SYPHILIS IN PREGNANCIES AND VERTICAL TRANSMISSION AS A PUBLIC HEALTH PROBLEM

SÍFILIS EM GESTAÇÕES E TRANSMISSÃO VERTICAL COMO PROBLEMA DE SAÚDE PÚBLICA

Marisa Dias Rolan Loureiro1, Rivaldo Venâncio da Cunha2, Maria Lúcia Ivo3, Eleonir Rose Jardim Cury Pontes4, Márcia Maria Ferrairo Janini Dal Fabbro5, Marcos Antonio Ferreira Júnior6

ABSTRACT

Objective: describe the frequency of infection with treponema pallidum in pregnancies and its vertical transmission. Method: this is a cross-sectional study with laboratory screening results regarding 228,196 pregnancies using the recombinant ELISA technique by elution in Mato Grosso do Sul, Brazil, from 2003 to 2008. The research was approved by the Ethics Committee of Universidade Federal de Mato Grosso do Sul (UFMS), under the Protocol 660/2009. Results: the total number of positive results detected for syphilis in pregnancies was 5,043, corresponding to 2.2% of cases. Within the study period, prenatal screening for disease detection reached the average of 95.42% of pregnancies. Conclusion: the microregions with higher frequency of syphilis in pregnant women are located in bordering zones, indigenous poles, and areas with high tourist traffic. Although the coverage index for the diagnosis of syphilis in pregnancy is close to 100% in the state, it’s not enough to ensure an improved quality of care for the pregnant woman with this disease.

Descriptors: Syphilis; Pregnancies; Prenatal Screening.

RESUMO

Objetivo: descrever a frequência da infecção por treponema pallidum em gestações e sua transmissão vertical. Método: trata-se de um estudo transversal com resultados de triagem laboratorial referentes a 228.196 gestações pela técnica ELISA recombinante por eluição em Mato Grosso do Sul, de 2003 a 2008. A pesquisa foi aprovada pelo Comité de Ética da Universidade Federal de Mato Grosso do Sul (UFMS), sob o Protocolo n. 660/2009. Resultados: foi detectado o total de 5.043 resultados positivos de sífilis em gestações, correspondendo a 2,2% dos casos. No período de estudo, a triagem pré-natal para detecção da doença alcançou a média de 95,42% das gestações. Conclusão: as microrregiões com maior frequência de sífilis em gestantes estão localizadas em zonas de fronteira, polos indígenas e áreas de grande movimento turístico. Embora o índice de cobertura para o diagnóstico de sífilis na gestação esteja próximo de 100% no estado, ele não é suficiente para garantir a melhoria da qualidade da atenção à gestante com essa doença. Descriptors: Sífilis; Gestações; Triagem Pré-Natal.

RESUMEN

Objetivo: describir la frecuencia de la infección por treponema pallidum en gestaciones y su transmisión vertical. Método: esto es un estudio transversal con resultados de tamizaje de laboratorio relativos a 228.196 embarazos por la técnica ELISA recombinante por elución en Mato Grosso do Sul, de 2003 hasta 2008. La investigación fue aprobada por el Comité de Ética de la Universidad Federal de Mato Grosso do Sul (UFMS), bajo el Protocolo 660/2009. Resultados: fue detectado el total de 5.043 resultados positivos de sífilis en embarazos, lo que corresponde al 2,2% de los casos. En el periodo de estudio, el tamizaje prenatal para detección de enfermedad alcanzó la media de 95,42% de los embarazos. Conclusion: las microrregiones con mayor frecuencia de sífilis en mujeres embarazadas están ubicadas en zonas fronterizas, polos indígenas y áreas de mucho tránsito turístico. Aunque el índice de cobertura para el diagnóstico de sífilis en el embarazo esté cerca del 100% en el estado, ello no es suficiente para garantizar una mejor calidad de la atención a la mujer embarazada con esta enfermedad. Descriptores: Sífilis; Embarazos; Tamizaje Prenatal.

