

Epidemiological profile of gestational and congenital syphilis in the state of Mato Grosso, Brazil

Perfil epidemiológico da sífilis gestacional e congênita no estado de Mato Grosso, Brasil

Perfil epidemiológico de la sífilis gestacional y congénita en el estado de Mato Grosso, Brasil

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Abstract

Introduction: Syphilis is a disease transmitted mainly sexually and vertically. Congenital syphilis is preventable when a pregnant woman is treated, warning about the importance of prenatal screening. **Objective:** To describe the epidemiological profile of gestational and congenital syphilis in the state of Mato Grosso - Brazil. **Methodology:** A descriptive cross-sectional study with a quantitative approach, using secondary data from the Notifiable Diseases Information System (SINAN), from 2011 to 2020. **Results:** 5120 cases of gestational syphilis and 2320 cases of syphilis were reported congenital in the state of Mato Grosso. The induced cases increased over the years, with notification peak of gestational syphilis in the year 2019 with 942 (18%) cases and congenital syphilis in the year of 2018 with 322 (14%) cases. Most women affected by gestational syphilis were young, with low education, mixed race, who underwent prenatal care, did not have their partners treated concomitantly and had a late diagnosis after the first trimester. Patients with congenital syphilis were mostly diagnosed early. **Conclusion:** The findings change flaws in prenatal care and the need for greater investments in innovative actions in order to reduce vertical transmission of syphilis.

Keywords: Syphilis, congenital; Pregnant women; Prenatal care; Vertical, infectious disease transmission; Sexually transmitted diseases.

Resumo

Objetivo: A s filis   uma doen a transmitida principalmente por via sexual e vertical. A s filis cong nita   pass vel de preven o quando a gestante   tratada adequadamente, alertando sobre a import ncia do rastreamento no pr -natal. Dessa forma, o objetivo desse estudo   descrever o perfil epidemiol gico da s filis gestacional e cong nita no estado de Mato Grosso – Brasil. **Metodologia:** Estudo descritivo de corte transversal de abordagem quantitativa, por meio de dados secund rios provenientes do Sistema de Informa o de Agravos de Notifica o (SINAN), per odo de 2011 a 2020. **Resultados:** Foram notificados 5120 casos de s filis gestacional e 2320 casos de s filis cong nita no estado de Mato Grosso. Os casos mostraram-se ascendentes ao longo dos anos, com pico de notifica o de s filis gestacional no ano 2019 com 942 (18%) casos e de s filis cong nita no ano de 2018 com 322 (14%) casos. A maioria das mulheres acometidas por s filis gestacional eram jovens, de baixa escolaridade, pardas, que realizaram pr -natal, n o tiveram seus parceiros tratados concomitantemente e tiveram diagn stico tardio, ap s o primeiro trimestre. Os pacientes com s filis cong nita tiveram em sua maioria diagn stico precoce. **Conclus o:** Os achados sugerem falhas na assist ncia ao pr -natal e necessidade de maiores investimentos em a oes inovadoras afim de reduzir a transmiss o vertical da s filis.

Palavras-chave: S filis cong nita; Gestantes; Cuidado pr -natal; Transmiss o vertical de doen a infecciosa; Doen a sexualmente transmiss vel.

