

# EPIDEMIOLOGICAL PROFILE OF CASES OF CONGENITAL SYPHILIS IN BELÉM CITY, PARÁ STATE, FROM 2009 TO 2018

*PERFIL EPIDEMIOLÓGICO DA SÍFILIS CONGÊNITA EM BELÉM, PARÁ, BRASIL DE 2009 E 2018*

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## ABSTRACT

**Introduction:** Congenital Syphilis (CS) is a systemic infectious disease caused by the bacterium spirochete *Treponema pallidum*, of vertical transmission, transplacentally, resulting from the non-treatment or inadequate treatment of infected mothers, thus determining alarming numbers in the national territory, as in Belém City (Pará State). **Objective:** To analyze the epidemiological profile and incidence rate of CS in Belém, Pará. **Methods:** Quantitative, ecological, and descriptive study, conducted based on data available on DATASUS/TABNET from 2009 to 2018. **Results:** A total of 1,109 cases of CS were reported in Belém City. The mean incidence rate in this period was 5.4/1000 live births. As for newborns, 1,031 (92.97%) were diagnosed in the first week of life, 499 (45.00%) were male, 742 (66.91%) were pardo, and 860 (77.55%) classified as CS. Regarding maternal characteristics, the age group was inadequately filled in 100% of notifications, 476 (42.92%) had their level of education ignored at the time of filling out the forms, 768 (69.25%) underwent prenatal care, 490 (44.19%) were diagnosed with congenital syphilis at the time of delivery/curettage, and 636 (53.35%) reported no partner treatment. **Conclusion:** The profile studied showed an incidence rate above the parameters established for control, reflecting the increase in social inequalities, the lack of information about the disease, failure to register health organs, especially on the maternal age analyzed, low prevalence in the appropriate treatment of pregnant women's partners, resonating the need for improvements in the notification system.

**Keywords:** syphilis, congenital; epidemiology; prenatal care.

## RESUMO

**Introdução:** A Sífilis Congênita (SC) é uma doença infecciosa sistêmica causada pela bactéria espiroqueta *Treponema pallidum*, a qual possui transmissão vertical, transplacentalmente, resultado do não tratamento ou tratamento inadequado de mães infectadas, determinando, desse modo, números alarmantes em território nacional, como no município de Belém (PA). **Objetivo:** Analisar o perfil epidemiológico e a taxa de incidência de SC em Belém, Pará. **Métodos:** Estudo quantitativo, ecológico e descritivo, realizado com base em dados disponíveis no DATASUS/TABNET de 2009 a 2018. **Resultados:** Foram notificados 1.109 casos de SC na cidade de Belém. A taxa média de incidência nesse período foi de 5,4/1000 nascidos vivos. Quanto aos recém-nascidos, 1.031 (92,97%) foram diagnosticados na primeira semana de vida, 499 (45,00%) eram do sexo masculino, 742 (66,91%) da cor parda e 860 (77,55%) classificado como SC. Quanto às características maternas, a faixa etária foi inadequadamente preenchida em 100% das notificações, 476 (42,92%) tiveram seu nível de escolaridade ignorado no momento do preenchimento dos formulários, 768 (69,25%) realizaram pré-natal, 490 (44,19%) tiveram o diagnóstico de sífilis congênita no momento do parto/curetagem e 636 (53,35%) relataram ausência de tratamento do parceiro. **Conclusão:** O perfil estudado mostrou uma taxa de incidência acima dos parâmetros estabelecidos para controle, refletindo o aumento das desigualdades sociais, a falta de informação sobre a doença, falha no registro de órgãos de saúde, especialmente sobre a idade materna analisada, baixa prevalência no tratamento adequado dos parceiros das gestantes, ressaltando a necessidade de melhorias do sistema de notificação.

