greater Vitória Metropolitan Region (RMGV-ES) and São Mateus Microregion (MRSM) and were admitted to the public health facilities at the time of delivery between 2010 and 2012/2013. The multivariate logistic regression was performed to test the association between social and gestational risk variables. Variables with a significance level < 0.20 in the Chi-square test were adopted for the final model, and only those variables with a p-value < 0.05 remained. An association was found between high gestational risk and women's dwelling place in the RMGV-ES (OR = 1.74; CI95% 1.32-2.28), women as head of households (OR = 3.03; CI95% 1.64-5.61), head of household with less than five years of schooling (OR = 1.58; CI95% 1.14-2.20) and receipt of social benefit "Bolsa Família" (Family Grant) (OR = 1.46; CI95% 1.04-2.03). While some social variables underpin the classification of gestational risk, other social factors have been shown to produce this risk.*

Key words *Inequalities in health, High-risk pregnancy, Pregnancy*

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Introduction

Social inequalities in health refer to situations that involve some level of injustice, that is, differences that are unfair because they are associated with social characteristics that systematically put some groups at a disadvantage in relation to the opportunity to be and remain healthy¹, and are avoidable because they are subject to intervention. These inequalities arise because of the circumstances in which populations grow, live, work and age, as well as the systems implemented to address diseases².

The circumstances in which people live and die are shaped by political, social and economic forces and are caused by the unequal distribution of power, income, goods and services; therefore, these conditions favor the exposure of people to different risks and vulnerabilities³. Within or between countries, inequality is constructed as the result of a complex system operating at the global, national and local levels, which shapes the way society organizes its activities and defines the different social standings and hierarchy⁴.

This social construction process affects health and disease of individuals and consists of a set of determinations and mediations whose result will be the preservation of health or the occurrence of diseases or other health problems⁵. In maternal and child health, inequalities are observed from the analysis of socioeconomic issues, ranging from gender and ethnicity to access to health services issues⁴. Scientific studies have shown that social inequalities are associated with high infant mortality rates⁶ and inadequate prenatal care in black adolescent and unmarried pregnant women⁷. This shows that social inequalities have repercussions not only for some diseases, such as neglected diseases but also become a reality for groups sharing specific characteristics in public health services, such as prenatal care.

Since situations of risk affect mainly women with difficult access to health services, improved reproductive health conditions to avoid deaths is a great challenge. In this context, prenatal care services play an extremely important role in reducing risks, preventing diseases and promoting the health of women and children⁸, as prenatal care coverage rate is almost 100%⁹ in Brazil.

Thus, prenatal care mainly aims to identify these possible risks and provide adequate care with risk management¹⁰. This makes the timing of prenatal care an excellent opportunity to prevent maternal and child deaths or reduce the risks of their occurrence¹¹. Measuring these risks is a great

challenge and also a way of evaluating the probability of some negative event¹². Therefore, establishing criteria to identify gestational risk is fundamental to reorient conduct during prenatal care¹¹.

Based on these considerations, it is understood that the magnitude of gestational risk should not only consider clinical criteria for pregnant women in prenatal care, but also recognize social inequalities in health, seek to understand the processes that produce them and identify the different aspects of pregnancy that establish mediation between the macro-social processes and the epidemiological profile of the different social groups, an indispensable condition to facilitate the search for coping measures, whether within the scope of public policies or of daily life¹. Thus, it is necessary to improve knowledge about gestational risk, as well as its social determinants, which implies analyzing the various social factors that may be risk factors, but which are not yet part of the universe of the variables that underpin the available Gestational Risk Classifications (GRC). In this aspect, which is related to gestational risk and its conditioning factors and evaluation methods, it is necessary to discuss gestational risk and its social inequalities. Having said that, the importance of the study in the context of collective health is justified. Thus, this study aims to analyze the association between social inequalities and gestational risk in administrative regions of the state of Espírito Santo.

Materials and Methods

This is a cross-sectional study involving 1,777 puerperal users of the Unified Health System (SUS) of the Greater Vitória Metropolitan Region (RMGV-ES)¹³ and the São Mateus Microregion (MRSM-ES)¹⁴, both in the state of Espírito Santo, Brazil. We investigated aspects related to prenatal care of these women who should reside in these microregions.