Resumen

Objetivo: La sífilis es una enfermedad de transmisión principalmente sexual y vertical. La sífilis congénita es prevenible cuando la gestante es tratada adecuadamente, advirtiendo sobre la importancia del control prenatal. Así, el objetivo de este estudio es describir el perfil epidemiológico de la sífilis gestacional y congénita en el estado de Mato Grosso - Brasil. **Metodología:** Estudio transversal descriptivo con abordaje cuantitativo, utilizando datos secundarios del Sistema de Información de Enfermedades de Declaración Obligatoria (SINAN), de 2011 a 2020. **Resultados:** 5120 casos de sífilis gestacional y 2320 casos de sífilis congénita fueron notificados en el estado de Mato Grosso. Los casos mostraron un aumento a lo largo de los años, con un pico de notificación de sífilis gestacional en 2019 con 942 (18%) casos y de sífilis congénita en 2018 con 322 (14%) casos. La mayoría de las mujeres afectadas por sífilis gestacional eran jóvenes, con baja escolaridad, morenas, que tenían control prenatal, sus parejas no habían sido tratadas concomitantemente y tenían un diagnóstico tardío, después del primer trimestre. Los pacientes con sífilis congénita en su mayoría fueron diagnosticados de manera temprana. **Conclusión:** Los hallazgos sugieren fallas en la atención prenatal y la necesidad de mayores inversiones en acciones innovadoras para reducir la transmisión vertical de la sífilis.

Palabras clave: Sífilis congénita; Mujeres embarazadas; Atención prenatal; Transmisión vertical de enfermedad infecciosa; Enfermedades de transmisión sexual.

1. Introduction

Syphilis is a systemic infectious disease caused by the bacterium *Treponema pallidum*, being transmitted mainly sexually and vertically from mother to baby. When it affects pregnant women, syphilis can result in abortion, stillbirth, premature birth, neonatal death, and congenital manifestations (WHO; 2016; Brasil, 2019). The notification of cases of congenital syphilis and gestational syphilis is mandatory in Brazil since 1986 and 2005, respectively. Despite syphilis has effective treatment, this infectious disease still has high incidence rates, evidencing a public health problem (Lafetá et al., 2016; Conceição et al., 2020)

Congenital syphilis is preventable when the pregnant woman is properly treated, warning about the importance of prenatal care. Being considered a preventable perinatal cause, congenital syphilis can be controlled through effective diagnosis and treatment during pregnancy, therefore, it is an important marker of the quality of prenatal care (Domingues et al., 2013; Lafetá et al., 2016; Cardoso et al., 2018). Despite the fact that the coverage of prenatal care in Brazil is superior to 90%, the quality of monitoring for pregnant women still faces many difficulties (Domingues et al., 2012; Viellas et al., 2014; Cardoso et al., 2018; Silva et al., 2018).

Worldwide, syphilis represents a re-emerging infection. In Latin America, Africa and Asia its incidence remains high (Deperthes et al., 2004; Valdemarra et al., 2004; Mattei et al., 2012). It is estimated that, congenital syphilis is a factor present in 1 million pregnancies each year, accounting for 305,000 perinatal deaths worldwide per year. In 2017, there were 23.8 cases of congenital syphilis per 100,000 live births in the United States, the highest number of cases in the last 20 years (Hussain & Vaidya, 2019).

In Brazil, gestational syphilis totaled 61,127 notifications during 2019, a detection rate of 20.8 cases per thousand of live births. In relation to congenital syphilis, in the same year, 24,130 cases were reported in the country, with an incidence rate of 8.2 cases/1,000 live births. In the last ten years, the infant mortality rate due to syphilis increased from 2.4/100,000 live births in 2009 to 7.4/100,000 live births in 2019 (Brasil, 2017). In 1993, with the aim of reducing the incidence rate to 1:1000 live births, the Ministry of Health launched the project to eliminate congenital syphilis based on the proposal to control the disease in the Americas, formulated by the Pan American Organization Health (OPAS) and the World Health Organization (WHO). However, to date this goal has not yet been reached (Magalhães et al., 2013; Bottura et al., 2019).

In this context, it is crucial that managers and health professionals obtain epidemiological information to guide them about the seriousness of these diseases. Thus, the aim of this study was to describe the epidemiological profile of cases of gestational and congenital syphilis in the state of Mato Grosso – Brazil. It is believed that knowing the epidemiological profile of gestational and congenital syphilis in the State can contribute to the development of prevention and health promotion

actions, in search of more qualified and safe prenatal care, in addition to providing an opportunity to expand public health policies to reduce morbidity and mortality indicators related to these diseases.

