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ORIGINAL ARTICLE

Prevalence and factors associated with low birth weight in the state of Minas Gerais, Brazil

Prevalência e fatores associados ao baixo peso ao nascer no estado de Minas Gerais, Brasil

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ABSTRACT

Introduction: One of the health indicators of the newborn children is low birth weight (LBW) - weight less than 2,500g - which can be determined by the influence of several reasons, such as, maternal, fetal, placental and environmental factors. **Objective:** To determine the prevalence and factors associated with LBW in the state of Minas Gerais (MG), Brazil. **Method:** Cross-sectional study which analyzed data from 259,863 live births, in MG, from Brazilian Live Birth Information System (SINASC), in 2011. Of these, 242,487 records met the inclusion criteria: birth weight equal to or greater than 500g, no malformations, 22 weeks or more of gestational age. The prevalence of the LBW was determined. The crude and adjusted prevalence ratios were determined by Poisson regression. **Results:** The prevalence of LBW was 9.2%. The prevalence was higher in mothers with lower educational level, primiparity, dead children from previous pregnancies, prenatal care with less than 5 visits to doctor, gestational age less than 37 weeks, multiple pregnancy, and female newborn. The prevalence was lower in the North, Northeast, Northwest, Eastern of South, Southeast, Southern Triangle, East and Jequitinhonha health macro-regions. **Conclusion:** The LBW prevalence was high, and the variables associated with higher LBW prevalence were gestational age, multiple pregnancy, educational level, number of prenatal visits to doctor, parity, gender, place of birth. The lower prevalence was observed in the health macro-regions in which the socioeconomic and sanitary conditions are worst, characterizing the LBW paradox.

Keywords: Low birth weight, Maternal and child health, Health planning, Health Information System.

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RESUMO

Introdução: Um dos indicadores de saúde do recém-nascido é o baixo peso ao nascer (BPN) - peso inferior a 2.500 g – que pode ser determinado pela influência de diversos fatores, como maternos, fetais, placentários e ambientais. **Objetivo:** Determinar a prevalência e fatores associados ao BPN no estado de Minas Gerais (MG). **Métodos:** Estudo de corte transversal que analisou dados de 259.863 nascimentos em MG a partir das Declarações de Nascidos Vivos do Sistema de Informações sobre Nascidos Vivos (SINASC) de 2011. Desses, 242.487 registros preenchiam os critérios de inclusão: peso maior ou igual a 500 g, sem malformações, 22 semanas ou mais de idade gestacional. Determinou-se a prevalência do BPN e as razões de prevalência brutas e ajustadas por regressão de Poisson. **Resultados:** A prevalência do BPN foi 9,2%, sendo maior em mães com menor escolaridade, primigestas, filhos mortos de gestações anteriores, <5 consultas de pré-natal, prematuridade, gravidez múltipla, sexo feminino. A prevalência foi menor nas macrorregiões de saúde Norte, Nordeste, Noroeste, Leste, Leste do Sul, Sudeste, Triângulo do Sul, Jequitinhonha. **Conclusão:** A prevalência do BPN é alta em MG. As variáveis associadas com maior prevalência foram: idade gestacional, gravidez múltipla, escolaridade materna, número de consultas de pré-natal, paridade, sexo, local de nascimento. A menor prevalência ocorreu nas macrorregiões de saúde nas quais as condições socioeconômicas e sanitárias são menos favorecidas, caracterizando o paradoxo do BPN.

Palavras-chave: Baixo peso ao nascer; Saúde materno-infantil; Planejamento em saúde; Sistema de Informação em Saúde.

Introduction

Low birth weight (LBW) is considered by the World Health Organization (WHO) as a birth weight of less than 2500g. It can occur as a result of an early termination of pregnancy, intrauterine growth restriction or a combination of both[1]. More than 20 million children worldwide are born with LBW[1].

LBW is associated with a higher risk of impaired cognitive, motor and behavioral development, as well as with several diseases in adulthood such as cardiovascular occurrences, metabolic syndrome and type 2 diabetes mellitus (DM2), dyslipidemia, arterial hypertension, asthma and higher mortality. in the first year of their life[2-5].

The lower the weight of the newborn (NB), the higher the infant mortality. In 2013, infant mortality in the United States in the LBW group was 50.26/1,000 live births, 219.56/1,000 live births in the group weighing less than 1,500g, and 2.05/1,000 when birth weight was greater than 2,500g[2].