The original research was approved by the Research Ethics Committee of the Federal University of Espírito Santo, in observance of Resolution 196/96 of the National Health Council. The research carried out in the RMGV-ES was approved, while the one developed at MRSM-ES was approved. In addition, formal authorizations were obtained in all maternity wards involved. In the same way, all the puerperae signed the Informed Consent Form (ICF) to conduct the interviews and collect data in their respective medical records and pregnant women's card.

The dependent variable of this analysis is gestational risk, classified according to the adaptation of the GRC proposed by the Brazilian Ministry of Health, derived from the revised and updated version¹⁵. The score assigned to each variable was constructed considering pre-existing GRC and the levels of care proposed for each variable¹⁵.

Thus, the outcome variable originated from the sum of the risk characteristics obtained by the pregnant women's card and the interview, as described in Chart 1. The variable gestational risk was determined by the sum of the scores of each variable; this score was based on the levels of care directed by the Brazilian Ministry of Health.

The other variables below are characterized as follows: *inadequate weight gain* is an adaptation of the recommendations of the Institute of Medicine¹⁶, which considers the preconception body mass index (BMI) plus the weight gain until the end of gestation, where it is inadequate for women with low weight to gain more than 18kg; for women with adequate weight to gain less than 11kg and more than 16kg; for overweight women to gain less than 7kg and more than 11.5kg; and for obese women to gain less than 5kg; the *very inadequate weight gain* is the adaptation of the recommendations of the Institute of Medicine¹⁶, which considers the preconception body mass index (BMI) plus weight gain until the end of gestation, and it is very inappropriate for women with low weight to gain less than 12.5 kg; and for obese women to gain more than 9kg. *Hypertension* is characterized by absolute values of systolic blood pressure (BP) > 140 mmHg and/or diastolic blood pressure > 90 mmHg in current gestation, and *gestational hypertension* is defined based on the diagnosis of systemic arterial hypertension after the 20th week, without proteinuria, and possibly defined as "transient" (when normalization occurs after childbirth) or "chronic" (when hypertension persists).

After analyzing all these characteristics, women were considered "low risk" when they scored up to four points; those scoring five to points, "medium risk"; and those scoring ten or more points, "high risk". However, in order to draw this study closer to the reality of the organization of prenatal services – which have only two references for care in the Unified Health System, one for low and medium risk and another for high risk – it was decided to merge low and medium risk categories into a single category, and keeping the high risk category unchanged.

Health services-related demographic and socioeconomic factors were used as independent

variables. The demographic variables used in this study were: *dwelling region* (RMGV-ES and MRSM-ES); *dwelling area* (urban or rural); and *Municipal Human Development Index - MHDI* (0.500-0.799; > 0.799). The socioeconomic variables were: *housing situation* (owned or other type); *resident/room* (adequate when resident per household's room ratio, excluding bathrooms and kitchens, was less than or equal to two, or inadequate when the ratio of resident per household's room, excluding bathrooms and kitchen was higher than two); *ethnicity/skin color* (white, black or brown); *head of household* (puerperae or someone else); *head of household schooling* (less than five full years of schooling or greater than or equal to five full years); *economic classification* of the Brazilian Association of Research Companies - ABEP (A/B, C, D/E); receipt of *social benefits* (defined as the receipt or not of the "Bolsa Família"); *open sewage* (present or absent); *waste disposal* (collected by street cleaners or other types).

The Statistical Package for the Social Sciences (SPSS), version 20.0, and the statistical program R, version Rx64 3.3.2 were used for statistical analysis. The descriptive statistics of the variables were initially determined according to the calculation of absolute and relative frequencies, with a confidence interval of 95%. The bivariate analysis was then performed using the Yates Chi-square test to verify a possible association between independent variables and gestational risk.

