

Vulnerability to gestational and congenital syphilis: a 11-year analysis

Vulnerabilidade à sífilis gestacional e congênita: uma análise de 11 anos

Vulnerabilidad a la sífilis gestacional y congénita: un análisis de 11 años

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ABSTRACT

Objective: to examine the occurrence of gestational and congenital syphilis in the light of vulnerability in Mato Grosso do Sul, from 2008 to 2018. **Method:** this retrospective, analytical, quantitative, cross-sectional study was based on secondary data collected from Brazil's Notifiable Disease Information System. **Results:** gestational and congenital syphilis increased steadily over the eleven years, predominantly in vulnerable groups. The occurrence of congenital syphilis was found to associate ($p < 0.05$) with the variables "education", "age group" and "skin color". Behavioral and health service-related factors – among them, late diagnosis of syphilis and poor treatment adherence by pregnant women and their sexual partners – were found to influence the association. **Conclusion:** gestational and congenital syphilis had multifactorial causes and can be combated with health measures that address aspects that heighten this population's social, individual and programmatic vulnerability.

Descriptors: Health Vulnerability; Syphilis, Congenital; Women's Health Services; Prenatal Care.

RESUMO

Objetivo: analisar a ocorrência de sífilis gestacional e congênita à luz da vulnerabilidade, no período de 2008 a 2018, no Mato Grosso do Sul. **Método:** estudo transversal, retrospectivo, de caráter analítico e abordagem quantitativa, com base em dados secundários coletados no Sistema de Informações e Agravos de Notificação. **Resultados:** houve aumento progressivo de sífilis gestacional e congênita ao longo dos 11 anos, com predomínio em populações vulneráveis e associação ($p < 0,05$) da ocorrência de sífilis congênita com as variáveis "escolaridade", "faixa etária" e "cor da pele". Verificou-se a influência de fatores comportamentais e relacionados aos serviços de saúde, dentre eles o diagnóstico tardio da sífilis e a baixa adesão do tratamento entre estas gestantes e seus parceiros sexuais. **Conclusão:** a sífilis gestacional e congênita tiveram causas multifatoriais e podem ser combatidas com ações em saúde que considerem os aspectos que potencializam a vulnerabilidade social, individual e programática da população.

Descritores: Vulnerabilidade em Saúde; Sífilis Congênita; Serviços de Saúde da Mulher; Cuidado Pré-Natal.

RESUMEN

Objetivo: examinar la ocurrencia de sífilis gestacional y congénita a la luz de la vulnerabilidad en Mato Grosso do Sul, de 2008 a 2018. **Método:** este estudio retrospectivo, analítico, cuantitativo y transversal se basó en datos secundarios recopilados del Sistema de Información de Enfermedades Notificables de Brasil. **Resultados:** la sífilis gestacional y congénita aumentó de manera sostenida durante los once años, predominantemente en grupos vulnerables. Se encontró que la ocurrencia de sífilis congénita se asocia ($p < 0.05$) con las variables "educación", "grupo de edad" y "color de piel". Se encontró que factores relacionados con el comportamiento y los servicios de salud, entre ellos, el diagnóstico tardío de la sífilis y la mala adherencia al tratamiento por parte de las mujeres embarazadas y sus parejas sexuales, influyen en la asociación. **Conclusión:** la sífilis gestacional y congénita tuvo causas multifactoriales y se puede combatir con medidas de salud que aborden aspectos que aumentan la vulnerabilidad social, individual y programática de esta población.

Descriptores: Vulnerabilidad en Salud; Sífilis Congénita; Servicios de Salud para Mujeres; Atención Prenatal.

INTRODUCTION

The concept of vulnerability has been used in the field of public health for more than two decades and found space in discussions with the aim of favoring more comprehensive reading of complex health-disease processes. The main characteristic of its approach is in seeking to understand how social, cultural and individual aspects interact to create conditions in which certain dangers or threats occur¹.