**Palavras-chave:** sífilis congênita; epidemiologia; cuidado pré-natal.

## INTRODUCTION

Congenital syphilis (CS) is a systemic infectious disease caused by the spirochete bacterium *Treponema pallidum*. Its transmission to the conceptus occurs mainly transplacentally,<sup>(1)</sup> due to the non-treatment or inadequate treatment of infected mothers.<sup>(2)</sup> Clinically, it presents in a variable way, from asymptomatic to severe forms, including miscarriage or stillbirth.<sup>(3,4)</sup> Clinical symptomatology may occur in prenatal, perinatal, early (infants or children aged  $\leq 2$  years), and late (children  $> 2$  years), the latter similar to tertiary syphilis.<sup>(2-4)</sup>

Widely distributed worldwide, syphilis is one of the most common sexually transmitted infections, with approximately 6.3 million new cases each year (95%CI 5.5–7.1 million). In this context, according to data from the World Health Organization (WHO), CS is a global public health problem, and in 2016, 661,000 cases of CS were detected worldwide, resulting in 200,000 stillborn and neonatal deaths, preceded only by malaria.<sup>(5)</sup>

In Brazil, the number of cases of CS is worrying. In 2018, the incidence rate was 9.0/1,000 live births, and the mortality rate was 8.2/100,000 live births.<sup>(6)</sup> These data show the importance of conducting epidemiological studies to know the disease and identify the challenges regarding prevention, control, and, consequently, cases reduction.

Therefore, the study aimed to describe the epidemiological profile of cases of congenital syphilis from 2009 to 2018, in Belém City, Pará State, Brazil.

## OBJECTIVE

To analyze the epidemiological profile and the incidence rate of congenital syphilis (CS) in Belém City, Pará State.

## METHODS

This is a quantitative, ecological, descriptive study based on data available in the Department of Informatics of the Unified Health System (DATASUS) through health information (TABNET).

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The variables analyzed related to newborns were: age at diagnosis of CS and classification of the final diagnosis. Regarding the socio-demographic data of pregnant women, the following variables were addressed: age group, skin color/ethnicity, and schooling. The variables studied in relation to the follow-up of pregnancy were: prenatal care, time of diagnosis of syphilis in pregnant women, adequacy of treatment, and treatment of the partner concomitantly with the treatment of pregnant woman.

Data processing and analysis were based on tabwin (DATASUS) and Excel (Microsoft®) software, whose results received simple treatment of descriptive statistics and were presented in figures and tables. Data collection occurred in May 2020. They were analyzed and compared according to the relevant literature.

As for ethical precepts, because it is documentary research, whose content is of a public nature, the study did not need to be submitted to the Research Ethics Committee.

## RESULTS

In Belém City, Pará State, from 2009 to 2018, 5,761 and 1,109 cases of congenital syphilis were reported and confirmed, respectively. Of these, 5,758 reported cases and 1,107 confirmed cases occurred in children up to 23 months of age (2 years incomplete), as shown in **Table 1**, demonstrating a high but stable value of the number of notifications from the year 2013. This increase is reflected in the incidence values of state and municipal cases of CS from 2014, with the years 2015, 2016, and 2017 presenting a higher incidence rate at the municipal level when compared to the state level; the municipal level presented 11.1, 15.0, and 8.6 per 1,000 live births, respectively, whereas the state level, 4.6, 5.3, and 5.8 per 1,000 live births, respectively. Finally, when analyzing the incidence rate over the years in Belém City, despite the substantial decrease in its values from 2016, **Graph 1** shows a high average of 5.4/1,000 live births for the city in the analyzed interval, five to 10 times higher than that recommended by the WHO of 0.5–1.0/1,000 live births.

Considering the 1,109 reported and confirmed cases of CS in Belém, regarding the variables related to newborns, it was observed that 1,031 (92.97%) were diagnosed in the first week of life 499 (45.00%) were male, 742 (66.91%) brown color and 860 (77.55%) were classified as recent congenital syphilis as shown in **Table 2**.

Regarding maternal characteristics, the age group was inadequately filled, registering a number of 1,091 of pregnant women aged 80 years or older, 476 (42.92%) had their level of education ignored at the time of filling out the forms, 768 (69.25%) had prenatal care, 490 (44.19%) had the diagnosis of congenital syphilis at the time of delivery/curettage, and 636 (53.35%) reported non-treatment of their partners (**Table 3**).