Those with a significance level < 0.20 (to control possible confounding factors) were used to build the final model, however, only the independent variables with a level of significance of less than 5% with interval confidence intervals of 95% remained in the Multivariate Logistic Regression final model. The effect of independent variables on the outcome was calculated using the odds ratio (OR). In addition, interaction tests were performed for the variables "head of household schooling" with "head of household" and "MHDI" with "dwelling region". They did not reach a significance level of 5%.

Results

A total of 1.777 puerperae participated in the study, of which only 1.183 could be classified as a gestational risk due to the lack of information for some variables. Of these, 13.2% were low risk, 20.4% were medium risk and 66.4% were high risk. The variables that contributed the most to

Chart 1. Score of the variables that make up the gestational risk.

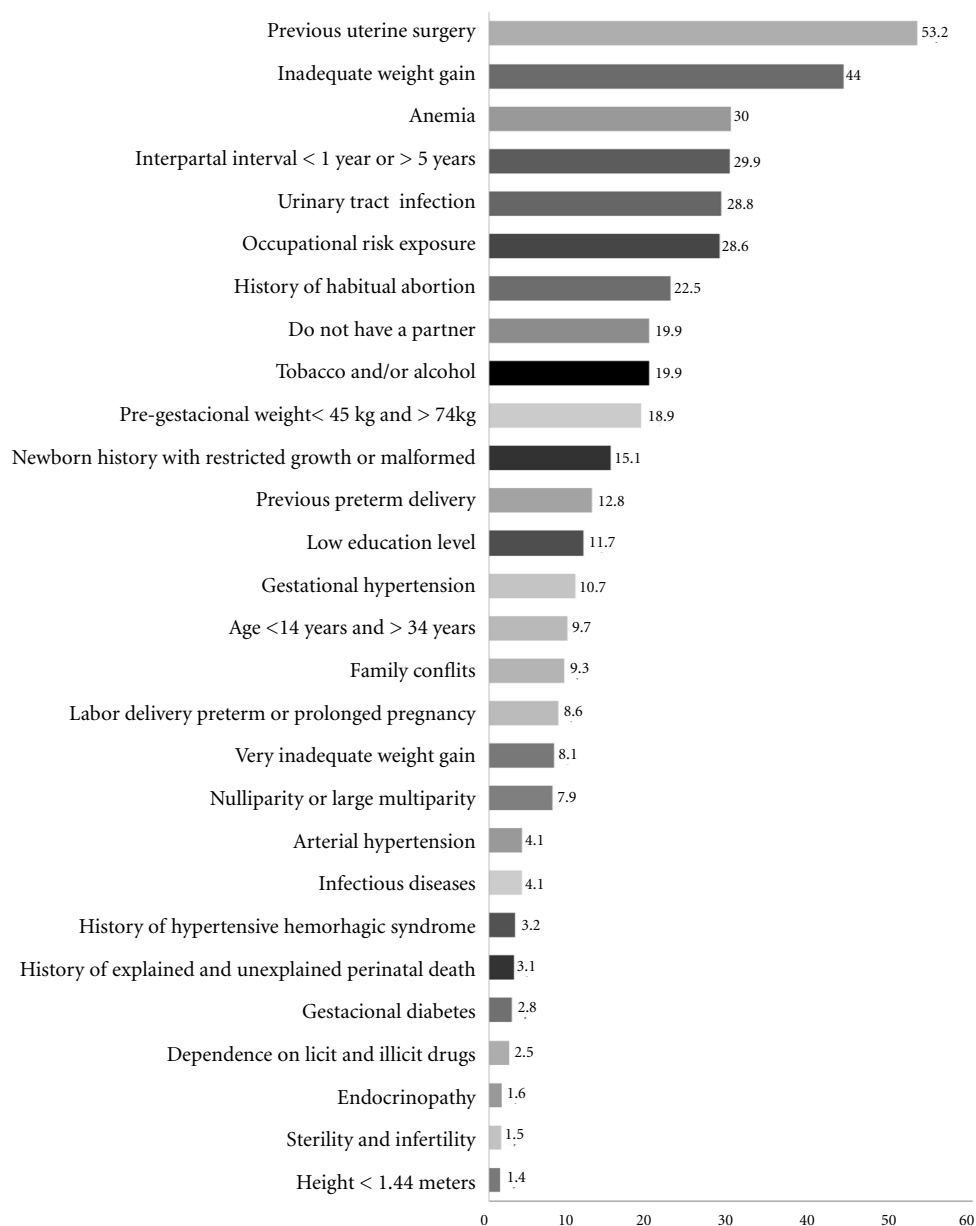
Score 1	
Age ≤14 years and >34 years	Pre-gestacional weight < 45 Kg and > 74 Kg
Schooling < 5 years complete	Height ≤ 1.44 meters
Occupational risk exposure (not having paid work.)	Father dissatisfied with gestation (family conflicts)
Do not have a partner.	
Score 2	
Use of tobacco and / or alcohol during pregnancy	Inadequate weight gain
Previous uterine surgery	Interpartal interval <1 year or > 5 years
Score 3	
Very inadequate weight gain	
Score 5	
History of habitual abortion or of explained and unexplained perinatal death	Newborn with a history of restricted growth or malformed
Anemia	History of gestational diabetes
Previous preterm delivery	Urinary tract infection (> 100.000 colonies/ml)
History of hypertensive hemorrhagic syndrome	Nulliparity or large multiparity (more than five deliveries)
Sterility and infertility	
Score 10	
Dependence on licit and illicit drugs	Gestational hypertension
Infection with hepatitis, toxoplasmosis, HIV infection, tertiary syphilis and other Sexually Transmitted Infections (condyloma)	Labor delivery with gestational age <37 weeks (preterm birth) or > 42 weeks (prolonged pregnancy)
Pneumopathy (including bronchial asthma)	Gynecopathy (presence of uterine malformation, myomatosis, adnexal tumors)
Cardiopathy	Neoplasms
Nephropathy	Preeclampsia and eclampsia
Endocrinopathy (Diabetes mellitus, hypothyroidism and hyperthyroidism)	Gestational diabetes (fasting blood glucose > 110mg / dl)
Arterial hypertension	Gestational hemorrhage
Hemopathy (blood diseases such as sickle cell disease and thalassemia)	Psychiatric diseases (psychosis or depression)
Epilepsy	Leprosy in pregnancy
Autoimmune diseases (presence of systemic lupus erythematosus, other collagenoses)	Tuberculosis in pregnancy