In this sense, it is noted that the occurrence of gestational (GS) and congenital (CS) syphilis can be discussed from the perspective of health vulnerability, since several studies demonstrate how much socioeconomic and individual factors, as well as those related to health services²⁻⁴ influence the occurrence of these diseases²⁻⁴.

It was estimated that there were about 930,000 maternal infections in 2012 due to active syphilis and 350,000 adverse outcomes during pregnancy worldwide, such as fetal and neonatal deaths, stillbirths, premature births and low birth weight, in addition to infected fetuses⁵. A GS detection rate of 17.2 cases/thousand live births and 8.6

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cases/thousand live births for CS were registered in Brazil in 2017⁶. In turn, Mato Grosso do Sul (MS) had a higher GS and CS prevalence than the national average with a detection rate of 33.3 cases/thousand live births for GS, and 10.2 for CS⁶.

The World Health Organization (WHO) launched a worldwide initiative to eliminate the transmission of syphilis in 2007. However, cases of the disease continue to rise in pregnant women and the number of CS notifications has increased in all regions of Brazil. Age range, low education and inadequate treatment of pregnant women and/or their sexual partner are factors which contribute to the increase of these diseases².

In this context, it is assumed that the serious occurrence of GS and CS in the state of Mato Grosso do Sul was enhanced by social and behavioral conditions as well as those related to unfavorable health services for controlling these diseases. Considering the heterogeneity of the populations in the region and the need to develop strategies based on the doctrinal principles of the Unified Health System (*SUS*), the aim of this study was to analyze the occurrence of gestational and congenital syphilis from the perspective of vulnerability in the period from 2008 to 2018 in Mato Grosso do Sul, Brazil.

LITERATURE REVIEW

Syphilis is caused by *Treponema pallidum*, and is a sexually transmitted infection (STI) which can be transmitted vertically to the fetus by an infected or untreated mother, or if she has failed the therapeutic regimen⁷. Vertical syphilis transmission results in adverse events such as spontaneous diseases, abortion, stillbirth, prematurity, clinical manifestations of CS, infant death and late sequelae⁸, which can be minimized through prenatal screening and appropriate treatment with penicillin³.

A national hospital-based study showed that control of GS and CS in Brazil is deficient. Although the Ministry of Health has adopted important strategies such as the Stork Network (*Rede Cegonha*) offering rapid tests for pregnancy diagnosis and application of benzathine penicillin in Basic Health Units (*UBS*), there are still flaws which hinder implementing these control measures, mainly to achieve the most susceptible populations⁹.

Studies have concluded that the occurrence of GS and CS is higher in groups considered to be more vulnerable^{10,11} and highlighted that specific actions should be considered for this portion of the population⁹. It is noteworthy that vulnerability should not be confused with risk, since people, families or the community may be vulnerable because they do not have the conditions to face the risks to which they are exposed¹².

Vulnerability started to be discussed in the health area in the 1980s with research on the acquired immunodeficiency syndrome (AIDS)¹³, and over time it has enabled us to not only see epidemics from their pathological aspect, but also to understand the health-disease process towards macro and microstructural directions¹⁴. In this sense, it is noted that the concept of vulnerability seeks to consider the individual-collective dimension as a unit and demonstrate how interference at different levels influence both exposure and susceptibility to contagion or injury¹.

Vulnerability can be categorized into three dimensions: individual - referring to knowledge and information about specific problems and attitudes to assume protective behaviors or practices; Social or collective - concerning economic, gender, ethnic/racial relations, religious beliefs, social exclusion, etc.; Programmatic or Institutional - related to health services and the way they manage to reduce vulnerability contexts¹⁵.

Authors still criticize only approaching illness from a risk perspective, since the concept of risk group leads one to believe that only those who have specific characteristics and inherent to the subject can develop a certain disease. In line with this presented concept¹⁵, other authors point out that the notion of risk has become a complex situation which blurs the individual's problem and points to social and environmental contexts which also produce illness¹⁶.