2. Methodology

This is a descriptive cross-sectional study with a quantitative approach (Minayo, 2008). Secondary data provided by the Information System of the Mato Grosso State (SINAN) was used, referring to all confirmed cases, according to the Ministry of Health classification for gestational and congenital syphilis in the period from 2011 to 2020.

The following investigated variables of the pregnant woman affected by the infection were considered: number of cases of gestational syphilis by year of notification, age group, education, ethnicity, gestational period of diagnosis and treatment of the partner. For the investigation of congenital syphilis, the following characteristics related to the mother were analyzed: education, ethnicity, prenatal care and adequate treatment for maternal syphilis. In addition, the number of cases of congenital syphilis per year of notification and the patient's age at diagnosis were investigated.

Appropriate maternal treatment was considered when the patients received benzathine penicillin at least 30 days before the birth of the baby, in accordance with the norms of the Ministry of Health for the prevention of vertical transmission of syphilis. In addition, the treatment of the partner must be carried out concurrently with the pregnant woman (Brasil, 2019).

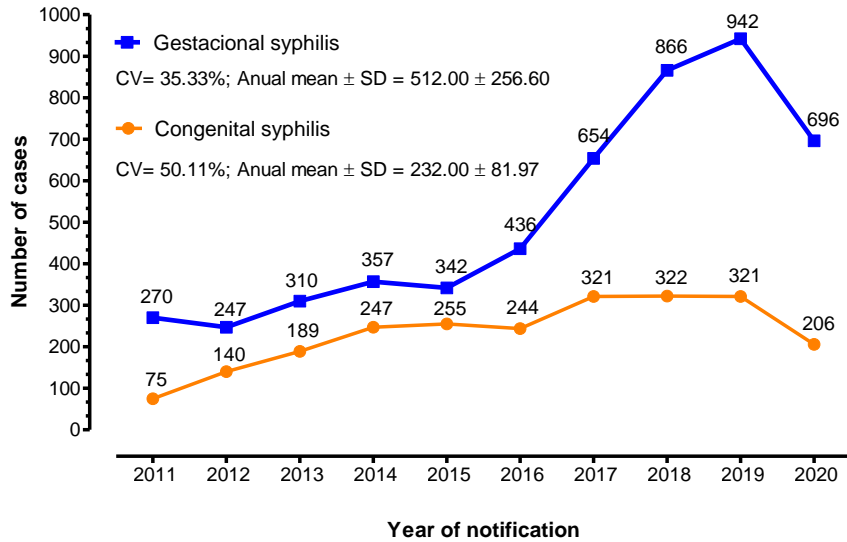
Microsoft Office Excel[®] program (2013 version) was used for data tabulation. In order to analyze the differences between the frequencies of the variables, the chi-square test was used, assuming equal values as the null hypothesis (H_0). These tests were performed on GraphPad Prism Software[®] (version 5.0 for Windows, San Diego, CA, USA). The definition of significance was $p < 0.05$ for all statistical analyses.

Ethical aspects were followed in accordance with the Resolution of the National Health Council n° 510/2016, whose research falls under item II, which uses publicly accessible information, therefore, without processing in the Research Ethics Committee system.

3. Results

Syphilis is a systemic infectious disease caused by the bacterium *Treponema pallidum*. Despite syphilis has effective treatment, this infectious disease still has high incidence rates, evidencing a public health problem. In this context, it is crucial that managers and health professionals obtain epidemiological information to guide them about the seriousness of these diseases. From 2011 to 2020, 5120 cases of gestational syphilis and 2320 cases of congenital syphilis were reported in the state of Mato Grosso - Brazil. The peak of notification of gestational syphilis occurred in 2019 with 942 (18%) cases, with an increase of 248.8% compared to 2011 (n=270; 5%). Congenital syphilis had its peak incidence in the year 2018 with 322 (14%) cases, an increase of 329.3% compared to the year 2011 (n=75; 3%) (Figure 1).