1Nurse, Ph.D Professor at the Nursing Department of Federal University Mato Grosso do Sul/UFMS, Campo Grande (MS), Brazil. Email: marisa.dianorolan@gmail.com; Infectious disease physician, Post-Ph.D Professor at Dr. Helio Mandetta School of Medicine of UFMS, as well as at the Graduate Program in Health and Development in the Central-West Region and at the Graduate Program in Infectious and Parasitic Diseases. Campo Grande (MS), Brazil. Email: rivaldo.venciniciano@gmail.com.br. 2Nurse, Ph.D Professor at the Nursing Department and at the Graduate Program in Health and Development in the Central-West Region of Dr. Helio Mandetta School of Medicine of UFMS, Campo Grande (MS), Brazil. Email: ivoms@terra.com.br; Dentist, Ph.D Professor at the Center for Biological and Health Sciences, as well as at the Graduate Program in Health and Development in the Central-West Region and at the Graduate Program in Infectious and Parasitic Diseases of Dr. Helio Mandetta School of Medicine of UFMS. Campo Grande (MS), Brazil. Email: elenirpontes@uol.com.br; Infectious disease physician, State Health Secretary of Campo Grande, Mato Grosso do Sul/Brazil, and Researcher at the Institute for Research, Teaching, and Diagnoses of the Association of Parents and Friends/IPED/APAE. Campo Grande (MS), Brazil. Email: mmfalbo@terra.com.br. 3Nurse, Ph.D Professor at the Nursing Department from the Center of Health Sciences of Federal University Rio Grande do Norte/UFRN, Natal (RN), Brazil. Email: marcosjunior@ufrnet.br.
INTRODUCTION

Known since the 15th century, syphilis, almost 600 years later, is still regarded as a major public health problem worldwide, although the discovery of penicillin, in 1940, and the improvement of health care have led to a sharp decline in its incidence, both in the acquired and congenital forms — up to the point that one predicted total eradication of the disease by the end of the 20th century.

From 1960 and more sharply after 1980, the incidence of syphilis took an ascending path in general population, given a lower awareness on the preventive measures, something which came along with the use of oral contraceptives, abuse in injecting drug use, a greater sexual promiscuity, a neglect of health care authorities, a poor structural organization of health care services, failures in the training of professionals from health care areas, and non-compulsory notification, factors which allowed an intensification of the disease.1-4

Syphilis is conceptualized as a sexually transmitted disease, although it can be transmitted by transfusion of contaminated blood or through contact with mucocutaneous lesions rich in treponemes. Vertical transmission of treponema pallidum (TPPA) can occur transplacentally at any time during pregnancy, being directly related to maternal treponemia. In pregnant women with early untreated syphilis, the vertical transmission rate ranges from 70% to 100% and in the late untreated syphilis it ranges from 30% to 40%, and it’s possible to occur abortions, stillbirths, or perinatal deaths in about 40% of infected children.2,3

In underdeveloped countries, syphilis and its congenital form never ceased to be a public health problem, affecting 10% to 15% of pregnant women, according to data from the World Health Organization (WHO).6 The disease also presents a high prevalence and incidence in rich countries, such as the USA, Australia, and European nations.

In Brazil, gestational syphilis is still observed in a significant proportion of women, something which has favored a relevant occurrence of congenital syphilis. Although the Ministry of Health launched in 1993 the Project for the Elimination of Congenital Syphilis, aiming to reduce its incidence to 1 case or less per 1,000 live births, the government targets weren’t met, as shown by the fact that in 2004, among mothers from 15 to 49 years in all regions of the country, a prevalence rate of 1.6% was found; one estimated about 50,000 pregnant women with syphilis and 12,000 live births with congenital syphilis, besides a vertical transmission rate of 25%, which ranges from 1.9% in the Northeast Region to 1.3% in the Central-West Region.7,9