the gestational risk and that underlie social factors were: tobacco and alcohol use during pregnancy (19.9%), unsafe marital status (19.9%), occupational risk exposure (28.6%) and inadequate and very inadequate weight gain during gestation, which accounted for a significant percentage (52.1%). On the other hand, the ones that contributed the most in the obstetric history group were usual abortion history (22.5%), previous uterine surgery (53.2%) and interpartal interval shorter than one year or greater than five years (29.9%) (Chart 1). Prevailing gestational diseases were urinary tract infection (28.8%), anemia (30.0%) and gestational hypertension (10.7%). Regarding nutritional aspects, inadequate

pre-gestational weight (18.9%) was highlighted (Chart 1).

The variables that contributed with less than 1% to the risk-generating categories were: a history of gestational diabetes; cardiopathy; pneumopathy; nephropathy, hemopathy, epilepsy, autoimmune diseases, gynecopathy, neoplasms, preeclampsia and eclampsia, gestational hemorrhage, psychiatric diseases, leprosy and tuberculosis.

In the bivariate analysis, factors with significance below 0.20 and greater than 0.05 were: housing situation ($p = 0.200$); ethnicity/skin color ($p = 0.114$); waste disposal ($p = 0.107$); and open sewage ($p = 0.158$). Those who showed



Graphic 1. Distribution of factors that compose Gestational Risk and Classification of Gestational Risk based on recommendations of the Ministry of Health.

a significance of less than 5% were: the head of household ($p = 0.001$); head of household schooling ($p = 0.014$); MHDI ($p = 0.001$); social benefits ($p = 0.020$); and dwelling region ($p = 0.000$) (Table 1).