Following this reasoning, a study analyzed the occurrence of GS and its relationship with sociodemographic, behavioral and health service-related factors and concluded that poverty and its vulnerable conditions were associated with the occurrence of GS¹⁰. Vulnerability was also addressed in other studies as an important factor and must be taken into account in order to elaborate specific strategies to confront syphilis during pregnancy and control vertical transmission^{9,17}.

It is known that GS and CS are national epidemics and MS was among the states with the most cases of these diseases in 2016 and 2017^{6,18}. However, no current studies have been found aimed at a historical analysis of the GS and CS cases in MS or in order to identify which conditions led to the state having such a number of cases above the national average.

METHOD

This is a cross-sectional, retrospective, analytical study with a quantitative approach based on public data collected from the Notifiable Diseases Information System (*SINAN*) in the period from March 01 to 08, 2019. We used the data available in two databases of the *SUS* Informatics Department (*DATASUS*): TabNet WIN32 3.0 and Indicators for GS and CS, both referring to confirmed disease cases in the state of MS from 2008 to 2018. We opted for an analysis of 11 years due to the data prior to 2008 being presented in a grouped way, which made it impossible to visualize the behavior of cases over the years.

The methodological path to obtain the data was as follows: access to the *DATASUS* portal and selection of items - access to information; health information (*TABNET*); epidemiological and morbidities; Notification Diseases and Diseases from 2007 onwards, with automatic targeting for GS and CS indicators.

The study population consisted of the total confirmed notified cases of GS and CS in the period from 2008 to 2018. The data were entered and organized in Microsoft® Office Excel 2016 and the occurrence of diseases was analyzed according to sociodemographic, behavioral and health service-related variables, for which the total number of GS and CS cases, the residence area and treponemal test were obtained from TabNet Win32 3.0, and the others from GS and CS Indicators.

Thus, the variables analyzed in this investigation were: age, education, race, residence area, prenatal care, gestational age of diagnosis, time of diagnosis, mother's treatment schedule, partner's treatment schedule and treponemal test. It is important to highlight that the total number of GS and CS cases of the variables extracted from the TabNet Win32 3.0 database was higher in relation to the others because the last update of this database occurred in January 2019, while the GS and CS indicator database had been last updated in June 2018 (up until completion of data collection).

BioEstat 5.0 and GraphPad InStat 3 statistical programs were used. The variables were analyzed in descriptive statistics using absolute and relative frequencies, as well as by central tendency and dispersion measures. The Chi-squared test was applied to check the association between variables with the occurrence of CS, along with the Bonferroni correction¹⁹ to perform multiple comparisons, considering a significance level of 5%. The disease detection rate was calculated by dividing the number of notified cases in the year by the number of live births in the same year, obtained by the Monitoring Panel for Live Births of the Ministry of Health.

Regarding ethical aspects, it is worth noting that a Free and Informed Consent Form and the submission of this investigation to the Research Ethics Committee were waived since the data used are in the public domain, as recommended by Resolution 466/2012 regarding the performance of research with human beings.