Congenital syphilis is the disease that, perhaps, best represents the deficiencies in access and use of health services, especially among the most disadvantaged people, as it’s a preventable cause of perinatal morbimortality, with the possibility of early diagnosis and effective treatment during pregnancy. This form of the disease constitutes one of the most sensitive indicators to assess the quality of health care services, and the Ministry of Health recommends monitoring its rate as an indicator of primary health care in towns.10

Given the fact that the incidence of sexually transmitted diseases in pregnant women enhances the risk of vertical transmission to the newborn infant and taking into account the poor information on health care for pregnant women during the prenatal period in Mato Grosso do Sul, this study aims to describe the frequency of infection with treponema pallidum in pregnancies and its vertical transmission.

METHOD

This cross-sectional study was developed with secondary data, relating to all results of laboratory screening tests of pregnant women from the 78 towns of Mato Grosso do Sul, Brazil, enrolled in the State Program for Pregnant Women Protection from the Institute for Researches, Teaching, and Diagnoses of the Association of Parents and Friends of Exceptional Children (PEPG/APAE/IPED), with the period from January 2003 to December 2008.

PEPG/IPED/APAE recommends the laboratory screening test for syphilis diagnosis through recombinant ELISA technique (Q-PREVEN Sifilis Total – DBS) by elution. Blood samples are obtained through finger prick and absorbed into six discs of filter paper S&S 903 to perform the test. Regarding screened cases of infection with TPPA, new samples of blood are requested, obtained through peripheral venipuncture, from which the serum is extracted and confirmatory tests are performed through the recombinant ELISA (EIAgen TMPA Screen Recombinant Kit) and VDRL test techniques.

The variables selected for the study were: syphilis cases in pregnant women by health care microregion and by hometown.
Data were tabulated in the Microsoft Excel software, version 2003, pertinent statistical tests with percentages were applied, to check whether there was a statistically significant association between the study variables, and the chi-square test ($\chi^2$) was applied, at a 5% significance level.

The study was approved with regard to its methodological and ethical aspects by the Research Ethics Committee of Universidade Federal de Mato Grosso do Sul, under the Protocol 660/2009.

## RESULTS

Table 1 shows the percentages of screened pregnancies and the number and frequency of positive results.

Within the study period, 228,916 laboratory tests were performed to detect syphilis in pregnant women, among which 5,043 had a positive result, corresponding to 2.2% (2.1-2.3%, a 95% coverage index) of all screened pregnancies.

The coverage index ranged from 90% to 99% within the period from 2003 to 2008, and the average in the years studied was 95.42%. Since 2006, coverage came close to 100% (Table 1).

![Table 1. Distribution of syphilis cases in pregnant women and coverage index, per year. Mato Grosso do Sul, 2003 to 2008.](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>Screenings</th>
<th>Cases</th>
<th>Case/screening ratio (%)</th>
<th>Coverage index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>34,989</td>
<td>353</td>
<td>1.01</td>
<td>89.66</td>
</tr>
<tr>
<td>2004</td>
<td>38,471</td>
<td>905</td>
<td>2.35</td>
<td>93.11</td>
</tr>
<tr>
<td>2005</td>
<td>39,204</td>
<td>1,149</td>
<td>2.93</td>
<td>95.47</td>
</tr>
<tr>
<td>2006</td>
<td>39,118</td>
<td>1,004</td>
<td>2.57</td>
<td>98.72</td>
</tr>
<tr>
<td>2007</td>
<td>37,064</td>
<td>807</td>
<td>2.18</td>
<td>96.79</td>
</tr>
<tr>
<td>2008</td>
<td>40,070</td>
<td>825</td>
<td>2.06</td>
<td>98.79</td>
</tr>
<tr>
<td>Total</td>
<td>228,916</td>
<td>5,043</td>
<td>2.20</td>
<td>95.42</td>
</tr>
</tbody>
</table>

Note: In 2004, VDRL laboratory test was replaced by recombinant ELISA, which has greater sensitivity and specificity and facilitates screening, as it’s automated. Calculated having live births and screening tests as the bases.