Figure 1. Evolution of the occurrence of gestational and congenital syphilis. Mato Grosso - Brazil, from 2011 to 2020. The distribution of the number of cases was statistically different between the years analyzed (congenital syphilis $p < 0.0001$, gestational syphilis $p < 0.0001$). CV = coefficient of variation. SD = standard deviation.



Source: Authors.

Among the groups of women notified with gestational syphilis the age with highest number of cases was 20 to 29 years old 2800 (55%), followed by the age of 15 to 19 years old 1340 (26%), with incomplete primary education 1340 (26%), and who declared themselves brown, 3264 (64%). When we analyzed the moment of diagnosis, 1794 (35%) cases occurred in the first trimester, followed by 1683 (33%) in the third trimester of pregnancy. Most partners (2111 - 41%) did not receive concomitant treatment (Table 1).

Table 1. Profile of cases of gestational syphilis notified in the state of Mato Grosso - Brazil, from 2011 to 2020.

Variable	N	%
Age (Years)		
10 to 14	66	1%
15 to 19	1340	26%
20 to 29	2800	55%
30 to 39	849	17%
40 or more	65	1%
p-value	<0.0001	
Education		
Illiterate	33	1%
Incomplete Elementary School	1340	26%
Complete Elementary School	578	11%
Incomplete high school	1029	20%
Complete high school	1021	20%
Incomplete Undergraduation	101	2%
Complete Undergraduation	82	1%
Ignored/Blank	936	18%
p-value	<0.0001	
Ethnicity		
Yellow	44	1%
White	1114	22%
Indigenous	54	1%
Brown	3264	64%
Black	522	10%
Ignored/Blank	122	2%
p-value	<0.0001	
Gestacional period		
First trimester	1794	35%
Second trimester	1494	29%
Third trimester	1683	33%
Ignored/Blank	149	3%
p-value	<0.0001	
Partner treated		
Yes	2042	40%
No	2111	41%
Ignored/Blank	967	19%
p-value	<0.0001	

Differences between the frequencies of the variables were analyzed using chi-square test. Source: Authors.

When we analyze congenital syphilis cases, the predominant maternal profile indicated 583 (25%) mothers with incomplete primary education, with no women with complete higher education being notified. Most of the reported cases were of mixed-race women (1626-70%), that had undergone prenatal care (1961- 84%), however 916 (40%) had an inadequate

therapeutic regimen and 423 (18%) did not take treatment for maternal syphilis. Regarding the age of diagnosis of patients with congenital syphilis, 2221 (95%) were within the first 7 days of life (Table 2).

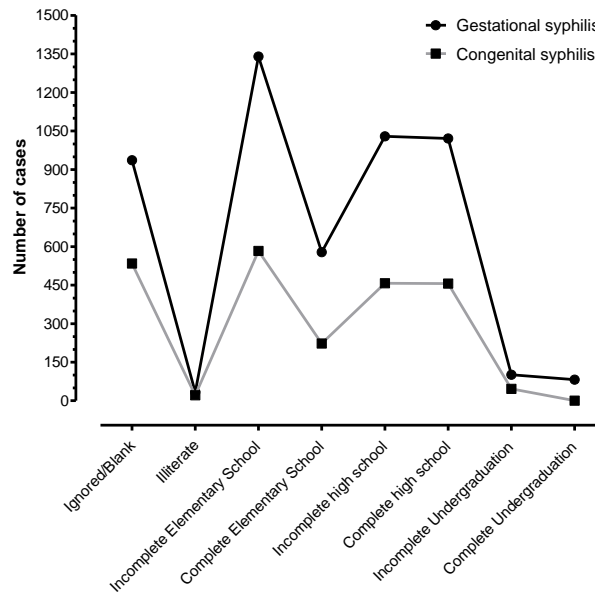
Table 2. Profile of congenital syphilis cases notified in the state of Mato Grosso – Brazil, from 2011 to 2020.