RESULTS AND DISCUSSION

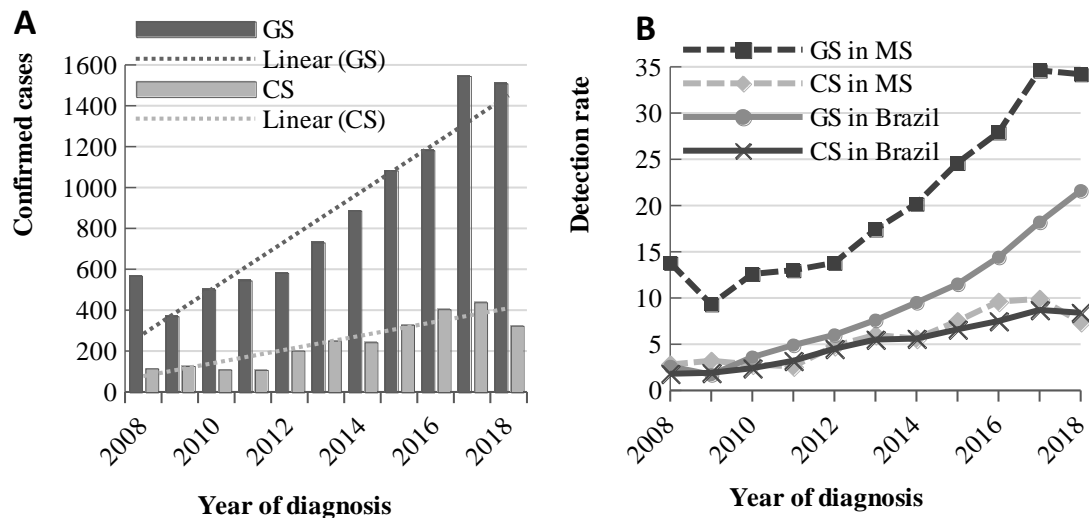
It was found that GS and CS had a progressive increase in the number of confirmed cases and had an average detection rate of 20.1 cases/1000 live births for GS and 5.7 cases/thousand live births for CS in the last 11 years, both above the national average for GS and CS of 9.2 and 5.1 cases/1000 live births, respectively. The goal of eliminating CS established by WHO is to reduce the number of cases of the disease to a minimum of 0.5 cases/1000 live births⁵. However, the findings showed that MS had a CS detection rate well above that target.

There was an average of 866 GS cases per year in the analyzed period, with the lowest occurrence in 2009 with 373 (3.9% of the cases in the time frame) confirmed cases and a detection rate of 13.8 cases/thousand live births. The occurrence peak was in 2017 with 1,548 (16.2%) confirmed cases and a detection rate of 34.6 cases for every 1000 live births, which is almost double the national detection rate of the same year (21.6 cases/1000 live births). These data are shown in Figure 1.

The progressive increase in cases regarding CS was similar to that of GS in MS, except for the year 2018. There was an average of 243 cases per year, with the lowest number occurring in 2010 with 110 (20%) cases of CS and a detection rate of 2.6 cases/1000 live births. The highest occurrence of the disease was in 2017 with 441 (28%) cases of CS and a detection rate of 10 cases/1000 live births, also above the national average which was 8.7 cases/1000 live births in the same year. It is noteworthy that the year 2018 presented a 15% reduction in the CS detection rate compared to 2017 (9.9 against 7.4).

There was a visible reduction in reported cases in the state in 2018, which may reflect the implementation of strategies agreed in the Strategic Actions Agenda for Syphilis Reduction in Brazil launched in October 2017. Among the various objectives, the agenda provides for reducing CS through the rapid response to syphilis in healthcare networks and expanding the Investigative Committees for Vertical Transmission of HIV, Syphilis and Viral Hepatitis²⁰. Thus, the

importance of continuity in elaborating health policies of this nature is highlighted, in addition to promoting debates involving *SUS* managers, professionals and users in order to strengthen actions to eliminate CS.



GS: Gestational syphilis, CS: Congenital syphilis, MS: Mato Grosso do Sul

FIGURE 1: Occurrence of gestational and congenital syphilis in the state of Mato Grosso do Sul and Brazil, according to (A) total confirmed cases and (B) detection rate per year of diagnosis. Mato Grosso do Sul, Brazil, 2019.

Another point which drew attention was the amount of information marked as “blank” or “ignored”, mainly in the education fields (29.0%), the treatment plan for pregnant women (24.5%) and the partner treatment (25.7%). This suggests the need for constant improvement in the work processes and qualification of professionals involved in case notification. It is noteworthy that despite GS and CS notification being mandatory, underreporting still remains a problem which can mask an even more serious situation and is considered one of the greatest barriers in this scenario²¹. It is noteworthy that failures in filling out the forms in addition to compromising the correct identification of the individual also make it difficult to recognize the different health needs of specific groups²².

