FACTORS ASSOCIATED WITH PREMATURITY: AN ANALYSIS OF INFORMATION SYSTEM DATA ABOUT BORN ALIVE

FACTORES ASOCIADOS A PREMATURIDAD: ANÁLISE DOS DADOS DO SISTEMA DE INFORMAÇÕES SOBRE NASCIDOS VIVOS

FACTORES ASOCIADOS CON PREMATUROS: UN ANÁLISIS DE DATOS DEL SISTEMA DE INFORMACIÓN ACERCA DE LOS NACIDOS VIVOS

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ABSTRACT

Objectives: estimating the prevalence of prematurity and the factors associated with premature births.

Method: a descriptive cross-sectional study that used secondary data obtained through the Live Birth Information System in the city of Cuiabá-MT, in 2011. The data were presented in a figure and tables, submitted to descriptive statistical analysis. Results: in 2011, the prevalence of preterm births was of 10.9%, with an increase trend between 2000 and 2011. The results pointed as factors associated with premature births, the gender of the newborn, congenital anomaly, maternal marital status and number of consultations in prenatal care. Conclusion: premature birth may be related to socioeconomic status, maternal obstetric care and prenatal and the analysis of the same is of fundamental importance for planning health actions directed to promoting healthy birth.

Descriptors: Risk Factors; Premature Birth; Premature; Information Systems.

RESUMO

Objetivos: estimar a prevalência da prematuridade e os fatores associados aos nascimentos prematuros.

Método: estudo transversal descritivo, que utilizou dados secundários obtidos do Sistema de Informação sobre Nascidos Vivos no município de Cuiabá-MT no ano de 2011. Os dados foram apresentados em uma figura e tabelas, submetidos à análise estatística descritiva. Resultados: em 2011, a prevalência de prematuridade foi de 10.9%, com tendência de aumento entre os anos de 2000 e 2011. Os resultados apontaram como fatores associados aos nascimentos prematuros, o sexo do recém-nascido, anomalia congênita, estado civil materno e número de consultas realizadas no pré-natal. Conclusão: o nascimento prematuro pode estar relacionado às condições socioeconômicas, obstétricas maternas e de assistência ao pré-natal e a análise das mesmas é de fundamental importância para o planejamento de ações de saúde direcionadas para promoção do nascimento saudável.

Descritores: Fatores de Risco; Nascimento prematuro; Prematuro; Sistemas de Informação.

RESUMEN

Objetivos: estimar la prevalencia de prematuridad y los factores asociados con los nacimientos prematuros.

Método: un estudio descriptivo transversal que utilizó datos secundarios obtenidos a través del Sistema de Información acerca de los Nacidos Vivos en la ciudad de Cuiabá-MT en 2011. Los datos se presentaron en una figura y tablas, sometidos al análisis estadístico descriptivo. Resultados: en 2011, la prevalencia de partos prematuros fue de 10,9%, con una tendencia al alza entre 2000 y 2011. Los resultados mostraron como factores asociados con los nacimientos prematuros, el sexo del recién nacido, anomalía congénita, estado civil de la madre y el número de consultas en la atención prenatal. Conclusión: el nacimiento prematuro puede estar relacionado con el nivel socioeconómico, la atención obstétrica materna y prenatal y su análisis es muy importante para la planificación de acciones de salud dirigidas a la promoción de parto saludable.

Descritores: Factores de Riesgo; El Nacimiento Prematuro; Prematuro; Sistemas de Información.
INTRODUCTION

According to the World Health Organisation (WHO), it is estimated that nearly 15 million premature babies are born every year in the world, that is, more than 1 in 10 births are preterm, and Brazil is ranked tenth in the world in the occurrence of prematurity.¹

Study supported by the United Nations Children’s Fund (UNICEF) published in 2013 shows that the prevalence of preterm births in Brazil is 11.7%, which places the country in the tenth position worldwide of preterm births. The Midwest region occupies the third position among all the regions with the highest number of newborn preterm. The results of the study showed, even as main causes of prematurity, skin color, maternal age and the number of elective deliveries cesárias.¹