The prevalence of LBW in 2011 was 3.2% in Iceland, 4.2% in Sweden, 4.6% in Norway, 6.4% in Switzerland, 6.6% in the Netherlands, 6.8% in France, 7.0% in the UK, 6.2% in Australia, 6.2% in Canada, 8.4% in the US, 5.9% in Chile, 8.6% in Mexico. The prevalence was highest in Turkey (11.0%), Indonesia (11.1%), South Africa (13.2%) and India (27.6%)[6].

In Brazil, in 1994, the prevalence of LBW was 8.75%. There was a reduction in the period from 1994 to 2000, reaching the lowest value in 2000 (7.7%). Subsequently, between 2000 and 2010, a slow increase in the percentage was observed, reaching 8.41% in 2010. This decline in prevalence followed by an increase occurred in all regions of the country. From 1994 to 2010, the prevalence of LBW in the Southern and Southeastern regions was higher than that noticed in the Northern, Northeastern and Midwest regions and in Brazil[7].

During this period, the prevalence of LBW in the state of Minas Gerais followed the same behavior, going from 10.72% in 1994 to 8.8% in 2000, reaching 9.48% in 2010, always being higher than in the Southeast, South, North, Northeast, Midwest and Brazil as a whole[7].

The objective of this study was to determine the prevalence and factors associated with LBW in the state of Minas Gerais from the Declarations of Live Births (DNV) of the Information System on Live Births (SINASC) and information regarding the municipalities, such as population, Municipal Human Development Index (MHDI), infant mortality rate (IMR), *per capita* income and administrative health regions.

Methods

A cross-sectional, descriptive and analytical observational study was carried out, based on the information on the Declarations of Live Births (DNV) of the Information System on Live Births (SINASC), referring to births in the State of Minas Gerais in 2011, made available by the Ministry of Health in 2013[8].

We selected for analysis the records of live births with a gestational age greater than or equal to 22 weeks, with a birth weight greater than or equal to 500g, without congenital malformations, from resident mothers, whose delivery took place in the State of Minas Gerais.

Birth weight (outcome variable) was selected as: low weight, when birth weight was less than or equal to 2499 g and non-low weight, when it was greater than or equal to 2500 g[1].

The independent variables obtained from SINASC were: mother's age (less than 20 years, 20 to 34 years and 35 years or more), mother's education (less than eight, eight to eleven and twelve or more years of study); marital status (with and without a partner); occupation out of home (yes or no); living children from previous pregnancies (none, one, two and three or more); dead children from previous pregnancies (none, one, two and three or more); duration of pregnancy (less than 37 weeks, 37 to 41, and 42 or more); number of prenatal consultations (three or less, four to six and seven or more); pregnancy (single, double, three or more); delivery (vaginal and cesarean); place of birth (hospital, other health facility, home and other locations - ambulance, street, etc.); gender of the newborn (male and female); skin color (white, black/brown and others).

In addition to these, other variables related to municipalities of Minas Gerais were incorporated in the analysis: terciles of the infant mortality rate (IMR) (less than 5.89; 5.89 to 16.94 and 16.95 or more per thousand live births), Municipal Human Development Index (MHDI) (less than 0.500; 0.500 to 0.599, 0.600 to 0.699; 0.700 to 0.799 and 0.800 or more), terciles of *per capita* income (R$) (less than 87.40, 87.40 to 147, 77, more than 147.77), terciles of population (less than 5,580, 5,580 to 12,322, more than 12,322) and Health macro-region (Central, Southern of Center, Jequitinhonha, East, Eastern of South, Northeast, Northwest, North, West, Southeast, South, Northern Triangle and Southern Triangle), based on the Minas Gerais Social Responsibility Index (IMRS) 2013, from João Pinheiro Foundation Government of Minas Gerais, referring to the year 2011.

Data were processed using the SPSS 16.0 program (SPSS Inc., Chicago, IL, USA).

The values of the crude Prevalence Ratios (PR) and their 95% Confidence Intervals (95%CI) were determined by Poisson regression. Adjusted PR were determined by Hierarchical Multivariate Poisson regression (GENLIN function; Distribution = Poisson; link = log, robust variance).

All variables with *p*-values lower than 0.20 in the bivariate analysis were selected for inclusion in the first stage of the model.

When performing the multivariate analysis, the independent variables were divided into four hierarchical levels. The most peripheral (level I) consisted of population, infant mortality rate, *per capita* income, MHDI and health macro-region. The next level (level II) contained information regarding marital status, mother's education, mother's occupation, mother's age, number of living children and number of dead children. Information regarding the duration of pregnancy, number of prenatal consultations, type of pregnancy, type of delivery and place of birth were included in level III. In the fourth hierarchical level, the newborn's race/skin color and sex were included.