Sociodemographic aspects

It was found that GS predominantly occurred in women with 1 to 9 years of formal education (44.8%), aged between 20 and 29 years (50.6%) and in non-white pregnant women (61.8%). In addition, the occurrence of CS was also higher in children of women in these conditions. All variables were associated with CS ($p < 0.05$) except for the area of residence. Although CS occurrence was higher in rural areas than in urban areas, there was no statistical difference between the prevalence of the disease in this variable, as shown in Table 1.

There was a higher vertical transmission prevalence among illiterate women compared to literate women, regardless of education time. However, it was found that women with 1 to 9 years of education had a higher prevalence of vertical transmission compared to those with 10 or more years of education ($p < 0.05$). Considering the PR and using the ‘illiterate’ category as a reference, it was found that the vertical transmission prevalence of syphilis decreased as the study time increased. The CI analysis reinforced that there is an association between education and the occurrence of CS.

The high number of cases of these diseases in pregnant women with low education may be related to a lack of understanding means of STI prevention²³, to less access to information and health services, in addition to a limited understanding of the importance of healthcare and prevention measures of syphilis²⁴. These findings corroborate the perspective of vulnerability complexity by demonstrating the existence of vast aspects which produce it, including those that are beyond the individual’s decision such as illiteracy, early education, lack of income and great social inequality¹⁴.

It was noted that the lack of information and low education increase the vulnerability of these women, but they can be mitigated by prenatal care which adapts to this reality. Thus, it is considered essential that the language used

during the guidelines on GS and its consequences is clear and appropriate to the pregnant woman's education level so that it can be fully understood²⁵.

TABLE 1: Occurrence of congenital syphilis according to sociodemographic variables (n = 8253). Mato Grosso do Sul, Brazil, 2019.

Variables	Sífilis congênita*		Total n (%)	p-value	PR (95%CI)
	Yes n (%)	No n (%)			
Education (years)					
Literate	36 (52.9)a	32 (47.1)	68 (0.8)		1
1 to 9	1134 (30.6)b	2567 (69.4)	3701 (44.8)	0.0001	0.57 (0.46-0.72)
10 to 12	469 (24.8)c	1425 (75.2)	1894 (22.9)		0.24 (0.22-0.26)
> 12	40 (20.5)c	155 (79.5)	195 (2.4)		0.17 (0.12-0.22)
Ignorado [†]	699 (29.2)	1696 (70.8)	2395 (29.0)		
Age range (years)					
10 to 14	29 (21.6)ab	105 (78.4)	134 (1.6)		1
15 to 19	567 (29.5)ab	1357 (70.5)	1924 (23.3)	0.02	1.36 (0.97-1.83)
20 to 29	1220 (29.2)a	2954 (70.8)	4174 (50.6)		1.35 (0.97-1.81)
30 to 39	452 (25.4)b	1328 (74.6)	1780 (21.6)		0.93 (0.67-1.30)
≥40	64 (26.6)ab	177 (73.4)	241 (2.9)		0.26 (0.83-1.83)
Skin color					
White	586 (22.6)	2009 (77.4)	2595 (31.4)		1
Non-white	1696 (32.7)	3488 (67.3)	5184 (61.8)	0.0001	1.45 (1.34-1.57)
Ignored [†]	114 (24.1)	360 (75.9)	474 (5.7)		
Residence area					
Rural	317 (30.1)	735 (69.9)	1052 (11.2)	0.08	1
Urban	2296 (27.5)	6049 (72.5)	8345 (88.8)		0.91 (.082-1.00)

Legend: PR: Prevalence ratio; CI: Confidence interval.

Note: * Letters in the column indicate a significant difference in the prevalence of variables associated with CS (chi-squared test with Bonferoni correction and p-value <0.05). † Not included in the statistical analysis.