## DISCUSSION

The present study found a total of 5,758 and 1,107 cases of CS in Pará State and in Belém City, respectively. In these locations, the years 2017 (n=808) and 2016 (n=239) revealed the maximum values of cases reported, respectively. The state values found in the study overlap with the findings of the one-decade cross-sectional study (2000–2009), conducted in Ceará State,<sup>(7)</sup> represented by a number of 2,930 reported cases. In addition, the 1,107 cases reported in the state capital of Pará are higher than those found by epidemiological surveys in other Brazilian capitals, such as Natal (Rio Grande do Norte),<sup>(8)</sup> which presented 311 cases of CS from 2004–2007, and 204 cases of CS in Palmas City (Tocantins State)<sup>(9)</sup> in the 2007–2014 period. Such significant numbers in different national locations, especially in the Northern region, which historically presented the lowest national incidence values related to this pathology due to the low performance of testing,<sup>(10)</sup> highlight an increase in the notification of cases of CS in recent years, the result of a possible reflection of the improvement in notification for this infection over time, advances in epidemiological surveillance, and greater access of pregnant women to the prenatal service existing in Family Health Strategies (*Estratégia Saúde da Família* - ESF).

**Table 1** – Comparison of CS cases in children under one year of age and incidence (per 1,000 live births) in Belém City and in Pará State, from 2009 to 2018.

Year	LB	Pará State		LB	Belém City	
		Cases (%)	Incidence		Cases (%)	Incidence
2009	141,786	359 (100)	2.5/1,000	30,186	63 (17,55)	2.7/1,000
2010	139,208	301 (100)	2.1/1,000	29,871	47 (15,61)	2.1/1,000
2011	140,566	426 (100)	3.0/1,000	29,933	45 (10,56)	2.0/1,000
2012	136,235	533 (100)	3.8/1,000	30,711	76 (14,25)	3.5/1,000
2013	137,634	605 (100)	4.3/1,000	31,816	37 (6,11)	1.6/1,000
2014	141,521	692 (100)	4.8/1,000	31,422	111 (16,04)	5.1/1,000
2015	141,556	662 (100)	4.6/1,000	32,520	237 (35,80)	11.1/1,000
2016	135,701	743 (100)	5.3/1,000	29,889	289 (38,90)	15.0/1,000
2017	136,592	808 (100)	5.8/1,000	30,361	168 (20,79)	8.6/1,000
2018	139,442	629 (100)	4.4/1,000	28,762	34 (5,40)	1.7/1,000
Total		5758 (100)			1,107 (19,22)	

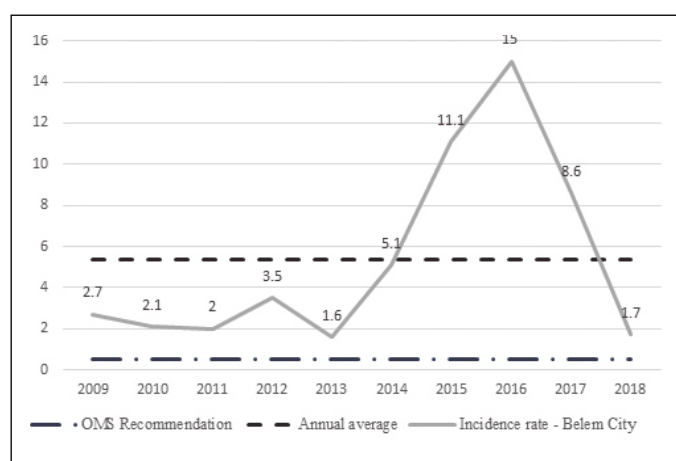
Source: Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação* - SINAN) and Live Birth Notification System (*Sistema de Informações sobre Nascidos Vivos* - SINASC).

LB: live birth

In addition, desaturation of penicillin, the main drug for treating this infection, in Brazil and worldwide from 2013, highlight the need for national production of Active Pharmaceutical Inputs (*Insumo Farmacêutico Ativo* - IFA), thus avoiding the need to import raw materials from international suppliers and, consequently, the worsening of this epidemic installed in the country.<sup>(11,12)</sup> However, despite progress in epidemiological surveillance, the lack of uniformity in diagnosis and conduct for patients with this condition still promotes high underreporting of CS cases, despite the existence of compulsory notification since 1986.<sup>(13-15)</sup>