Despite the decrease which occurred in 2006 and 2007, there was an upward trend in the proportion of screened cases ($p < 0.001$; $\chi^2$ for trend).

Mato Grosso do Sul is divided by the State Health Department into 11 heterogeneous geographical microregions (Table 2). There was a statistically significant difference in the case/screening ratio among microregions ($p < 0.001$; $\chi^2$ test).

![Table 2. Distribution of syphilis cases in pregnant women, by health care microregion. Mato Grosso do Sul, 2003 to 2008.](image)

<table>
<thead>
<tr>
<th>Microregion</th>
<th>Screenings</th>
<th>Cases</th>
<th>Case/screening ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ponta Pora</td>
<td>27,854</td>
<td>1,510</td>
<td>5.42</td>
</tr>
<tr>
<td>Corumba</td>
<td>12,497</td>
<td>420</td>
<td>3.34</td>
</tr>
<tr>
<td>Navirai</td>
<td>14,085</td>
<td>372</td>
<td>2.63</td>
</tr>
<tr>
<td>Jardim</td>
<td>7,771</td>
<td>202</td>
<td>2.60</td>
</tr>
<tr>
<td>Aquidauana</td>
<td>14,939</td>
<td>287</td>
<td>1.91</td>
</tr>
<tr>
<td>Dourados</td>
<td>28,209</td>
<td>468</td>
<td>1.66</td>
</tr>
<tr>
<td>Campo Grande</td>
<td>82,020</td>
<td>1,286</td>
<td>1.57</td>
</tr>
<tr>
<td>Paranaiba</td>
<td>8,992</td>
<td>134</td>
<td>1.49</td>
</tr>
<tr>
<td>Tres Lagos</td>
<td>14,542</td>
<td>189</td>
<td>1.30</td>
</tr>
<tr>
<td>Coxim</td>
<td>8,329</td>
<td>89</td>
<td>1.07</td>
</tr>
<tr>
<td>Nova Andradina</td>
<td>9,678</td>
<td>86</td>
<td>0.89</td>
</tr>
<tr>
<td>Total</td>
<td>228,916</td>
<td>5,043</td>
<td>2.20</td>
</tr>
</tbody>
</table>

Regarding the ratios shown (Table 2), one highlights the Ponta Pora microregion (5.42%), followed by the Corumba (3.34%), Navirai (2.63%), and Jardim (2.60%) microregions. The lowest percentage was that of the Nova Andradina microregion (0.89%).

There was a statistically significant difference among the towns of the Ponta Pora microregion ($p < 0.001$; $\chi^2$ test). The towns of Amambai (10.94%) and Coronel Sapucaia (5.90%) were above the average calculated for the microregion (Table 3).

The town of Ladario showed a higher case/screening ratio when compared to Corumba ($p = 0.008$; $\chi^2$ test), with 4.34% and 3.18%, respectively (Table 3).

There was a statistically significant difference in the case/screening ratio among the towns of the Jardim microregion ($p < 0.001$; $\chi^2$ test). The towns above the microregion average were micro Jardim and Porto Murtinho, with 3.37% and 3.40%, respectively (Table 3).
One found out a statistically significant difference among the towns in the Navirai region ($p < 0.001$; $\chi^2$ test). The towns where the case/screening ratio was higher than the microregion average were Japora, Iguatemi, and Mundo Novo, with 6.13%, 4.64%, and 3.68%, respectively (Table 3).

### DISCUSSION

The average coverage ratio (screenings with regard to live births) found in this study was 95.42%. On the other hand, 500 congenital syphilis cases were notified to the Brazilian Information System for Notifiable Diseases (SINAN) between 2003 and 2008.