Variable	N	%
Age of patient		
0 day	1515	65%
1 day	543	23%
2 to 7 days	163	7%
8 to 27 days dia	40	2%
28 th day up to 14 years old	59	3%
p-value	<0.0001	
Education of mother		
Illiterate	21	1%
Incomplete Elementary School	583	25%
Complete Elementary School	223	9%
Incomplete high school	457	20%
Complete high school	456	20%
Incomplete Undergraduation	46	2%
Not applicable	27	1%
Ignored/Blank	507	22%
p-value	<0.0001	
Ethnicity of mother		
Yellow	8	<1%
White	413	18%
Indigenous	15	1%
Brown	1626	70%
Black	155	7%
Ignored/Blank	103	4%
p-value	<0.0001	
Prenatal care		
Yes	1961	84%
No	251	11%
Ignored/Blank	108	5%
p-value	<0.0001	
Maternal treatment		
Adequate	725	31%
Inappropriate	916	40%
Unrealized	423	18%
Ignored/Blank	256	11%
p-value	<0.0001	

Differences between the frequencies of the variables were analyzed using chi-square test. Source: Authors.

According to Figure 2, education level was a decisive factor in the occurrence of cases and the increase in education tends to reduce the frequency of cases in both gestational and congenital syphilis.

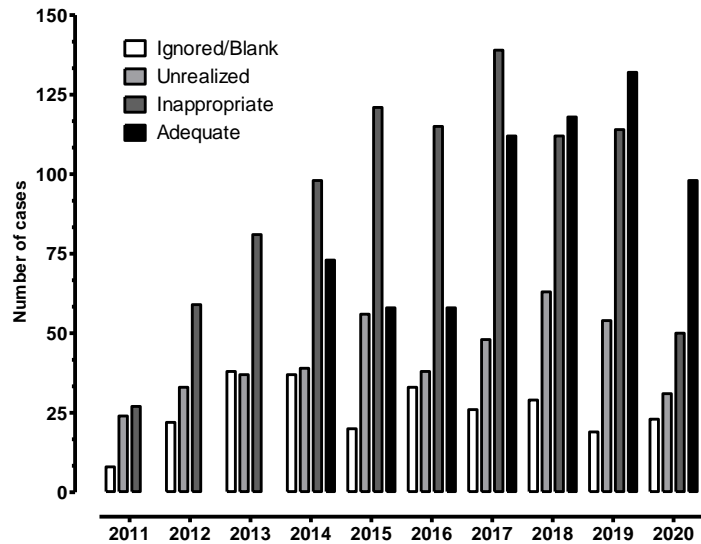
Figure 2: Comparison of the evolution of the occurrence of gestational and congenital syphilis in relation to the level of education of the pregnant woman/mother, Mato Grosso - Brazil, from 2011 to 2020. According to the Chi-square test, the frequency distribution of cases was statistically significant ($p < 0.0001$).



Source: Authors.

An important factor that contributes to the number of cases of congenital syphilis is appropriate treatment of pregnant woman. Figure 3 shows that inadequate treatment was predominant until the year of 2017 and from the year 2018, adequate treatment became prevalent.