When using low gestational risk (LGR) as a reference and analyzing factors associated with

high gestational risk (HGR), we found a 74% higher probability of classification of HGR in pregnant women living in the RMGV-ES when compared to residents of MRSM-ES; three times higher probability for pregnant women who are heads of household compared to those in which someone else was the head, and 58% higher

probability for those whose head of household has less than five years schooling compared to those with five or more years of schooling. Pregnant women's household receiving social benefits directly from the government – “Bolsa Família” (OR = 1.46, 95% CI 1.04-2.03) was also revealed as a factor that increased the probability of classifying HGR. In the univariate analysis, the variables MHDI and waste disposal lost significance in the regression analysis and did not require continuing in the model after adjustment (Table 2). In addition, there was no interaction between the variables head of household schooling and head of household, and the MHDI and the dwelling region.

Discussion

Multiple overlapping and potentiating risk factors together may increase the probability of negative outcomes for pregnant women. Thus, the most frequent characteristics of the GRC adapted from Ministry of Health were: inadequate weight gain; previous uterine surgery; anemia and urinary infection. Among the more serious ones, whose evidence alone already indicated a high gestational risk, gestational hypertension stood out.

In this study, we can observe that more than half of puerperae were considered high risk, which reinforces the need for actions that seek to

Table 1. Gestational risk according to social factors in puerperal women from the RMGV-ES (2010) and MRSM-ES (2012/2013).

(N = 1183)		Risk				Total	χ^2	p-value	
		χ^2		p-value					
		n	%	n	%				
Dwelling area	Urban	328	82.8	645	82.7	973	0.003	0.954	
	Rural	68	17.2	135	17.3				203
Housing situation	Owned	243	61.2	450	57.3	693	1.640	0.200	
	Other type	154	38.8	335	42.7				489
Resident/room	Adequate	387	97.5	755	96.1	1142	1.601	0.206	
	Inadequate	10	2.5	31	3.9				41
Ethnicity/skin color	White	61	15.7	100	13.3	161	4.339	0.114	
	Black	47	12.1	123	16.4				170
	Brown	281	72.2	527	70.3				808
Head of household	Puerpera	25	6.3	100	12.8	125	11.749	0.001	
	Someone else	372	93.7	681	87.2				1053
Head of household schooling	< 5 years	67	19.0	169	25.8	236	6.014	0.014	
	≥ 5 years	286	81.0	485	74.2				771
Economic classification	A/B	11	3.0	21	3.0	32	0.474	0.789	
	C	45	12.3	76	10.9				121
	D/E	311	84.7	603	86.1				914
MHDI	0.500 – 0.799	342	86.1	612	77.9	954	11.594	0.001	
	> 0.799	55	13.9	174	22.1				229
Social benefits	No	321	80.9	585	74.8	906	5.413	0.020	
	Yes	76	19.1	197	25.2				273
Open sewage	No	352	89.3	676	86.4	1028	1.996	0.158	
	Yes	42	10.7	106	13.6				148
Waste disposal	Collected by Street cleaners	367	92.7	704	89.8	1071	4.717	0.107	
	Other types	29	7.3	80	10.2				109
Dwelling region	RMGV-ES	159	40.1	405	51.5	564	13.926	0.000	
	RMSM-ES	238	59.9	381	48.5				619

eliminate or reduce elements associated with risk during pregnancy. In addition, the contextual variables that increased the probability of HGR were residing in the RMGV-ES, pregnant woman being head of the household, head of household with less than five years of schooling and household receiving the government social benefit – Bolsa Família.

These variables point to conditions of social inequality in health that may entail specific risks for the health of pregnant women. We note that equity is understood by several authors as an essential factor for social justice, taking into account the context of social inequalities in which the Unified Health System is inserted. The search for equity in health reaffirms health as a social right, thus increasing the leading role of individuals in a democratic system¹⁷.

In this regard, adequate care during pregnancy and childbirth are essential to reduce existing social inequities, and consequently the magnitude of maternal and child morbidity and mortality. The study *Nascer no Brasil* (“Born in Brazil”) showed that the weighted neonatal mortality rate in the country was 11.1 deaths per thousand live births and that prematurity and low birth weight were the main factors associated with neonatal death, especially birth weight ex-

tremes. These factors are avoidable and should focus on prevention in prenatal care, gestational risk and iatrogenic prematurity¹⁸. In the process of reducing these indicators, the gestational risk is a variable that requires a lot of attention, since underlying risk factors are sometimes preventable or controllable.