The Ministry of Health, based on the proposition of the WHO, recommends, for reducing vertical transmission of the infection with TPPA, that testing should be performed during the 1st and 3rd trimester of pregnancy and at delivery. However, there’re marked differences in compliance with these protocols, due to heterogeneity of regions in the country with regard to their development stages and access to specific health care services (prenatal and laboratory tests).11,12

A study carried out in Niterói, Rio de Janeiro, Brazil, revealed that 60% of pregnant women attended prenatal care. One third of pregnant women, therefore, arrive at the maternity hospital without serologic result for syphilis. The later the diagnosis and treatment of maternal infection, the greater the difficulty for completing the treatment within the time required, in order to achieve prevention of vertical transmission.11

Despite the high coverage of prenatal care in the country, above 85% and with a ratio of five prenatal care consultations per delivery within the Unified Health System (SUS), the quality of care for the pregnant woman falls short of needs. The National Policy on Obstetric and Neonatal Care provides for examinations for syphilis, although sometimes one verifies a failure to comply with the recommended routine and other times one verifies treatment mismanagement, without partner treatment.8,12

Regarding the diagnosis of syphilis in a pregnant woman, it’s regarded as late if performed on the 2nd and 3rd trimesters. In this period, deleterious effects can already have occurred to the fetus, due to the higher maternal treponemia.

Even if proper treatment is performed in the pregnant woman up to 30 days before delivery, the fetus will be regarded as a congenital syphilis case.

Early diagnosis of maternal infection is still the best way to prevent vertical transmission of the disease. Even with completion of treatment during pregnancy, fetal infection can still occur in 14% of cases. These rates can vary according to the infection stage. Even if the pregnant woman is properly treated, congenital syphilis can occur, although this is a rare event in these cases.11

In a study on attendance to prenatal care, it was found that 55.6% of pregnant women surveyed underwent VDRL test and that 13.9% repeated it, something which demonstrates the low importance attributed to prevention of congenital syphilis. The authors consider

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**Table 3. Distribution of syphilis frequency in pregnant women in the Ponta Pora, Corumba, Jardim, and Navirai microregions, by town. Mato Grosso do Sul, 2003 to 2008.**

<table>
<thead>
<tr>
<th>Towns</th>
<th>Screenings</th>
<th>Cases</th>
<th>Case/screening (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ponta Pora Microregion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amambai</td>
<td>5,432</td>
<td>109</td>
<td>10.94</td>
</tr>
<tr>
<td>Coronel Sapucaia</td>
<td>2,442</td>
<td>144</td>
<td>5.90</td>
</tr>
<tr>
<td>Paranobos</td>
<td>2,271</td>
<td>117</td>
<td>4.93</td>
</tr>
<tr>
<td>Ponta Pora</td>
<td>8,786</td>
<td>376</td>
<td>4.28</td>
</tr>
<tr>
<td>Antonio Joao</td>
<td>1,389</td>
<td>58</td>
<td>4.18</td>
</tr>
<tr>
<td>Aral Moreira</td>
<td>912</td>
<td>35</td>
<td>3.84</td>
</tr>
<tr>
<td>Bela Vista</td>
<td>2,684</td>
<td>99</td>
<td>3.69</td>
</tr>
<tr>
<td>Tacuru</td>
<td>1,396</td>
<td>52</td>
<td>3.72</td>
</tr>
<tr>
<td>Sete Quedas</td>
<td>1,791</td>
<td>27</td>
<td>1.51</td>
</tr>
<tr>
<td>Caracol</td>
<td>651</td>
<td>8</td>
<td>1.23</td>
</tr>
<tr>
<td>Corumba Microregion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ladario</td>
<td>1,911</td>
<td>83</td>
<td>4.34</td>
</tr>
<tr>
<td>Corumba</td>
<td>10,586</td>
<td>337</td>
<td>3.18</td>
</tr>
<tr>
<td>Jardim Microregion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jardim</td>
<td>2,817</td>
<td>95</td>
<td>3.37</td>
</tr>
<tr>
<td>Porto Murtinho</td>
<td>1,646</td>
<td>56</td>
<td>3.40</td>
</tr>
<tr>
<td>Guia Lopes da Laguna</td>
<td>1,213</td>
<td>21</td>
<td>1.73</td>
</tr>
<tr>
<td>Bonito</td>
<td>2,095</td>
<td>30</td>
<td>1.43</td>
</tr>
<tr>
<td>Navirai Microregion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japora</td>
<td>963</td>
<td>59</td>
<td>6.13</td>
</tr>
<tr>
<td>Iguatemi</td>
<td>2,157</td>
<td>100</td>
<td>4.64</td>
</tr>
<tr>
<td>Mundo Novo</td>
<td>2,420</td>
<td>89</td>
<td>3.68</td>
</tr>
<tr>
<td>Eldorado</td>
<td>1,331</td>
<td>31</td>
<td>2.33</td>
</tr>
<tr>
<td>Navirai</td>
<td>4,839</td>
<td>73</td>
<td>1.51</td>
</tr>
<tr>
<td>Juti</td>
<td>557</td>
<td>6</td>
<td>1.08</td>
</tr>
<tr>
<td>Itaquirai</td>
<td>1,679</td>
<td>14</td>
<td>0.83</td>
</tr>
</tbody>
</table>
that this behavior may be a result of lack of knowledge or forgetfulness on the part of health professionals with regard to the need to track syphilis during prenatal care.2

