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# Gestational syphilis in Tocantins cities: risk factors and epidemiological surveillance between 2009-2018

Sífilis gestacional em cidades de Tocantins: fatores de risco e vigilância epidemiológica entre 2009-2018

Sífilis gestacional em cidades do Tocantins: fatores de risco e vigilância epidemiológica entre 2009-2018

## ABSTRACT

Objective: To compare and to analyze the clinical-epidemiological profile of gestational syphilis in the most populous municipalities in Tocantins, from 2009 to 2018. Methods: Cross-sectional and retrospective study, carried out with data from the municipalities of Araguaína, Gurupi, Palmas, Paraíso do Tocantins and Porto Nacional, provided by the Ministry of Health through the Informatics Department of the Brazilian Unified Health System and analyzed by descriptive and statistical analysis. Results: An increasing incidence rate was observed in all locations from 2016 onwards. Pregnant women were diagnosed late, mostly in the 2nd and 3rd trimesters. Palmas had the highest notification of latent syphilis (55.57%). The risk factors identified were: mulato and age group between 20-29 years old, the predominant schooling diverged between the municipalities. Gestational age ( $p < 0.0001$ ), education ( $p = 0.003$ ) and clinical classification ( $p = 0.024$ ) were statistically significant variables. Conclusions: There were possible failures in prenatal care, in the execution of clinical protocols and in filling out the Notification forms.

**DESCRIPTORS:** Syphilis; Epidemiological Monitoring; Pregnancy; Prenatal care.

## RESUMEN

Objetivo: Comparar y analizar el perfil clínico-epidemiológico de la sífilis gestacional en los municipios más poblados de Tocantins, de 2009 a 2018. Métodos: Estudio transversal y retrospectivo, realizado con datos de los municipios de Araguaína, Gurupi, Palmas, Paraíso do Tocantins y Porto Nacional, proporcionado por el Ministerio de Salud a través del Departamento de Informática del Sistema Único de Salud de Brasil y analizado mediante análisis descriptivo y estadístico. Resultados: Se observó una tasa de incidencia creciente en todas las localidades a partir de 2016. Las mujeres embarazadas fueron diagnosticadas tardíamente, principalmente en el segundo y tercer trimestre. Palmas tuvo la mayor notificación de sífilis latente (55,57%). Los factores de riesgo identificados fueron: color marrón y grupo de edad entre 20-29 años, la escolaridad predominante divergió entre los municipios. La edad gestacional ( $p < 0,0001$ ), la educación ( $p = 0,003$ ) y la clasificación clínica ( $p = 0,024$ ) fueron variables estadísticamente significativas. Conclusiones: Hubo posibles fallas en la atención prenatal, en la ejecución de los protocolos clínicos y en el llenado de los formularios de Notificación.

**DESCRIPTORES:** Sífilis; Monitoreo epidemiológico; El embarazo; Cuidado prenatal.

## RESUMO

Objetivo: Comparar e analisar o perfil clínico-epidemiológico da sífilis gestacional nos municípios de Paraíso, Palmas, Araguaína, Porto Nacional e Gurupi, do estado do Tocantins, no período de 2009 a 2018. Métodos: Estudo transversal e retrospectivo, realizado com dados dos municípios de Araguaína, Gurupi, Palmas, Paraíso do Tocantins e Porto Nacional, fornecidos pelo Ministério da Saúde por meio do Departamento de Informática do Sistema Único de Saúde do Brasil e analisados por análise descritiva e estatística. Resultados: Observou-se taxa de incidência ascendente em todas as localidades a partir de 2016. As gestantes foram diagnosticadas tardiamente, majoritariamente nos 2º e 3º trimestres. Palmas apresentou maior notificação de sífilis latente (55,57%). Os fatores de risco identificados foram: cor parda e faixa etária entre 20-29 anos, a escolaridade predominante divergiu entre os municípios. A idade gestacional ( $p < 0,0001$ ), escolaridade ( $p = 0,003$ ) e classificação clínica ( $p = 0,024$ ) foram variáveis estatisticamente significativas. Conclusões: Observaram-se possíveis falhas na assistência pré-natal, na execução de protocolos clínicos e no preenchimento das fichas de Notificação.