The main risk factors for prematurity identified in the scientific literature are related to the state of maternal health (hypertension, diabetes mellitus, vaginosis, obesity, preeclampsia history, periodontal infections, urinary tract infections and congenital infections); maternal lifestyle habits (use of caffeine and tobacco); anxiety during pregnancy; teenage pregnancy; low maternal education; mother’s marital status (being single); low quality of care received during pregnancy; elective C-section; use of abortion in early pregnancy; premature rupture of the membranes and cerebrospinal-pelvic disproportion.³ ⁵

Still they are seen as causes contributing to the occurrence of preterm low family income, primiparity, pregnancy complications⁶; presence of congenital anomalies, twin;⁴ prior history of preterm birth and bleeding of any cause during pregnancy.⁷ In addition, prematurity is associated statistically with neonatal mortality. According to data provided by the Ministry of Health, in 2011, neonatal mortality accounted for 70% of deaths in the first year of life, with approximately 53% of these infants had been born preterm.⁸

It is considered that the main way to reduce the prevalence of premature births is to prevent the risks associated especially with the recognition and the monitoring thereof, and the terms of maternal health and prenatal and birth that contribute to improving maternal and child assistance and consequent reduction of neonatal deaths. Thus, this study is justified by the need to know the local situation, considering that prematurity has economic and social repercussions and it is one of the country’s leading health problems.

Soon, to identify factors associated with the event is critical to propose and redirect actions to improve maternal and newborn health suited to this reality.

This study aimed to estimate the prevalence of prematurity and factors associated with premature births.

METHOD

It is a cross-sectional descriptive study whose population was composed of all live births born to single birth (only one fetus), in 2011 in the city of Cuiaba-MT.

Data on births were collected from the information available in the Live Birth Information System (SINASC) online in the site DATASUS (www.datasus.gov.br) in January 2014 and the time frame of 2011 happened due of this being the last year available online at SINASC at the time of the investigation.

The independent variables were categorized for analysis as follows: gender of the NB (female and male); skin color/race (white and non-white - black, yellow, brown and Indian); congenital anomaly (yes and no); mother’s age (adolescents 10-19 years old and not teenagers, ≥ 20 years old); mother’s marital status (married - married and common-law marriage and unmarried - single, separated and widows); maternal education (0-7 and 8 or more years of schooling); type of birth (cesarean and vaginal); number of prenatal visits (0 · 6 and 7 or more).

It was considered preterm all children born alive whose pregnancy that lasted less than 37 weeks. The twin births were excluded, since this type of pregnancy is common birth of premature children, regardless of the influence of other risk factors. Also there were excluded children with a gestational age of 22 weeks because it is considered abortion.⁹

To estimate the tendency of prematurity there were calculated prevalence rates of this variable for the years 2000 to 2011. Then, the frequency distribution was made of the variables of interest for the year 2011.

To systematize and analyze the data we used the Epi Info 7.0 program and to analyze the correlations was performed chi-square test ($\chi^2$) the significance level of $p<0.05$.

This research used secondary data from official bases, so there are no ethical implications on the approach of humans. It is sought, however, to follow all the principles of confidentiality of information recommended by Resolution no. 466/12 of the National Health Council.
In 2011, Mato Grosso recorded 49,670 births with known gestational age between 22 and 42 weeks. Of these, 19,71% (9,788) occurred in Cuiaba, among which 9,547 were single birth, and 1,048 (10,9%) were premature. There has been a tendency to increase in preterm births in the city of Cuiaba - MT between the years 2000 and 2011 (5,1% and 10,9% respectively).

Note also that by the year 2008 the prevalence of preterm births in the municipality presented few fluctuations, and in 2009 there was a significant fall and after this period there was a significant increase in prematurity by 2011, as shown in Figure 1.

![Figure 1](image_url)

**Figure 1.** Preterm birth rate between the years of 2000 to 2011. Live Births Information System (SINASC), Cuiaba, Mato Grosso, Brazil.

In 2011, there was a higher percentage of newborns male (50,4%) and nonwhites declared (79,0%). There was a predominance of mothers not teenagers (83,2%), married (75,3%), with over 8 years of education (86,6%), which made 7 or more consultations of prenatal care (70,5%) and had cesarean birth (61,0%) (Table 1).