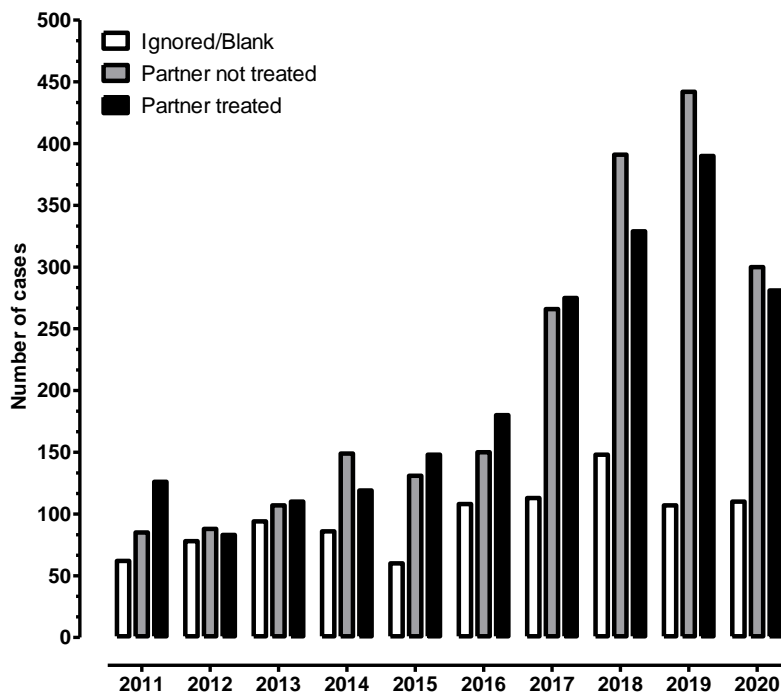
Figure 3: Evolution of the occurrence of congenital syphilis in relation to the treatment condition of the pregnant woman, Mato Grosso - Brazil, from 2011 to 2020. According to the Chi-square test, the distribution of frequency of cases was statistically different ($p < 0.0001$) between the years analyzed for all evaluated treatment conditions (Blank/Ignored, Unrealized, Inappropriate and Adequate).



Source: Authors.

Regarding the occurrence of gestational syphilis in relation to the condition of the treatment of partner, it was possible to observe that the non-treated partner was predominant in almost all the years analyzed (Figure 4).

Figure 4: Evolution of the occurrence of gestational syphilis in relation to the treatment of the partner, Mato Grosso - Brazil, from 2011 to 2020. According to the Chi-square test, the distribution of frequency of cases was statistically different ($p < 0.0001$) between the years analyzed for all evaluated treatment conditions (Blank/Ignored, Partner not treated, Partner treated).



Source: Authors.

4. Discussion

The present study showed a progressive increase in cases of gestational and congenital syphilis in the state of Mato Grosso - Brazil over the years analyzed (Figure 1, $p < 0.0001$). In 2020, a drop in the number of reported cases was noted compared to previous years (2018 and 2019). This fact may be related to the practices of social isolation that occurred in the country because of the pandemic caused by the new coronavirus. These results were corroborated by data published in a study developed in the United States, which showed a reduction of 63.7% in the number of cases of syphilis reported in 2020 when compared to 2019 (Pagaoa et al., 2021).

Profile of pregnant women analyzed in this study indicated that gestational syphilis is predominantly occurring in young women with low education. These findings are in line with the results already described in the literature (Campos et al., 2010; Cardoso et al., 2018; Ramos & Boni, 2018; Bottura et al., 2019; Conceição et al., 2020). Age is related to the high point of the reproductive life, however, the high number of syphilis in adolescence (26%) could indicate an early and unprotected sexual initiation that legitimizes the importance of health promotion and prevention actions with the population in this age group (Costa et al., 2013; Cardoso et al., 2018).

Low education level was presented as an increased risk for cases of gestational and congenital syphilis (Figure 2). These findings corroborate authors who claim that low education is associated with several risk factors for maternal and child health (Ramos & Cuman, 2009). Low education can predispose to the appearance of potentially risky situations for the mother and newborn, as it is associated with late onset and absence of prenatal care, inadequate nutrition and habits that are incompatible with pregnancy, such as drug abuse. In addition, less access to information hinders the understanding of the importance of health prevention measures, such as the use of condoms, that could interrupt the syphilis transmission chain (Conceição et al., 2020).

A predominance of brown women followed by white women was observed in the present work for both gestational and congenital syphilis, as well as, it has been noticed in others works (Cavalcante et al., 2007; Ramos & Boni, 2018; Bottura et al., 2019; Favero et al., 2019; Silva et al., 2020; Soares et al., 2020). These results demonstrate that the prevalent color among patients may be related to the Brazilian region studied (Bottura et al., 2019). The last census published by Brazilian Institute of Geography and Statistics (IBGE) in 2010 found that the predominant population in the state of Mato Grosso is brown, followed by white, demonstrating consistency with the predominant ethnicity related in this study (IBGE, 2010).