**DESCRIPTORES:** Sífilis; Monitoramento Epidemiológico; Gravidez; Cuidado pré-natal.

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**INTRODUCTION**

**S**yphilis is a sexually transmitted infection caused by the *Treponema pallidum* bacteria, which over the years has become a challenge to be faced by public health agencies worldwide.<sup>1, 2, 3</sup> According to estimates by the World Health Organization (WHO), the disease affects more than 12 million people worldwide.<sup>4</sup> In 2016, the region of the Americas presented 131.000 cases of pregnant women with active syphilis, of which 37.436 corresponded to Brazil.<sup>1, 5, 6, 7</sup>

When untreated or inadequately treated, gestational syphilis (GS) can be transmitted to the fetus via the placenta, causing congenital syphilis (CS).<sup>3, 8, 9</sup> The vertical transmission rate changes according to the stage of maternal disease, ranging from 30 to 100%.<sup>9, 10, 11, 12</sup> It is noteworthy that fetal risks extend to abortion, stillbirth and perinatal death in 40% of infected children, in addition to prematurity and low birth weight.<sup>2, 8, 10, 13</sup> In 2004, the incidence rate of CS in Brazil was 1,6/1000 live births, increasing to 3,51/1000 live births in 2016. The vertical transmission rate, in that same year, was 34,3%.<sup>6, 14</sup>

Prenatal laboratory serological screening

**Syphilis is a sexually transmitted infection caused by the *Treponema pallidum* bacteria, which over the years has become a challenge to be faced by public health agencies worldwide.**

is performed using non-treponemal tests, such as the most used Venereal Disease Research Laboratory (VDRL), for diagnosis and monitoring of the treatment of gestational syphilis in order to minimize the incidence of CS.<sup>2, 9, 15</sup> Added to this is the implementation of immunochromatographic tests (Quick Tests) in Basic Health Units in 2013, which facilitated, especially in areas that lack laboratory resources, the tracking of syphilis.<sup>1, 10, 15</sup>

The WHO, the Pan American Health Organization (PAHO) and the Ministry of Health (MH) recommend serological testing in the first prenatal consultation (preferably in the 1st trimester), at the beginning of the 3rd trimester and at the time of childbirth or curettage.<sup>3, 15</sup> Despite improvements in epidemiological surveillance, studies carried out in Ceará, Minas Gerais and Tocantins identified late diagnosis of syphilis in pregnancy, which increases the severity and risk of CS, as it affects the fetus mainly between the 16th and 28th week of pregnancy.<sup>17, 18, 19, 20</sup>

According to symptomatology and exposure time, syphilis is divided into recent, corresponding to the subclassifications: primary, secondary and recent

latent, with up to one year of evolution, and late, with more than one year of progression and represented by the subdivisions: late latent and tertiary.<sup>15</sup> The treatment of the disease is cost-effective, preferably based on benzathine penicillin G, as recommended by the MH.<sup>2,15</sup> Doses and intervals vary according to the stage of infection.<sup>7</sup>

In 2005, GS was considered a disease of compulsory notification by Ordinance No. 33, of July 14th, of the MH.<sup>21,22</sup> Despite this, underreporting is an impasse to be overcome, compromising the development of strategies, from the federal to the municipal level, for the control and eradication of CS and pregnancy.<sup>19,22</sup> In 2007, the notification rate was estimated at only 32% in the national territory.<sup>12</sup>

In Brazil, although initiatives have been implemented to expand the diagnosis and treatment of pregnant women, the incidence of GS has been growing annually.<sup>3,14,17,23</sup> From 2017 to 2018, the North Region showed an increase of 19,4%, with Tocantins being the only state whose detection rate (25,1/1.000 live births) surpassed the national rate.<sup>5</sup>

Thus, the objective of the study is to compare the clinical and epidemiological profile of GS in the most populous municipalities of Tocantins, in the period from 2009 to 2018, and analyze it in order to help health departments and agencies to see the disease more clearly, in order to program public and budgetary

policies that are more effective and adapted to minimize the vertical transmission of syphilis.

## METHODS

Retrospective cross-sectional study of quantitative character, using descriptive and analytical statistics.<sup>24</sup> Data from the public domain were collected, made available by the MS through the Department of Informatics of the Brazilian Unified Health System (DATASUS), a service fed by the compulsory notification forms of the Information System for Diseases and Notification (SINAN).<sup>25</sup> In the tab of the Department of Chronic Diseases and Sexually Transmitted Infections, it was possible to filter indicators and information about SG by municipality. The following study variables were established:

- Sociodemographic information of the pregnant woman (age, color and education);
- Information regarding STI (incidence rate, gestational age at diagnosis and clinical classification).

All data pertaining to the period of interest, 2009 to 2018, and to the municipalities of Tocantins: Araguaína, Palmas, Porto Nacional, Gurupi and Paraíso do Tocantins, were included in the study and then tabulated in ascending order of

population contingent with the help of Microsoft Office Excel® 2010 tool. The choice of municipalities was due to the high population size, allowing the execution of statistical tests.