### Table 1. Characterization of born alive. Live Births Information System (SINASC), Cuiaba - Mato Grosso, Brazil, 2011.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Born Alive</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender of the NB</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>4812</td>
<td>50,4</td>
</tr>
<tr>
<td>Female</td>
<td>4735</td>
<td>49,6</td>
</tr>
<tr>
<td>Total</td>
<td>9547</td>
<td>100,0</td>
</tr>
<tr>
<td>Color/race of the NB*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non White</td>
<td>7492</td>
<td>79,0</td>
</tr>
<tr>
<td>White</td>
<td>1995</td>
<td>21,0</td>
</tr>
<tr>
<td>Total</td>
<td>9487</td>
<td>100,0</td>
</tr>
<tr>
<td>Congenital anomaly*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>66</td>
<td>0,7</td>
</tr>
<tr>
<td>No</td>
<td>9432</td>
<td>99,3</td>
</tr>
<tr>
<td>Total</td>
<td>9498</td>
<td>100,0</td>
</tr>
<tr>
<td>Mother’s age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teenagers</td>
<td>1606</td>
<td>16,8</td>
</tr>
<tr>
<td>Non teenagers</td>
<td>7941</td>
<td>83,2</td>
</tr>
<tr>
<td>Total</td>
<td>9547</td>
<td>100,0</td>
</tr>
<tr>
<td>Mother’s marital status*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>7163</td>
<td>75,3</td>
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<tr>
<td>Unmarried</td>
<td>2344</td>
<td>24,7</td>
</tr>
<tr>
<td>Total</td>
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<td>100,0</td>
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<tr>
<td>Mother’s schooling (years)*</td>
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<td></td>
</tr>
<tr>
<td>0 - 7</td>
<td>1278</td>
<td>13,4</td>
</tr>
<tr>
<td>8 or more</td>
<td>8252</td>
<td>86,6</td>
</tr>
<tr>
<td>Total</td>
<td>9530</td>
<td>100,0</td>
</tr>
<tr>
<td>Birth type*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal</td>
<td>3705</td>
<td>39,0</td>
</tr>
<tr>
<td>Cesarean</td>
<td>5836</td>
<td>61,0</td>
</tr>
<tr>
<td>Total</td>
<td>9541</td>
<td>100,0</td>
</tr>
<tr>
<td>Prenatal consultation*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 6</td>
<td>2788</td>
<td>29,5</td>
</tr>
<tr>
<td>7 or more</td>
<td>6662</td>
<td>70,5</td>
</tr>
<tr>
<td>Total</td>
<td>9450</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Corrected values after application of the exclusion criteria of the study.

Source: Official data of SINASC, city of Cuiaba, 2011.
It has been identified as possible factors associated with prematurity, newborn gender (p = 0.043), congenital anomaly (p = 0.023), maternal marital status (p = 0.009) and the number of consultations in prenatal care (p < 0.001) (Table 2).

Table 2. Factors associated with prematurity in Cuiaba-MT, according to Live Births Information System (SINASC), 2011.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Prematurity</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Gender of the NB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>559</td>
<td>4253</td>
</tr>
<tr>
<td>Female</td>
<td>489</td>
<td>4246</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1048</td>
<td>8499</td>
</tr>
<tr>
<td>Color/race of the NB*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non White</td>
<td>822</td>
<td>6670</td>
</tr>
<tr>
<td>White</td>
<td>222</td>
<td>1773</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1044</td>
<td>8443</td>
</tr>
<tr>
<td>Congenital anomaly*</td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>53</td>
</tr>
<tr>
<td>No</td>
<td>1030</td>
<td>8402</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1043</td>
<td>8455</td>
</tr>
<tr>
<td>Mother’s age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teenagers</td>
<td>164</td>
<td>1442</td>
</tr>
<tr>
<td>Non teenagers</td>
<td>884</td>
<td>7057</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1048</td>
<td>8499</td>
</tr>
<tr>
<td>Mother’s marital status*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Married</td>
<td>291</td>
<td>2053</td>
</tr>
<tr>
<td>Married</td>
<td>751</td>
<td>6412</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1042</td>
<td>8465</td>
</tr>
<tr>
<td>Mother’s schooling (years)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 7</td>
<td>153</td>
<td>1125</td>
</tr>
<tr>
<td>≥ to 8</td>
<td>894</td>
<td>7358</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1047</td>
<td>8483</td>
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<tr>
<td>Birth type*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cesarean</td>
<td>630</td>
<td>5206</td>
</tr>
<tr>
<td>Vaginal</td>
<td>418</td>
<td>3287</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1048</td>
<td>8493</td>
</tr>
<tr>
<td>Prenatal consultations*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 6</td>
<td>420</td>
<td>2368</td>
</tr>
<tr>
<td>≥ to 7</td>
<td>609</td>
<td>6053</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1029</td>
<td>8421</td>
</tr>
</tbody>
</table>