Regarding the age group, there was a higher prevalence of GS in women aged 20 to 29 years. There was also an association between this variable (p = 0.02) and the occurrence of CS, with a higher prevalence of CS among neonates of women aged 20 to 29 years compared to that observed among women aged 30 to 39 years. In an analysis of the PR taking the lowest age group as a reference, a higher prevalence of vertical transmission was observed in women aged 15 to 29 years.

The high number of cases in this age group occurs because it is the peak of reproductive life, which leads to a greater number of pregnancies²⁶. Similar research revealed that women between 20 and 29 years of age were more affected by GS, in addition to other sociodemographic characteristics such as low education and low socioeconomic status which can be important markers of poor access to health services^{24,27}.

Regarding the age from 15 years old, it is important to highlight that in addition to the early onset of sexual life and low condom use, pregnant women may be exposed to situations of vulnerability related to this age group such as low education, knowledge and deficient information about STIs, cultural factors, issues related to gender²⁸, family conditions, violence and drug abuse²⁹. It should be noted that both genders may be exposed to these conditions and given the age group, schools can be strong allies in building opportunities for adolescents to expose their problems, discuss the topic and receive quality information to promote STI prevention³⁰.

Non-white skin color showed a predominance of GS cases and an association (p = 0.0001) with CS in the present analysis, revealing a 1.45 times higher prevalence of CS occurrence compared to white women. It is known that socioeconomic, cultural and institutional racism inequalities can justify the high incidence of STIs in these women³¹. Low education, low income, little access to information and difficulty in accessing health services, which is visible by the insufficient number of prenatal consultations with black women, can directly act on the health-disease process³², revealing some aspects of social vulnerability which permeate this population.

It was also found that the GS and CS prevalence was higher in the urban area. This situation occurred in other Brazilian locations and may be related to the number of people living in the urban region³³. It is noteworthy that there was no association between this variable and the occurrence of CS in Mato Grosso do Sul; however, the CS prevalence in the rural area was slightly higher than in the urban area, which points to the need to improve access to CS prevention through proper treatment of GS, as well as ensuring quality prenatal care³³.

Behavioral and health service-related aspects

The data show that 32.9% of pregnant women with syphilis were diagnosed in the second trimester of pregnancy, 30.6% were diagnosed in the primary stage of the disease, and 88.3% had access to the Treponemic test for diagnosing syphilis. In addition, 75.2% of the mothers of children with CS had access to prenatal care and yet adherence to treatment was extremely low among these pregnant women (4%) and their sexual partners (20.5%) (Figure 2).

A similar investigation revealed that 92.6% of mothers of children with syphilis had a late diagnosis and concluded that one of the main obstacles to controlling CS is related to early and appropriate diagnosis and treatment²¹. In a study conducted in the municipality of Sobral, CE, it was documented that 85% of mothers received prenatal care, but only 48% were diagnosed during prenatal care and 83% did not have their partners treated²³. These situations demonstrate that the quality of the prenatal care received by the pregnant woman was not sufficient to guarantee control or to reach the CS incidence goal established by WHO³³.