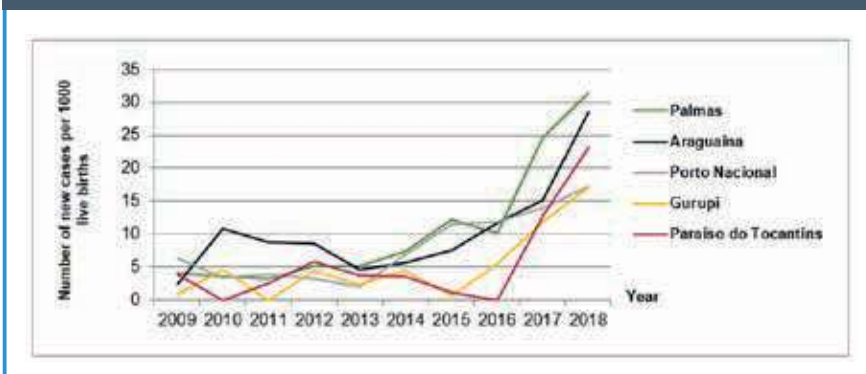
For statistical analyses, the tests: Chi-square ( $\chi^2$ ) by Association, Kruskal-Wallis and S-N-K were applied using the Minitab® program. The variables: age, color and education of the pregnant woman were grouped in order to achieve maximum precision in the first test mentioned. The Kruskal-Wallis test was used in order to verify the significance of the clinical classification variable, in relation to the number of cases. Its choice is justified by the fact that the variable table does not have a 2x2 dimension and some values of this tabulation are shown to be  $<5$ , not meeting the requirements for using  $\chi^2$  as it reduces its reliability.<sup>24</sup> Finally, the S-N-K Test was used to visualize the cities that presented significant differences between them.<sup>24</sup> Variables whose probability of significance ( $p$ ) was less than 5% were considered statistically significant.

Descriptive analysis of the collected data was performed using the frequency distribution and the unit number of cases per 1000 live births, in relation to the incidence rate. Because the collection and analysis of the research is based on data in the public domain, it is authorized to be carried out without registration and evaluation by the CEP/CONEP system, as established by Resolution No. 510/2016 of the National Health Council.<sup>26</sup>

## RESULTS

In the range from 2009 to 2018, the cities studied had a total of 1023 new cases of GS (Table 1), with a significant ( $p < 0,001$ ) evolution in the period. Despite the fluctuation in the incidence rate of gestational syphilis in the early periods, there was a general upward trend, especially from 2016 to 2018, with an increase of 21,3 new cases per 1000 live births in Palmas, 16,7 in Araguaína, 5,5 in Porto Nacional, 11,7 in Gurupi and 23,1 in Paraíso (Figure 1).

Figure 1. Syphilis incidence rate per 1000 live births in pregnant women per municipality of Tocantins, 2009-2018.



Source: Datasus - MS/SVS/DCCI - Department of Chronic Diseases and Sexually Transmitted Infections.

In most locations, pregnant women with syphilis were diagnosed late, such as Palmas, with higher detection in the 2nd trimester (38,66%) and Araguaína (47,65%), Porto Nacional (40,45%) and Gurupi (46,38%) in the third. Paraíso do Tocantins behaved as an exception, in which 56,25% of them were identified in the first trimester of prenatal care (Table

1). The difference in cases between quarters and between cities is statistically significant ( $p < 0,001$ ).

Regarding the stage of infection at the time of diagnosis, the city of Palmas revealed 55,57% of pregnant women with latent syphilis, this clinical classification was in second place in the percentage of cases in Paraíso, reaching 31,25%. In the

other municipalities it ranged between 7,86 - 10,14%.

All municipalities, except Palmas, presented most cases as SG in the primary phase, with relative frequency ranging between 44,94% and 58,33%. Syphilis reported as secondary and tertiary were the ones with the smallest representations, ranging, respectively, between

Table 1. Epidemiological data on gestational syphilis in the most populous municipalities of Tocantins, 2009-2018.