The categories adopted as reference, both in the univariate and in the multivariate analysis, were those which, according to the literature, present the lowest expected risk for low birth weight: mother aged 20 to 34 years, 12 years or more of schooling, with no occupation outside home, with a partner, without dead children, with a previous living child, with seven or more prenatal consultations, with a single and full-term pregnancy, vaginal delivery, hospital delivery, white skin, newborn male, 3rd tercile of population, 1st tercile of IMC, 3rd tercile of *per capita* income, highest MHDI and central macro-region.

This work was approved by the Research Ethics Committee, under registration number CEP 886.462.

Results

According to SINASC, there were 259,863 births in 2011 in the state of Minas Gerais. From these, 242,487 records met the inclusion criteria and were selected for analysis.

The prevalence of low birth weight was 9.2% (95%CI: 9.1% - 9.3%), with 1.3% in the group weighing between 500 and 1499g and 7.9% weighing between 1500 and 2499g.

It was found in the bivariate analysis that only the variable "occupation out of home" was not associated (*p*=0.745) with LBW. The others were associated with LBW and, therefore, were selected for the multivariate analysis.

The LBW prevalences and the adjusted prevalence ratios (*adjusted* PR) in relation to the variables of the four hierarchical levels are presented in Tables 1 to 4.

Table 1. Prevalence and adjusted prevalence ratio of low birth weight in relation to the population, Infant Mortality Rate (IMR), per capita income, Municipal Human Development Index (MHDI) and health macro-region.

Hierarchical level I	<2500 g		Total	*p*	PR adj	CI95%
	N	%				
Population *						
1º Tercile	942	8,4	11.208	0,862	1,13	0,29 - 4,31
2º Tercile	2.214	8,5	25.932	0,931	1,03	0,52 - 2,05
3º Tercile	19.216	9,4	205.347		1,00	
IMR **						
3ºTercile	4.014	9,1	44.175	0,888	1,11	0,25 - 4,96
2º Tercile	15.843	9,4	168.707	0,080	0,42	0,16 - 1,11
1º Tercile	2.515	8,5	29.605		1,00	
Per capita Income **(R$)** ***						
1º Tercile	2.709	8,3	32.612	0,161	3,14	0,63 - 15,58
2º Tercile	3.086	8,9	34.791	0,226	0,52	0,18 - 1,51
3º Tercile	16.577	9,5	175.084		1,00	
MHDI						
Low [0,500 |--- 0,599]	773	8,7	8.904	0,065	0,41	0,16 - 1,06
Avg[0,600 |--- 0,699]	6.090	8,5	71.794	0,215	0,98	0,94 - 1,01
High [0,700 |--- 0,799]	12.101	9,3	129.660	0,454	1,01	0,98 - 1,05
Very high [≥ 0,800]	3.408	10,6	32.129		1,00	
Health macro-regions						
Southern Triangle	764	8,8	8.633	0,028	0,93	0,88 - 0,99
Northern Triangle	1.418	9,3	15.295	0,440	1,02	0,97 - 1,07
South	2.606	9,0	29.089	0,196	0,97	0,94 - 1,01
Southeast	1.366	8,9	15.336	0,010	0,94	0,89 - 0,98
West	1.269	9,3	13.641	0,176	0,97	0,92 - 1,02
North	1.836	8,1	22.668	0,001	0,93	0,89 - 0,97
Northwest	635	8,3	7.662	0,002	0,89	0,83 - 0,96
Northeast	1.106	9,2	12.047	0,002	0,92	0,87 - 0,97
East of South	684	8,5	8.049	0,003	0,90	0,85 - 0,97
East	1.474	8,1	18.155	<0,001	0,89	0,85 - 0,93
Jequitinhonha	313	8,5	3.698	0,008	0,88	0,81 - 0,97
Southern Center	902	10,3	8.745	0,168	1,05	0,98 - 1,12
Central	7.999	10,1	79.469		1,00	

Legend: PR - Prevalence Ratio; 95%CI - 95% Confidence interval of the Prevalence Ratio
* Population: - 1st Tercile: <5,580; 2nd Tercile: 5,580 to 12,322; 3rd Tercile: >12,322 inhabitants
** IMR: - 1 st Tercile: <5.89; 2nd Tercile: 5.89 to 16.94; 3rd Tercile: >16.94 per thousand live births
*** Income (R$): - 1 st Tercile: <87.40; 2nd Tercile: 87.40 to 147.77; 3rd Tercile: >147.77.