During the period studied, the annual incidence rate of CS in Belém City was 5.4/1,000 live births, a value approximately five to 10 times above the average recommended by the Brazilian Ministry of Health together with the World Health Organization (WHO) of less than one case for 1,000 live births as a goal designed to have been achieved by 2015, aiming to deal with this public health problem.<sup>(16)</sup> Such a high incidence rate corroborates the findings of the descriptive study,<sup>(17)</sup> conducted in the period 2007–2012 in six Brazilian federative units, in which CS rates concomitantly with syphilis during pregnancy are increasing in all states analyzed, with notification occurring mainly in capitals, such as Belém, where they have more structured health care networks and a greater number of health professionals attentive to the notification of these cases. This growth trend occurs globally, as described in the survey by Philippe Read et al.,<sup>(18)</sup> which performed the analysis of 31 countries from 2000–2013, revealing a high proportion of notification, especially in high-income countries, showing that none of them presented efficient measures in the control of CS.

Regarding the diagnosis period performed through the Venereal Disease Research Laboratory (VDRL) test or rapid test during the first consultation or 28<sup>th</sup> week of pregnancy,<sup>(14)</sup> roughly 92% were diagnosed in the first week of life, evidencing the efficiency in detecting this clinical condition after delivery. This fact may be related to a deficiency presented in the screening of gestational syphilis, because a deficit presented in the detection during pregnancy consequently increases the number of CS cases, especially in the Northern region,



**Graph 1** – Temporal variation of incidence rates (per 1,000 live births) in Belém City, average annual incidence in the city, from 2009 to 2018, and the average value recommended by the WHO (0.5/1,000 live births).

which presents substantial regional distances between its localities, directly affecting the coverage of ESF.<sup>(19)</sup>

Regarding the final diagnosis of the analyzed CS cases, 860 cases of recent CS were noticeable, representing a total of 77.55% of the total number of reported cases. This fact may be indicative that, although the literature reports late diagnosis and inadequate treatment of syphilis in pregnant women, the same does not occur with neonates, with the detection of the disease in the first week of life.<sup>(13)</sup> For educational purposes, elucidating that syphilis can be classified in two ways is important: by analyzing the period of infection as recent acquired syphilis, with a large portion of newborns presenting a low weight (>2,500 grams) associated with prematurity,<sup>(20)</sup> or late acquired syphilis; or according to the clinical picture, such as primary syphilis, secondary, latent, tertiary, and neurosyphilis, with such symptomatology in the maternal case being difficult to analyze, because there is a difficulty for the clinical diagnosis of syphilis in pregnant women, according to the Ministry of Health,<sup>(21)</sup> since these are asymptomatic and its characteristic sign, hard cancer, is usually found in regions of difficult visualization, such as the vaginal wall or the cervix.

When verifying the age group, the data notification and exposure system of DATA OF DATASUS fails to adequately stratify the age of the mother affected by the pathology, classifying almost all of all cases aged 80 years or more, data that do not indicate reality, affecting the development of an appropriate epidemiological profile for the city. Thus, for a better understanding, it is worth noting that CS affects children independently of the age group of the mother infected with syphilis, and all reproductive ages are susceptible to this risk of infection, with unprotected sex being a risk factor for contamination. Thus, the most affected age range, according to the literature, is 20 to 34 years, where women have a more active sexual life and greater probability of becoming pregnant, as demonstrated in epidemiological studies conducted in other Brazilian capitals: Alagoas<sup>(22)</sup>, Salvador<sup>(23)</sup> and Belo Horizonte<sup>(24,8)</sup>.

When analyzing maternal characteristics, the highest rates related to schooling are ignored in the notification and represented by complete elementary school, corresponding to 476 (42.92%) and 285 (25.70%), respectively. In addition to the first quantitative being a demonstration of failure to record cases reported for syphilis that prevent the performance of quality epidemiological studies, the approximate value of 25% corresponding to low schooling is in accordance with what is presented in the literature, which elucidates this condition as a risk factor, because a low socioeconomic index and school dropout provide a limited view of the importance of health care, especially on methods of infection prevention and control.<sup>(14,25)</sup>

A significant number of 70% of pregnant women had prenatal care, and 490 (44.19%) mothers were diagnosed with congenital syphilis at the time of delivery. Therefore, despite the high amount present in prenatal care, this fact did not reflect in a decrease in CS cases, indicating failures in performing this procedure, preventing screening and, consequently, early intervention. Factors such as non-performance of tests, such as VDRL for the diagnosis of syphilis and the misinterpretation of these tests' results, drive a deficient prenatal care, allowing an increase in the number of diagnoses only at the time of delivery.<sup>(26,27)</sup>