VARIABLES	MOST POPULOUS MUNICIPALITIES IN TOCANTINS					VALUE - P
	PALMAS (A <sup>***</sup> )	ARAGUAÍNA (A <sup>***</sup> )	PORTO NACIONAL (AB <sup>***</sup> )	GURUPI (B <sup>***</sup> )	PARAÍSO (B <sup>***</sup> )	
NUMBER OF CASES	N = 538	N = 319	N = 89	N = 69	N = 48	<0,001*
CASES BY GESTATIONAL AGE - N(%)						
1st quarter	164 (30,48)	76 (23,82)	25 (28,09)	15 (21,74)	27 (56,25)	<0,0001*
2nd quarter	208 (38,66)	88 (27,59)	28 (31,46)	22 (31,88)	11 (22,92)	
3rd quarter	156 (29)	152 (47,65)	36 (40,45)	32 (46,38)	9 (18,75)	
Ignored gestational age	10 (1,86)	3 (0,94)	0 (0)	0 (0)	1 (2,08)	
CASES ACCORDING TO CLINICAL CLASSIFICATION - N(%)						
Classified as syphilis I	159 (29,55)	153 (47,96)	41 (46,07)	31 (44,94)	28 (58,33)	=0,024**
No. of cases classified as syphilis II	30 (5,58)	37 (11,60)	7 (7,86)	7 (10,14)	3 (6,25)	
No. of cases classified as latent syphilis	299 (55,57)	29 (9,09)	7 (7,86)	7 (10,14)	15 (31,25)	
No. of cases classified as syphilis III	35 (6,51)	58 (18,18)	10 (11,24)	7 (10,14)	0 (0)	
Classification ignored	15 (2,79)	42 (13,17)	24 (26,97)	17 (24,64)	2 (4,17)	
CASES ACCORDING TO THE PREGNANT WOMAN'S AGE GROUP - N(%)						
10-19 years	140 (26,02)	82 (25,71)	22 (24,72)	16 (23,19)	14 (29,16)	0,516*
20-29 years	265 (49,26)	173 (54,23)	45 (50,56)	40 (57,97)	19 (39,58)	
30+	133 (24,72)	64 (20,06)	22 (24,72)	13 (18,84)	15 (31,25)	
CASES ACCORDING TO THE PREGNANT WOMAN'S EDUCATION - N(%)						
<8 years	160 (29,74)	143 (44,83)	37 (41,58)	34 (49,28)	24 (49,99)	0,003*
>8 years	248 (46,1)	163 (51,09)	22 (24,71)	31 (44,93)	21 (43,75)	
ignored	130 (24,16)	13 (4,08)	30 (33,71)	4 (5,8)	3 (6,25)	
CASES ACCORDING TO THE PREGNANT WOMAN'S ETHNICITY - N(%)						
white	63 (11,71)	34 (10,66)	6 (6,74)	6 (8,7)	13 (27,08)	
black	50 (9,29)	26 (8,15)	18 (20,22)	7 (10,14)	4 (8,33)	
brown	391 (72,68)	251 (78,68)	58 (65,17)	54 (78,26)	29 (60,42)	0,183*
others	27 (5,02)	3 (0,94)	2 (2,24)	2 (2,9)	2 (4,17)	
ignored	7 (1,3)	5 (1,57)	5 (5,62)	0 (0)	0 (0)	

Source: Datasus - MS/SVS/DCCI - Department of Chronic Diseases and Sexually Transmitted Infections. \*Chi-square test by Association between cities and variable of interest. \*\*Kruskal-Wallis test. \*\*\*Equal letters do not show significant differences (S-N-K test).

6,25 - 11,60% and 0 - 18,18%. Furthermore, the municipalities of Araguaína (13,17%), Porto Nacional (26,97%) and Gurupi (24,64%) had high rates of ignored classification indicated in the SI-NAN forms.

The age range that most impacted the number of affected pregnant women in the localities was 20-29 years, followed, in most other regions analyzed, by 10-19 years. An exception is the city of Paraíso do Tocantins, which presented the 30+ age group in second place. The cities of Palmas and Porto Nacional had high rates of ignored age group (Table 1).

The level of education of pregnant women affected varied between municipalities. In Palmas and Araguaína, the highest percentage was in pregnant women with >8 years of schooling, which contrasts with the rest of the cities, which had a higher frequency with <8 years of schooling. In Palmas, 24.16% of the cases had the education of the pregnant woman ignored. The proportions were statistically significant ( $p=0,003$ ) for this variable (Table 1).

In relation to the pregnant woman's color, all the analyzed places showed the majority of pregnant women with mixed color, with a relative frequency ranging from 60,42 to 78,68%. In second place was the white color in Palmas, Araguaína and Paraíso do Tocantins and black in Porto Nacional and Gurupi.