*Corrected values after application of the exclusion criteria of the study.

Source: Official data of SINASC, city of Cuiaba, 2011.

DISCUSSION

The cross-sectional descriptive study using secondary data may have some limitations, among them the difficulty in analyzing the effect of some variables, the size of the population, underreporting of records and the type of formatting the data available online in the information system. Nevertheless, the SINASC proved an information system useful to assess the conditions of puerperal and neonatal pregnancy period and can support managers and healthcare professionals in monitoring the health and birth are essential to guide intervention strategies to prevent prematurity.

The prematurity rate of 10.9% found in this study is within the Brazilian standard, which according to data released by UNICEF was 11.7% for the country and 11.5% for the Midwest Region, 2010.2

The higher rate of premature births in Cuiaba-MT during the period studied is compatible with national reality, as evidenced by survey to evaluate preterm births in Brazil between 1994 and 2005, showing that the index rose from 5.0% in 1994 to 6.6% in 2005.10

Although prematurity rate is in the principal and is one of the main factors contributing to infant mortality, especially in the neonatal period, the survival of preterm births has increased due to the availability of technologies, especially in developed countries.11 In contrast, the reduction of neonatal mortality finds other obstacles as re-hospitalizations, mainly from respiratory causes and deficit growth and development of the premature child, making it necessary to search for better conditions of neonatal and post-neonatal service to them, providing support for families and subsidies for proper growth and development of premature baby.11
In this study the gender variable of the NB presented itself as a factor associated with preterm birth, as evidenced in surveys conducted in the State of Santa Catarina and 12 in Rio Grande do Sul.6

Another variable that was associated with preterm birth was the presence of congenital anomalies, such as that found in a survey conducted in the city of Caxias do Sul, State of Rio Grande do Sul.4 Congenital anomalies may put at risk the intrauterine growth leading to occurrence of premature birth. In addition, on condition that the elective termination of pregnancy before the end occurs more often in order to provide treatment to the NB. 13

The marital status of mothers, also represented a risk factor for preterm birth to occur in this study, coinciding with the results of research conducted in the State of Santa Catarina also indicated increased risk of prematurity among infants of unmarried mothers.7,17 It is possible that this aspect may be associated with emotional support demanded by women during pregnancy, because as described in the literature, there is a relationship between emotional factors such as anxiety and stress and the occurrence of preterm birth.5,8,14

Another aspect that has been discussed in the literature is the relationship between prenatal care inadequate or absent and premature birth.5,12,15 According to the Ministry of Health guidelines for attention to prenatal low risk, the appropriate number of consultations during pregnancy must be at least 6, with early continuation, carried out monthly until 28 weeks, fortnightly between 28 and 36 weeks and weekly until birth.9

Although it is considered that in the early interruption to pregnancies there are fewer prenatal consultations due to childbirth precocity with decreased time to perform this monitoring, the present study showed an association between the number of prenatal visits and premature births.