The characteristics of the mothers of patients with congenital syphilis were similar to the characteristics of women with gestational syphilis, most of them being brown and with incomplete primary education. Newborns with congenital syphilis were diagnosed mostly younger than 28 days old, featuring an early and effective diagnosis (Bottura et al., 2019).

As published in other studies, most patients performed prenatal care, however, this care must be done with efficiency, just like recommended by health agencies (Campos et al., 2010; Carvalho & Brito, 2014; Lafeté et al., 2016; Cardoso et al., 2018; Silva et al., 2018; Bottura et al., 2019; Cavalcante et al., 2019; Conceição et al., 2020; Pagaoa et al., 2021). Furthermore, the incidence rate of congenital syphilis is an indicator capable of evaluating the quality of prenatal care. Increases in this rate may be related to the low quality of prenatal consultations and could be a consequence of high number of partners not treated (Soares et al., 2020). In fact, the years with the highest frequency of cases coincided with the years with the highest number of untreated partners (2018 and 2019). The non-concurrent treatment of the partner alerts to the risk of reinfection of the woman. Other study evidenced that infected partners increase by five times the risk of congenital syphilis (Soares et al., 2017). Men tend to deny preventive health care, therefore, strategies such as prenatal care for men could be effective to reduce the number of cases of syphilis (Brasil, 2016).

Another aspect to be considered in this context was the predominance, until 2017 of pregnant women with an inadequate or non-performing therapeutic regimen. It is noteworthy that this may have been influenced by the lack of supply,

experienced in Brazil between 2014 and 2017, of benzathine penicillin, the main antibiotic used for the treatment of syphilis provided by the Brazilian Unified Health System (SUS). It is known that the shortage of medicines represents one of the obstacles to the timely and adequate treatment of preventable diseases such as syphilis (Araujo et al., 2020).

A strategy adopted in Brazil to reduce maternal and child morbidity and mortality rates is the “*Cegonha*” Network, which has as one of its objectives to improve the quality of care provided to women and children and which enables greater coverage of testing for diseases, promoting early and correct treatment, and consequently, the reduction of congenital syphilis cases in the country (Cardoso et al., 2018). Considering that the beginning of prenatal care in the first trimester of pregnancy is an indicator of quality of maternal health care, VDRL (Venereal Disease Research Laboratory) test for syphilis diagnosis must be performed as soon as the mother initiates the prenatal care, the results of the present study suggest a delay in diagnosis since it presented a considerable percentage of notifications in the second and third trimester (Brasil, 2013; Brasil, 2019).

The control of vertical transmission of syphilis proposed by the Brazilian Ministry of Health, has not yet been achieved in the state of Mato Grosso. It is essential to train professionals involved in the management of syphilis, looking for early diagnosis, the appropriate treatment, concomitant treatment of the partner and mother with the objective of interrupting the vertical transmission chain of this infection (Soares et al., 2020). Syphilis is a preventable disease and the risk of unfavorable outcomes for the child will be minimal if the pregnant woman receives adequate and early treatment. Furthermore, it is believed that this epidemiological study can contribute to redirecting effective actions to groups with high rates of contamination to control this disease.

5. Conclusion

The state of Mato Grosso - Brazil shows an increase in cases of gestational and congenital syphilis in the last 10 years, being more frequent in young mothers, with low education, mixed race and who underwent prenatal care. Results of the present work suggest a failure in prenatal care and the need for actions to reduce vertical transmission of syphilis. As examples of these actions, it is important (1) to train health professionals, (2) to promote education of the population, correct treatment of pregnant women and concomitant treatment of the partner.

The authors of the present study suggest that other productions related to the theme be developed, to expand the understanding of this phenomenon in other regions of Brazil.

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