According to the current protocol, the disease diagnosis and proper treatment for the pregnant woman and her partner during prenatal care make it possible to eliminate congenital syphilis as a public health problem, i.e. reducing its occurrence up to 1 case per 1,000 live births.12

However, access to diagnosis alone isn’t enough to ensure an improved quality of care for the pregnant woman with HIV, AIDS, and/or syphilis. Conformation to an organized network through the definition of responsibilities between the health care levels within SUS is inherent to testing, ensuring access for pregnant women, parturients, and newborn infants to the latest HIV and TPPA infection diagnostic, control, and management technologies.13

This study revealed a frequency of 2.2% (2.1-2.3%, a 95% coverage index) of syphilis cases with regard to the analyzed pregnancies. The study whose results came closer to this, although with a lower percentage, was that carried out in Caxias do Sul, Rio Grande do Sul, Brazil,14 which identified, among 8,009 births, 150 women (1.87%) with syphilis. On the other hand, this result differs from another which estimated that the average prevalence of syphilis in pregnant Brazilian women is 3% to 4%, varying according to region.9 These rates are higher than the prevalence of 1.6% estimated by the Ministry of Health.11,15

In the United States, the prevalence rates of syphilis for adults in general within the period from 2003 to 2007 were, successively, 12.1%, 11.6%, 11.5%, 12.5%, and 13.9% per 100,000 individuals.16 It’s believed that the increase in these rates may be related to drug use, sexual promiscuity, and return of soldiers from conflict regions. Among developing countries, surveys by WHO estimate that about 10% to 15% of pregnant women have syphilis.11,17

In the analysis of syphilis status in African countries, one observes that it’s still an important cause of morbidity and mortality during pregnancy. In the Sub-Saharan Africa, every year, about 1.6 million pregnant women with syphilis remain undiagnosed, favoring vertical transmission of this infection.18,19 An emphasis should be given to these countries, where the epidemic of HIV infection has decimated the population.