The quality of prenatal care has been evaluated by the number of consultations and the beginning of the continuation period. However, it is necessary to investigate the quality of the entire process for evaluation of prenatal care in the country, enabling investment in actions that increase access to health services, early monitoring, conditions for realization of adequate number of consultations as well as the quality of care within the parameters established by the Ministry of Health to promote healthy pregnancy and childbirth.9,16

A recent research that evaluated the structure of family health units for provision of prenatal care in Cuiaba-MT, pointed out that the necessary resources for proper prenatal care in the municipality found partially appropriate, drawing attention to the gaps related to the physical structure of the units, availability of equipment, materials and supplies, human resources and administrative aspects, primarily the reference and counterreference which can harm the quality of care.17

Given this situation it is imperative the improvement of prenatal care services in the municipality, in terms of ensuring adequate structure and availability of supplies, materials and necessary equipment, training of professionals and strengthening of the health care network, to it is possible to promote the quality of prenatal care and consequently lower rates of prematurity and mortality from preventable causes for appropriate assistance to pregnancy.

In addition to these investments in infrastructure, several interventions have been described in the literature to prevent premature births, including, monitoring of maternal weight and correction of potential faults in weight gain, anti-smoking and tracking urinary tract infections during pregnancy18. Prematurity can also be reduced with better access to family planning, especially for teenagers as well as improving care before and during pregnancy19.

Although the variable skin color/NB’s race has not been associated with prematurity in this study, confirming results found in Santa Catarina in the year 200512, there was a higher percentage of preterm births among nonwhites declared NB. This factor is compatible with the characteristics of the Mato Grosso state’s population as well as the city of Cuiaba, which have colorcast/brown race. According to DATASUS data, 63.8% of live births in 2011 in Mato Grosso were declared brown, and in the capital this percentage was of 79.0%.8

It is emphasized that it is difficult to measure skin color/race in the surveys conducted in the country because of the multiracial and miscegenation characteristic of the population, which in turn, may result in difficulty association between this variable and prematurity.

The variable maternal age showed no statistical significance in the city of Cuiaba during the study period, although studies conducted in the country point to important relationship between the mother’s age and extreme prematurity.5,7,12
Factors associated with prematurity: an analysis...

Given this reality, we need to implement policies and actions that can meet the health needs of women in age of extremes in pregnancy and childbirth, reflecting improvements in service conditions and hence reduce the preterm birth rates and maternal morbidity and mortality of children.

Despite the variable, maternal schooling did not present statistical significance as in other studies, investigations carried out in the country show that there is a higher incidence of prematurity births among mothers with less schooling.

Despite the high incidence of cesarean births in the population of the city of Cuiabá in the year studied, there was no association between the type of birth and frequency of prematurity, different from that found in other studies that showed higher incidence of prematurity among newborns born by cesarean section.

The cesarean delivery rate in Brazil is among the highest in the world, from 2001 to 2008 the rate increased from 38.0% to 48.8% and in some states the percentage of cesarean deliveries has become greater than the vaginals. In 2010, cesarean sections accounted for 52.3% of all births in the country, with the Midwest region ranked third among all states.

It is significant that the WHO recommendation is that the cesarean section rate not exceeding 15% of total births and the Ministry of Health recommends the encouragement of normal birth and reduction of the number of cesarean sections, especially in low-risk pregnancies.

CONCLUSION

Despite the increase in prematurity rates in the years 2000-2011 in the city of Cuiabá, it is still lower than the rate calculated for the country (11.7%). However, this increase should earn attention from health managers with the proposition of effective interventions that promote changes in this panorama.

The results of this study pointed out as factors associated with prematurity births, gender of the newborn, congenital anomalies, mother's marital status and number of prenatal visits, similar to that found in surveys conducted in other Brazilian states.

Preterm birth is a major risk factor for neonatal mortality and may be related to socioeconomic, maternal obstetric care and prenatal conditions. In this sense, knowledge of the local reality, and the monitoring of its rates contributes to the effective actions of prevention of prematurity and promotion of maternal and child health.

Therefore, the analysis of risk factors for preterm birth is extremely important for planning health actions, both in primary care and in the hospital area.

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It is significant that the WHO recommendation is that the cesarean section rate not exceeding 15% of total births and the Ministry of Health recommends the encouragement of normal birth and reduction of the number of cesarean sections, especially in low-risk pregnancies.

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