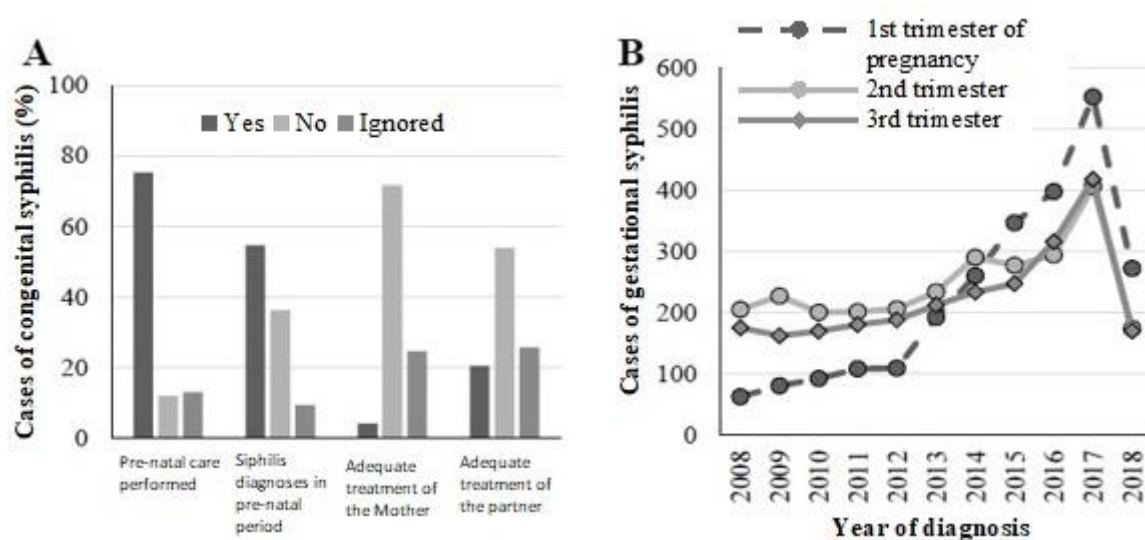


FIGURE 2: Characterization of congenital syphilis and gestational syphilis cases in Mato Grosso do Sul, according to (A) maternal characteristics and (B) gestational trimester at the time of diagnosis from 2008 to 2018. Mato Grosso do Sul, Brazil, 2019.

In the present analysis, it was found that syphilis diagnosis from 2008 to 2013 predominantly occurred in the second trimester of pregnancy (40.8%). The diagnosis in the first trimester surpassed the third trimester (33.2% against 29.8%) in 2014. However, the first trimester became the main gestational age for diagnosing syphilis (39.8%) in 2015, and in 2018 it reached 44.2% of the total diagnosis by gestational age. This change may be related to the improvement in access to prenatal care probably provided by health policies, such as the *Rede Cegonha*, which aims at an early capture of pregnant women to perform prenatal care and rapid testing for syphilis³⁵. It is known that syphilis is transmitted at any stage of pregnancy and that the risk is greater in the early stages of the disease¹⁸; therefore, early diagnosis is paramount.

Despite this advance, the state still faces inadequate or unfulfilled treatment by the mother and/or her sexual partner, and is considered one of the main problems related to the occurrence of CS³⁶. A study carried out with prenatal nurses found that low education, lack of knowledge about the disease, the association of syphilis diagnosis with infidelity, pain during medication administration and a fear of adverse reactions were among the barriers to adequate treatment³⁷.

Such factors reinforce the need to strengthen the partner's participation in prenatal consultations. Professionals can identify the partner's expectations, possibilities and difficulties through meetings based on ethical posture and

empathy, and thus help them to reflect on their behavior in relation to syphilis prevention and treatment measures³⁸. Actions of this nature must be strengthened to minimize the vulnerability produced by the weaknesses of health services.

CONCLUSION

There has been a progressive increase in GS and CS cases over the years. The pregnant women were adults, with low education and non-white skin color in most of the notified cases. Unfavorable action of social, behavioral and health service factors on controlling GS and preventing CS was notorious.

The concept of vulnerability allowed us to visualize the most diverse aspects that produce illness. This led to the conclusion that the cause of GS and CS is multifactorial and that syphilis control actions should not only be focused on the infected pregnant woman, but on any individual exposed to conditions which make them vulnerable to the occurrence of the disease.

This study had some limitations, with certain underreporting of cases and restricted information about some of the variables studied among them, which made it difficult to verify the statistical association between the variables analyzed in this topic and the occurrence of CS.

However, it is expected that these results will contribute to discussions about the conditions that enhance vulnerability to GS and CS and raise interest in elaborating interventions capable of minimizing their consequences in the short, medium and long term. A lack of studies to more precisely identify the factors which make different populations living in the state of MS more individually, socially and programmatically vulnerable is also noteworthy.

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