STDs are among the five leading causes of search for health services, and they may cause congenital malformations and other complications, besides abortion and death, events whose occurrence rises at least 10 times in cases of HIV infection. Syphilis constitutes an associated factor for the acquisition of other STDs, particularly viral diseases, such as herpes simplex type 2 and hepatitis B.20

A prospective study carried out from May 1996 to October 2001 in Campo Grande, Mato Grosso do Sul, Brazil, with 76 pregnant women with a mean age of 24 years infected with HIV revealed 9.2% of coinfection with syphilis.21 In another study carried out with 35,512 pregnant women in Mato Grosso do Sul, from 2002 to 2003, one observed a 0.8% frequency of syphilitic infection, much higher than HIV infection, which was 0.2%.22

According to the National STD/AIDS Program, among the diseases which can be transmitted during the gravidic-puerperal cycle, syphilis presents one of the highest transmission rates, with an estimate of 937,000 cases.13,23

In 1993, the Ministry of Health proposed the elimination of congenital syphilis by 2000, and it recommends screening for disease in pregnancy having non-treponemal serological diagnosis (VDRL) as a strategy to be favored.9

Currently, vertical transmission of HIV and syphilis is still a challenge in public health which needs to be faced by health policies in Brazil. To achieve advances in this prevention, there’s a need to improve the conditions of care for the pregnant woman with HIV or syphilis, as well as for her newborn child, especially in the case of people living in the countryside.12,22,24

The Ponta Pora microregion had the highest frequency in the state (5.42%), followed by the Corumba (3.34%), Navirai (2.63%), and Jardim (2.60%) microregions (Table 2). The town of Amambai is the leader, with 10.94% of confirmed cases of syphilis in pregnant women, followed by others with high percentages: Japorã (6.13%), Coronel Sapucaia (5.90%), Paranhos (4.93%), Iguaetemi (4.64%), Ladario (4.34%), Ponta Pora (4.28%), and Antonio Joao (4.18%) (Table 3). These percentages are higher than the state (2.2%) and national (1.6%) ones.12,15

The frequencies of gestational syphilis by microregion obtained in this study were high. To discuss these findings, one should take into account aspects such as the geographical location of Mato Grosso do Sul, with 78 towns in the Brazilian Central-West Region, whose

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capital city is Campo Grande. Having an area of 358,159 km², it’s limited to the west by Bolivia and Paraguay (open boundary), to the north by Mato Grosso, to the south by Paraguay and Parana, and to the east by Sao Paulo, Minas Gerais, and Goias. In 2007, it had 2,265,021 inhabitants (6.42 inhab./km²), presenting a multiethnic and multicultural population composition in the bordering areas which allow a migrant influx of. The state is also the second in Brazil with regard to the number of Amerindian inhabitants (63,000 in 2008). Due to its strategic geographical position, it has detachments from the three armed forces. Moreover, it’s an emerging state with regard to tourism, agribusiness, and industries, particularly the sugarcane industry.

By analyzing syphilis in pregnant women, it’s observed that all cases are located in bordering zones (with Bolivia and Paraguay). It’s understood as a bordering zone, according to the 1988 Brazilian Constitution, every area comprising 150 km perpendicular to the limiting line of the Brazilian territory.

In short, the borderline is a zone or area which presents two basic characteristics with regard to the health/disease processes established there: a) it’s the point of entry or exit of people and goods which allows the exchange and dissemination of pathogens between countries; and b) an area or zone with particular characteristics, where inhabitants from the neighboring countries experience the effects of closeness, generating particular behaviors.

Regarding the composition of population living in the bordering areas, one finds a high frequency of foreign migrants (2.5%) when compared to the national average (0.6%). In Mato Grosso do Sul, in the towns of Sete Quedas, Paranhos, and Coronel Sapucaia, the foreign migrants account for 9.9%, 6.4%, and 4.5% of the population, respectively.

The concept of twin towns deserves attention here. They are two towns located face to face on opposite sides of an international boundary, forming a conurbation or not, with varying levels of interaction. Seven towns investigated are regarded as twin towns with Paraguay: Bela Vista, Ponta Pora, Coronel Sapucaia, Paranhos, Porto Murtinho, and Mundo Novo. On the border with Bolivia, there’s the town of Corumbá. The flow of legal or illegal immigrants and tourists in these locations is high, setting a daily flow between towns.