After the multivariate analysis, only the following variables remained in the model: macro-region of health at hierarchical level I (Table 1); mother's education, number of live and dead children from previous pregnancies at level II (Table 2); type of pregnancy, duration of pregnancy, number of prenatal consultations and place of birth at level III (Table 3) and sex of the newborn at level IV (Table 4).

A higher prevalence of LBW was observed in mothers with less than eight years of schooling, with no live child or one or more dead children from previous pregnancies (Table 2), with an insufficient number of prenatal consultations, in multiple pregnancies, with less than 37 weeks of gestation, another place of birth (Table 3) and female newborns (Table 4). On the other hand, the prevalence was lower in health

Table 2. Prevalence and adjusted prevalence ratio of low birth weight in relation to maternal sociodemographic characteristics.

Hierarchical Level II	<2500 g		Total	*p*	PR adj	CI95%
	N	%				
Age						
≥ 35	3.447	11,5	29.903	0,285	1,28	0,81 - 2,01
< 20	4.017	10,1	39.850	0,393	1,08	0,90 - 1,30
20 |-- 35	14.906	8,6	172.726		1,00	
Marital status						
No partner	10.931	9,8	111.423	0,257	1,09	0,94 - 1,25
With partner	11.179	8,7	128.091		1,00	
Mother's education						
< 8 years	6.849	10,1	67.675	< 0,001	1,10	1,05 - 1,14
8 a 11 years	11.330	8,8	128.378	0,189	1,06	0,97 - 1,15
12 or more years	3.706	9,1	40.936		1,00	
Number of Living Children						
Three or more	2.254	10,5	21.369	0,369	0,96	0,89 - 1,04
2	2.607	8,2	31.693	0,497	1,06	0,89 - 1,26
1	5.521	7,5	73.805		1,00	
None	11.230	10,4	107.560	< 0,001	1,35	1,31 - 1,39
Number of Dead Children						
Three or more	236	17,8	1.326	< 0,001	1,47	1,18 - 1,82
2	536	12,7	4.208	< 0,001	1,36	1,20 - 1,53
1	2.416	10,3	23.396	< 0,001	1,12	1,05 - 1,19
None	18.171	9,0	201.613		1,00	

Legend: PR adj - Adjusted Prevalence Ratio; 95%CI - 95% confidence interval of the Prevalence Ratio.

macro-regions (Table 1), in which socioeconomic and sanitary conditions are less favored, such as the Northern, Northeastern, Northwestern and Jequitinhonha regions, when compared to the Central region (Table 1).

Discussion

The prevalence of low birth weight in the state of Minas Gerais in 2011 was 9.2% and of very low birth weight was 1.3%. Compared with other regions, the prevalence of LBW in Minas was higher than that observed in the United States[6], in most European Union countries[6], in Colombia[9], in Brazil and in their respective regions[10]. Considering the prevalence ratios, the two main variables associated with LBW were multiple pregnancy and prematurity. After adjusting for multivariate analysis, it was found that, in addition to these, the mother's education, the number of live and dead children from previous pregnancies, the number of prenatal consultations, the place of birth, the NB's sex and the health macro-regions were also associated with LBW.

In the year 2011, Minas Gerais had an approximate population of 19.72 million inhabitants. From an administrative point of view, the state is divided into 13 health macro-regions. As in other Brazilian states, Minas has regional inequalities in terms of socioeconomic development. The North, Northeast and Jequitinhonha macro-regions, for example, are the ones with the worst social, economic, basic sanitation and health resources indicators when compared to the Central macro-region which is more developed, has a greater Gross Domestic Product (GDP) and greater dynamism[11].

The higher prevalence of LBW in children of mothers with less than eight years of schooling has already been observed by Estrada-Restrepo et al. (2016)[9], Friche et al. (2006)[12], Carniel et al. (2008)[13], Coutinho et al. (2009)[14], Gonzaga et al. (2016)[15], Mattei et al. (2017)[16], Nascimento et al. (2017)[17] and Bahrami et al. (2020)[18].

For Dachs et al. (2005)[19], income and education level determine the social position of the individual in their community, generating differences in exposure to diseases, as well as in relation to vulnerability, access to health services, etc. There is also evidence that formal education plays a very important role, regardless of family income. Thus, within a given income bracket, there is evidence of greater protection for groups of mothers with better education.