## DISCUSSION

The increase in the incidence rate of GS in recent years can be justified by the appearance of new cases and/or by the change in the criteria for defining the case of gestational syphilis, in 2017, in which the MH declared that women with syphilis at the time of childbirth, prenatal or puerperium, with positivity in at least one test, regardless of the degree, should be included in the compulsory notification form for gestational syphilis and not the one for acquired syphilis, as was previously done.<sup>4,27</sup>

Due to the fact that CS is a sentinel

event for analyzing the quality of care for pregnant women, the change in the case definition and the increase in notifications of SG over time are extremely important for its prevention, since the higher and more recent is the screening of affected pregnant women, the greater the visualization of the disease by health professionals and more women can have access to counseling and treatment provided by the SUS, improving the fetal prognosis and decreasing the chances of CS incidence.<sup>16,22</sup>

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The sociodemographic information analyzed presented as risk factors for OS the age group of 20-29 years and brown color, similar results were reported by Souza et. al. and Cardoso et. al.<sup>1,17</sup> The higher number of notifications corresponding to women with this skin color

may be correlated with the ethnic and racial characteristics of the population living in Tocantins, which is mostly brown (63,6%), 30 or with the fact that they are more socially vulnerable.

The prevalent involvement of pregnant women aged 20-29 years is related to the fact that this age range comprises the peak of the active sexual life and reproductive phase.<sup>1</sup> The age group of 10-19 years was in second place for aggravating the disease, which indicates the early start of women's sexual life, the possible weakness in the implementation of strategies on reproductive planning and prevention of sexually transmitted infections. It is worth mentioning the unwanted early pregnancy as a factor associated with the late search for prenatal care by the pregnant woman.<sup>20</sup>

With regard to education as a risk behavior, the frequency of pregnant women with <8 years or >8 years of schooling exhibited varying proportions in each analyzed municipality, showing that although research carried out in Brazil present low education as a common factor, it is not a rule in all locations in the country, and it is important to apply Health Education strategies in the general population.

In Palmas, Araguaína, Porto Nacional and Gurupi, most pregnant women were diagnosed late, maintaining the same proportions in the possibility of population increase ( $p<0,001$ ), a fact that has contributed to the increase in the rate of vertical transmission.<sup>1,14,19,22</sup> The MH recommends that serological screening should be performed in the pregnant woman's 1st prenatal consultation, preferably in the 1st trimester of pregnancy, which indicates three possibilities for the aforementioned outcome: prenatal care performed late by the pregnant woman, inadequate care and of low quality and/or lack of knowledge of clinical protocols and guidelines by health professionals in the approach to tracking the disease.<sup>1,15,20</sup>

It is known that the clinical diagnosis of the primary stage of syphilis is complicated due to the difficulty in visualizing

the hard chancre in certain regions and its absence of painful symptoms, in addition to the fact that chronological information on the time of infection is not always available to the pregnant woman.<sup>15, 18</sup> Thus, it is expected that, due to the difficulty in clinically inferring the stage of the disease, screening will point to the predominance of records of syphilis of unknown duration, classifying and treating them as latent syphilis.<sup>15</sup>

In Palmas, most cases were identified as latent syphilis, demonstrating greater quality of care in relation to classification and diagnosis. On the other hand, in the remaining municipalities, a large part of the notifications corresponded to primary syphilis, with possible clinical misclassification and/or mistakes in filling out the compulsory notification forms. Inadequacies in classification can lead to an increased risk of occurrence of congenital syphilis due to inadequate treatment, as this differs according to the stage of the disease.<sup>2, 12, 15</sup>

The limitations of this research were due to the use of secondary data, with the possibility of underreporting and problems with filling in the forms that feed the data source. The possible underreporting makes the data presented in this study, such as variable proportions and incidence rates, much more alarming. Continuing Education measures are needed with health professionals to improve

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knowledge about the clinical protocol for the management and treatment of the disease, in addition to reinforcing the importance of properly filling out the notification forms available, in order to reduce the negative repercussions of GS, failures in prenatal care and difficulties in supervising the efficiency of prevention actions performed by health workers.

The use of strategies, such as an active search for pregnant women and guidance on care monitoring during pregnancy by the Family Health Strategy (ESF), to increase the rate of early prenatal care, the coverage of care for pregnant women and minimize the risks of CS, is of fundamental importance to change the reality of late diagnoses that occur so much in the country.<sup>20</sup>

## CONCLUSION

With this study, it was possible to note the fragility of the public health system in Tocantins in relation to the prevention of STIs and the quality of prenatal care in the cities analyzed. It is important that the monitoring of syphilis cases is constant, for their early identification and so that surveillance and care strategies are planned and implemented effectively, reaching the goal proposed by PAHO, that an exemplary and quality health of the pregnant woman and her newborn is reached. ■

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