In order to systematize the detection of risks to which pregnant women are exposed and, consequently, improve the care provided during the prenatal period, the Brazilian health services use the GRC suggested by the Ministry of Health as an evaluation tool. Thus, health services must be prepared to timely diagnose and treat the diseases that can affect pregnant women, such as urinary tract infection, anemia and hypertension, as well as identify previous uterine surgeries and inadequate weight gain. To this end, it is necessary to strengthen access and quality/adequacy of prenatal care, avoiding what Hart¹⁸ considers as “reverse care”, that is, that the neediest pregnant women are those with the least access to recommended services and care.

In this GRC, it is possible to observe the inclusion of social and demographic variables that facilitate the gauging of the context of social inequalities in health experienced by pregnant women. However, they did not seem sufficient

Table 2. Factors associated with High Gestational Risk in puerpera of the RMGV-ES (2010) and MRSM-ES (2012/2013).

Variables		High Gestational Risk			
		Odds Ratio	IC95%	Odds Ratio adjusted	IC95%
Region	MRSM	1.00	-	1.00	-
	RMGV	1.57	1.20-2.05	1.74	1.32-2.28
Ethnicity/skin color	White	1.00	-	-	-
	Black	1.14	0.81-1.62	-	-
	Brown	1.60	1.20-2.54	-	-
Head of household	Someone else	1.00	-	1.00	-
	Puerpera	2.99	1.63-5.50	3.03	1.64-5.51
Head of household schooling	≥5 years	1.00	-	1.00	-
	<5 years	1.49	1.08-2.05	1.58	1.14-2.20
MHDI	Medium	1.00	-	-	-
	High	1.77	1.27-2.46	-	-
Social benefits	No	1.00	-	1.00	-
	Yes	1.42	1.06-1.92	1.46	1.04-2.03
Open sewage	No	1.00	-	-	-
	Yes	1.31	0.9-1.92	-	-
Waste disposal	Collected	1.00	-	-	-
	Other types	1.29	0.8-2.06	-	-

for the diversity of aspects, so we decided to use the analysis of other social variables, which denote the existence of inequality in health and that could contribute to the gestational risk.

As a result, we expected that socioeconomic variables such as MHDI, social class, ethnicity/skin color, open sewage and waste disposal would be highlighted as factors associated with gestational risk, since they affect health outcomes and also because they are associated with poverty, limited access to quality healthcare, low schooling, unemployment, low-skilled employment and poor food, housing and transportation conditions¹⁹. These variables, however, were not significant in the final model, probably due to the sample universe from which the study population was extracted, that is, users of public hospitals or hospitals covenanted with the SUS, with all prenatal care performed in the SUS, which would possibly have leveled socioeconomic status among puerperae.

However, it was possible to identify the association of geographical inequalities with gestational risk. Pregnant women residing in the RMGV-ES were more likely to be classified as HGRs when compared to pregnant women living in MRSM-ES. These data may be related to the differentiated “favelization” process between geographical regions, in which the RMGV-ES has a more defined complex of favelas than the MRSM-ES, and may entail a greater risk to pregnant women due to the typical social barriers of these areas. Favela is understood as a poor settlement consisting of low-income families, characterized by illegal occupation of the land, by land occupation density and intensity, lack of infrastructure, difficult access to services and social facilities provided by the city and unhealthy housing, given its dimensions and environmental discomfort²⁰.

It was also possible to highlight social inequality related to the social role played by women. Pregnant women who headed their households were three times more likely to be classified as HGRs when compared to other household heads. We can postulate that when pregnant women have this dual burden – provider and maintainer of the household – they are more exposed to the psychosocial risks regarding the control and allocation of resources, besides the lack of social support, mainly regarding responsibilities assigned to the head of the household. Mothers being heads of households is related to lack of monetary and emotional support, which leads women to seek means to support their fam-

ily, and they are often the only source of income of the household²¹.