The boundaries can influence the behavior of their populations. The very health care system is influenced by the closeness to the international boundary, receiving an extra flow of users which raises the demand for assistance. Once in Brazil “health is a right for all and a duty for the State”, foreign individuals usually cross the border to seek care by SUS. A survey carried out by the National Council of Municipal Health Departments along with municipal health secretaries corroborates this occurrence, showing that 75% of towns provide assistance from SUS to the demand from foreigners. This survey also informs that about 100 deliveries of Paraguayan women are performed in Ponta Pora each year.

Corumba exerts a strong attraction in the region of the Bolivian border, favoring the flow of migrants and tourists by land, air, and water ways. Ladario is located 5 km far from this town, and, like Amambai, Bela Vista, Jardim, Ponta Pora, and Porto Murtinho, it has a large contingent of conscripted men (Brazilian army and navy). Therefore, they’re towns with transient population migrations. Population moves put in contact groups vulnerable to the occurrence of STDs, especially syphilis and HIV, with the emergence of new cases in remote locations. Thus, such diseases can be “exported” from Brazil to neighboring countries or “imported” from bordering countries.

According to the Brazilian STD/AIDS Program Coordination, in bordering towns, foreigners and Brazilians living in neighboring countries use, to ensure access to health care services, an address from a Brazilian town. Moreover, the search for health care services outside one’s hometown or referral to reference centers may be justified by the poor quality of local services. Such facts change morbidity indicators in these bordering or countryside areas, and they can cause undernotification of cases.

The Amerindian population from Mato Grosso do Sul is made up of 13 indigenous ethnic groups, which inhabit 72 villages located in 31 towns, among which 15 are regarded as indigenous poles: Iguateemi, Amambai, Caarapo, Eldorado, Japora, Sete Quedas, Antonio Joao, Bela Vista, Ponta Pora, Juti, Laguna Carapa, Bonito, Bodoquena, and Miranda. Out of these 15, 11 belong to the microrregions with higher frequency of syphilis in pregnant women and they’re located in bordering zones, a location which allows the influx of other population groups, creating risk situations to indigenous persons due to their vulnerability, especially with regard to the spread of epidemics, a context comprising STDs.
Taking into account the aspects mentioned, it’s still a challenge for managers to provide indigenous women with access to a prenatal service, on one hand because of cultural characteristics and on the other due to the difficulties for disseminating information, implement prevention strategies, know the serostatus, and treat STDs, aiming to ensure maternal health and achieve a decrease in vertical transmission.  

The associations between all these factors identified in the state may explain the phenomenon of high rate of syphilis in pregnant women, especially in the Ponta Pora and Corumba microregions. These facts make prenatal care a challenge for health managers, given the difficulties to implement it in such a heterogeneous geographical location.

**CONCLUSION**

Vertical transmission of syphilis remains a public health challenge which needs to be faced by health care policies in Brazil, constituting one of the most sensitive indicators for assessing the quality of health care services, especially the quality of prenatal care.

The microregions with higher frequency of syphilis in pregnant women are bordering zones, indigenous poles, and areas with high tourist traffic. Although the coverage index for diagnosis of syphilis in pregnancies is close to 100% in the state, it’s not enough to ensure an improved quality of care for the pregnant woman with this disease.

The authors recommend that managers from the three spheres of SUS in these microregions take into account their specificities, ensuring accessibility of pregnant women, sexual partners, and newborn infants to diagnosis, control, and management of infection with Treponema pallidum, through the effective implementation of the Stork Network, fulfilling the goal of eradicating syphilis by 2015.

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Corresponding Address
Marcos Antonio Ferreira Júnior
Universidade Federal do Rio Grande do Norte – Departamento de Enfermagem
Av. Senador Salgado Filho, s/n – Campus Lagoa Nova
CEP: 59072-970 – Natal (RN), Brazil