Table 3. Prevalence and adjusted prevalence ratio of low birth weight in relation to prenatal care, pregnancy and delivery.

Hierarchical Level III	<2500 g		Total	*p*	PRadj	CI95%
	N	%				
Number of prenatal consultations						
≤ 3	2.826	20,2	13.985	< 0,001	2,27	2,12 - 2,43
4 |-- 7	7.299	13,3	54.758	< 0,001	1,46	1,39 - 1,52
≥ 7	12.048	7,0	172.647		1,00	
Type of pregnancy						
Three or more	187	93,0	201	< 0,001	15,33	9,59 - 24,57
Double	3.202	63,0	5.084	< 0,001	10,84	10,23 - 11,49
Single	18.957	8,0	236.796		1,00	
Durantion of pregnancy						
< 37	11.785	51,5	22.871	< 0,001	10,41	10,05 - 10,77
≥ 42	243	3,8	6.352	0,074	0,74	0,52 - 1,03
37 |--- 42	9.803	4,7	208.311		1,00	
Type of delivery						
Cesarian	12.784	9,5	134.972	0,121	0,87	0,73 - 1,04
Vaginal	9.532	8,9	106.886		1,00	
Place of birth						
Another place*	56	23,3	240	< 0,001	4,19	2,43 - 7,22
Domicile	95	20,9	455	0,761	3,14	0,00 - 4.985,54
Another establishment**	71	8,7	815	0,753	1,48	0,13 - 17,48
Hospital	22.146	9,2	240.966		1,00	

Legend: PR adj - Adjusted Prevalence Ratio; 95%CI - 95% Confidence interval of the Prevalence Ratio; *Another place (ambulance, street, etc.); **Another health establishment.

Table 4. Prevalence and adjusted prevalence ratio of low birth weight in relation to the newborn's sex and race/skin color.

Hierarchical Level IV	<2500 g		Total	p	PRadj	CI 95%
	N	%				
Sex						
Female	12.025	10,2	118.348	< 0,001	1,24	1,22 - 1,27
Male	10.347	8,3	124.139		1,00	
Race/Skin color						
Other	138	10,2	1.353	0,303	0,93	0,81 - 1,07
Black and brown	12.355	9,5	129.675	0,059	1,02	1,00 - 1,05
White	8.151	8,7	93.262w		1,00	

Legend: PR aj - Adjusted Prevalence Ratio; 95%CI - 95% confidence interval of the Prevalence Ratio.

The highest prevalence in mothers who reported not having living children from previous pregnancies was reported by Friche et al. (2006)[12] in Belo Horizonte (MG), by Silva et al. (2006)[20] in São Luiz (MA) and in Santa Maria (RS) by Ferraz et al. (2011)[21]. Friche et al. (2006)[12] also described in Belo Horizonte, the highest risk associated with dead children.

Regarding the higher prevalence in newborns of mothers with an insufficient number of prenatal consultations, it was also reported by Carniel et al. (2008)[13], Coutinho et al. (2009)[14], Gonzaga et al. (2016)[15], Mattei et al. (2017)[16], Nascimento et al. (2017)[17], Silva et al. (2006)[20] and Souza Buriol et al. (2016)[22] in Brazil and Estrada-Restrepo et al. (2016)[9] in Colombia. It is known that adequate care for

pregnant women can prevent or identify risk situations early, both for the mother and for the NB[23-25].

The higher prevalence of LBW in female newborns has also been reported by Carniel et al. (2008)[13], Nascimento et al. (2017)[17] and Silva et al. (2006)[20], however, only Nascimento et al. (2017)[17] observed that the mother who is exposed to air pollutants during pregnancy would increase the risk of female newborns to be born with low birth weight.

An aspect of special interest is the lower prevalence observed in health macro-regions that are known to be less developed. This finding can be interpreted as evidence of the "paradox" of low birth weight. This has already been reported in Brazil by Silva et al. (2005)[26] comparing results from birth cohorts in the city of São Luís (MA) and Ribeirão Preto (SP), where they observed the highest prevalence of LBW. In Ribeirão Preto there was a higher proportion of premature and cesarean births. They considered that these results would probably be due to differences in the lifestyle of the populations of the two cities, especially regarding smoking, in addition to prematurity associated with cesarean delivery. However, they made clear that they were concerned with a possible underreporting of live births in the city of São Luís (MA).