Regarding schooling, the study showed a greater probability of pregnant women whose head of household had less than five years of schooling being classified as HGR. As a result, it is worth mentioning that, although pregnant women’s schooling is included in the GRC used by the Ministry of Health, the schooling of the head of the household is extremely important in the gestational risk assessment context, because it has a social impact on pregnant women’s lives, even if interaction between these two social variables has been ruled out. This result may be directly associated with social inclusion caused by better income, greater access to information, care and assistance and evidence pregnant women’s social setting. On the other hand, although the schooling level has increased considerably in Brazil, especially in the last years²², the persistent association of low schooling with inadequate prenatal care shows that socially vulnerable groups receive poor prenatal care, as observed in a study in the metropolitan region of Aracaju, Sergipe²³ and in a study conducted in São Luiz, Maranhão, where inadequate prenatal care rates increased almost twice with maternal schooling decline, and the highest rate of inadequacy was found in the category of zero to four years of schooling²⁴. This shows that not only women’s schooling, but also the schooling level of the head of the household is a social predictive factor for gestational risk.

When the direct social benefit – Bolsa Família – was analyzed, it was observed that pregnant women who benefited from this grant were more likely to be classified as HGRs when compared with those who did not receive it, possibly due to their social vulnerability situation. This result reinforces the idea that, while the Bolsa Família is a policy that seeks to promote the economic and social development of households living in poverty in the country²⁵, and consequently reduce social vulnerability, the monitoring of health determinants is not achieving the expected effect. In health – where determinants relate to the monitoring of the vaccination schedule and the growth and development of children under seven years of age, prenatal and puerperium for pregnant women and participation in educational activities on breastfeeding and healthy eating – the proportion of follow-up has been well below expectations, with an increasing trend in recent years²⁶. Therefore, it is worth emphasizing that this variable can work as a proxy for social vulnerability, acting as a social indicator, in which

women in this condition may evidence a greater risk during pregnancy. Moreover, the poor evaluation of these aspects can contribute to inefficient actions regarding their tackling, even within the limits of individual practice. These results show that, despite efforts to reduce social inequalities in terms of gestational risk, these measures have not been sufficient to reduce HGR.

While socioeconomic inequalities have declined, social inequalities in the adequate use of prenatal care persist, especially among the poorest and least educated women²⁶. Social inequality in health remains a major challenge for public health and consequently for maternal health. Qualifying prenatal care and, consequently, reducing gestational risk requires a great effort from the Brazilian health system. In addition, better access to information must be provided, since well-informed women are demanding more of their rights.

This study becomes an important tool in the planning of policies aimed at reducing or eliminating possible gestational risk factors since its results contain new social variables, which are associated with gestational risk. In addition, they indicate that pregnant women's gestational risk is usually underestimated in prenatal care, which may be contributing to the non-reduction of maternal and perinatal mortality rates. However, a limitation of the study was the impossibility of classifying all women regarding gestational risk,

due to the lack of some variables that are components of the set of factors contributing to gestational risk, and approximately 33% of the puerperae were excluded.

Conclusion

The result of this study evidenced that, in addition to the social variables included in the GRC used by the Ministry of Health, some social factors are associated with gestational risk, such as: residing in the metropolitan region, pregnant women being the head of the household, the head of the household having less than five years of schooling and the household receiving the government social benefit "Bolsa Família", which shows the presence of social inequalities in all its context as a producer of greater risk during pregnancy. Therefore, it is necessary to rethink the variables that underlie the GRC used by the Ministry of Health, in order to expand the field of evaluation that involves gestational risk, adding to the social factors already considered by the GRC other social determinants of health that are part of the pregnancy cycle context. Moreover, it is relevant that health professionals and health managers be able to address the whole context of inequalities, by introducing into the pregnant women's health care plan strategies and partnerships to mitigate or eliminate these factors.

Collaborations

EM Garcia, KG Martinelli, CDD Esposti and ET Santos Neto contribuíram para a criação, design, análise e interpretação de dados, elaboração do artigo e revisão crítica. AO Emmerich and SGN Gama contribuíram para a elaboração do artigo e revisão crítica.

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