In relation to the treatment of partners, even though they represent a negative response in more than 50% of cases,

compromising an adequate control of CS, in which besides serological screening and appropriate treatment for pregnant women, treatment with the drug protocol for partners is essential to avoid maternal reinfections, which allow vertical transmission.<sup>(28)</sup> This scenario is present in other studies, such as research conducted by Campos et al., who identified, despite the knowledge of the need for treatment, the non-possibility of partners to carry out the requested protocol, evidencing a cultural issue of men's disease, because searching health care is still perceived as something women do.<sup>(29)</sup>

The limitations of the study conducted are due to the use of secondary data, especially in cases of underreporting, and classification and registration errors existing in the DATASUS platform, highlighting the lack of reliability in some factors,<sup>(30)</sup> such as the absence of age

stratification of CS up to two years of age and the high percentage of characteristics ignored during notification.

## CONCLUSION

The results found in the present study demonstrated an incidence rate above 0.5 cases per 1,000 live births, a goal recommended by the WHO, thus demonstrating that, during the period studied, the control of CS in Belém City was deficient with the probable factors of inadequate prenatal care, social vulnerability, and crisis in the supply of penicillin between 2014 and 2017. Therefore, there is a need to develop actions aimed at optimizing the diagnosis and treatment of the disease, as well as the adoption of prevention and control strategies.

**Table 2** – Epidemiological characteristics of CS cases and their respective percentages in Belém City, from 2009 to 2018.

Variable	Cases	Distribution (%)
Age of children's diagnosis		
< Seven days	1,031	92.97
Seven to 27 days	50	4.510
28 to 364 days	25	2.25
One year	01	0.09
Two to four years	01	0.09
Five to 12 years	01	0.09
Total	1,109	100
Children's sex		
Male	499	45.00
Female	495	44.63
Ignored	115	10.37
Total	1,109	100
Children's ethnicity/skin color		
White	44	3.97
Black	18	1.62
Asian	02	0.18
Brown	742	66.91
Indigenous	02	0.18
Ignored	301	27.14
Total	1,109	100
Final diagnosis		
Recent congenital syphilis	860	77.55
Late congenital syphilis	04	0.36
Abortion/stillbirth by syphilis	94	8.48
Discarded	117	10.55
Ignored	34	3.06
Total	736	100

Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação* - SINAN).

**Table 3** – Distribution of maternal characteristics of reported and confirmed cases of congenital syphilis in Belém City, from 2009 to 2018.

Characteristics of the mother	Number of cases	Distribution (%)
Schooling		
Illiterate	04	0.36
Incomplete elementary school	285	25.70
Complete elementary school	95	8.56
Incomplete high school	102	9.20
Complete high school	133	12.00
Incomplete higher education	05	0.45
Complete higher education	04	0.36
Does not apply	05	0.45
Ignored	476	42.92
Maternal age group		
80 years old or older	1,091	98.37
Ignored	18	1.63
Prenatal performance		
Yes	768	69.25
No	283	25.52
Ignored	58	5.23
Time of syphilis diagnose		
During prenatal care	314	28.31
At the time of delivery/curettage	490	44.19
Postpartum	226	20.38
Not performed	05	0.45
Ignored	74	6.67
Partner treatment		
Yes	144	12.98
No	636	57.35
Ignored	329	29.67

Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação* - SINAN).

In this study, this would mean profile of CS cases originated from mothers with low schooling and with partners who did not undergo treatment for the disease. A large amount of incomplete data was evidenced in the completion of the notification forms, especially as to maternal age, impairing the epidemiological analysis in this aspect.

These observations demonstrate the need to expand the notification of CS cases and maternal syphilis by SINAN, and the improvement in the registration of information, especially in the categories in which incorrect filling of data was observed, such as maternal age, education, and treatment of partners. Greater accuracy of health professionals responsible for filling out the compulsory notification can improve the understanding of the diagnosis of CS and the understanding of the data aimed at public health actions.

### Participation of each author

All the authors contributed to the bibliographic research, in the development of the theoretical framework and its contextualization, as well as in the preparation of the manuscript itself.

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### Conflicts of interests

None declared.

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