Lima et al. (2013)[27], studying the spatial inequality of BPN in Brazil, with data from SINASC, Institute of Applied Economic Research (IPEA) and Brazilian Institute of Geography and Statistics (IBGE), showed that the highest rates of BPN were concentrated in the states of the south and southeast region, that is, more developed regions of the country and with better health levels. For the authors, this "underweight paradox" reflects the socioeconomic conditions of the states and could be related to the fact that the presence of the health service and its use by the population reduce the number of infant mortality and increase the rates of low weight at birth.

Mattei e Carreno (2017)[16], studying SINASC data from Rio Grande do Sul in 2012, found heterogeneity between the regions (Regional Health Coordination) of the State, in relation to sociodemographic factors and health care, where regions with a high Socioeconomic Development Index had the highest proportions of LBW (above 10%), among other risk factors for maternal and child health.

Andrade et al. (2008)[28], analyzing birth data from Brazil in 2005, observed that in all regions of Brazil the prevalence of LBW was higher in cities with more than 50,000 inhabitants when compared to those with a smaller population, concluding that there was evidence of the LBW "paradox". These authors also highlighted the possible underreporting of very low birth weight live births in the poorest regions, which would be inappropriately classified as stillbirths because they died soon after birth, due to the insufficient offer of adequate perinatal care for this high-risk group.

Silva et al. (2010)[29] studied the LBW trend in Brazil from 1995 to 2007 and also found evidence of the LBW "paradox" in Brazil. They suggest that the observed regional differences should be associated primarily with the availability of health services that provide adequate perinatal care and medical interventions, rather than with socioeconomic differences. Lourenço et al. (2014)[30] in a study in the state of São Paulo, observed that the drop in infant mortality in the analyzed period was also influenced by the growth of GDP per capita and by the Family Health model.

The finding of the association between LBW and maternal schooling in the present study reinforces that the LBW "paradox" is not associated with socioeconomic differences.

This study has limitations that prevent a full understanding of the factors associated with low birth weight. One of them is the impossibility of separately analyzing the factors associated with low weight due to intrauterine growth restriction and prematurity. As gestational age is categorized, it was not possible to assess the adequacy of weight to gestational age. This year, approximately 40% of the records had information on gestational age in weeks.

Another important limitation is the lack of information on smoking and alcoholism during pregnancy. If these variables were included in the analysis, there would probably be an important change in the prevalence ratios obtained, since smoking is one of the most important factors associated with low birth weight. In addition, it should be noted the absence of information regarding habits, customs, work, etc. of mothers.

Dachs et al. (2005)[19] consider that inequalities in the population's health status are determined by inequities in living conditions. Interventions that primarily address inequities in health access and spending will have limited results. These authors also mention that formal education plays an important role in reducing poverty and social inequalities, with an important effect on the health of children under four years of age.

As for maternal factors (alcoholism, parity, gestational age, multiple pregnancies, prematurity, smoking, etc.), it seems evident that the identification and reception of younger pregnant women, with low education, starting early and adequately monitoring their pregnancies, would make it possible to diagnose and treat the most prevalent diseases, such as diabetes, hypertension, urinary tract infection, iron deficiency anemia, reducing the impact of these maternal factors both on LBW and maternal mortality[18,24,25,31].

Therefore, it is not enough just to have access to prenatal care. There must be good quality and competence in the assistance provided. Several studies[23-25,31] have shown that there is also inequity regarding the quality of health care provided in the health system. Victora et al. (2011)[23], evaluating data from Pelotas (RS), state that, despite the number of consultations performed during prenatal care being adequate for most pregnant women, half of them did not have their breasts examined and 25% did not undergo a gynecological examination. In these cases, it was not about difficulties in accessing the health system, there was simply poor quality of care. Access to prenatal care must be improved, but it is also necessary to ensure good medical care for pregnant women.

Conclusion

The results have shown that the prevalence of LBW in the state of Minas Gerais in 2011 was high and that insufficient maternal education, parity, prematurity, multiple pregnancies, low frequency of prenatal consultations, female newborns and births occurring in another place (ambulance, street, etc.) were factors associated with a higher risk of LBW. The lowest prevalence occurred in health macro-regions in which socioeconomic and sanitary conditions are less favored, characterizing the "paradox" of low birth weight.

Authors' Contributions

Authors Medeiros GJM, Zanolli ML, Morcillo AM participated in: the conception and design of the study, data acquisition, data analysis and interpretation; writing the article and critically reviewing the relevant intellectual content; and final approval of the version to be submitted.

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