

## Congenital and maternal syphilis in the capital of Brazil

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### ABSTRACT

**Introduction:** This study aimed to describe the epidemiology of congenital and maternal syphilis in the Brazilian Federal District in 2010. **Methods:** A retrospective descriptive study was conducted on the basis of the cases recorded in the System of Notifiable Disease Information. **Results:** The study population comprised 133 cases of congenital syphilis; of these, 116 (52.6%) mothers received prenatal care, and 70 (60.4%) were diagnosed with syphilis during pregnancy. Only 1 mother was adequately treated, and 100 (75.2%) of the pregnant women's partners did not undergo treatment for syphilis. **Conclusions:** Although mothers attended prenatal care, not all were diagnosed during pregnancy or received adequate treatment for syphilis, as their partners did not undergo treatment for syphilis.

**Keywords:** Congenital syphilis. Vertical transmission. Prenatal care.

In developing nations, maternal syphilis and, consequently, congenital syphilis continue to be a public health problem, affecting approximately 10-15% of pregnant women<sup>(1)</sup>.

Congenital syphilis detection rates in Brazil, according to a series of studies conducted in 2008, 2009, and 2010, were 2.0, 2.1, and 2.4 cases/1,000 live births, respectively<sup>(2)</sup>.

In the Federal District (DF), which is one of the 27 units of the Federative Republic of Brazil, the number of cases and detection coefficients continued to increase between the years of 2007 (n=70; detection coefficient = 1.6/1,000) and 2009 (n=117; detection coefficient = 2.6/1,000), despite surveillance and disease control measures<sup>(3)</sup>.

The aim of this study was to describe the epidemiological characteristics of congenital and maternal syphilis cases diagnosed in the DF in 2010.

In this retrospective, observational study, data from 137 of children and their mothers with syphilis were collected from the System of Notifiable Disease Information of the Federal District (*Sistema de Informação de Agravos de Notificação/Distrito Federal - SINAN/DF*) and the Live Birth Information System (*Sistema de Informações de Nascidos Vivos - SINASC*) between October 2013 and March 2014. The study area is located in the Midwestern region of Brazil that has an area of 5.779,999km<sup>2</sup>, a demographic density of 444.07 individuals per

km<sup>2</sup>, and a population of 2,570,160<sup>(4)</sup> inhabitants. The Federal District has 15 Regional Health Units and 106 establishments of Public Health<sup>(5)</sup>.

Collected variables included the federated unit of residence, child's sex, clinical manifestations of syphilis in newborns (jaundice, anemia, splenomegaly, osteochondritis, mucusbloody rhinitis, hepatomegaly, skin lesions, and pseudoparalysis), age, race, and diagnostic features of mother and child; treatment information (adequate, inadequate) for the mother, child, and partner; mother's occupation and educational level; and prenatal care. The neonatal treatment was evaluated by comparing the regimen registered in the SINAN/DF to the recommended regimen for congenital syphilis from the Ministry of Health of Brazil (MoH). For this analysis, stillbirths, abortions, and deaths were excluded, representing 119 neonates. Age was calculated in days by subtracting the date of the neonate from the date of diagnosis. Stillbirths and deaths were also excluded for Nontreponemal tests analysis, totalizing 124 cases.

To calculate the congenital syphilis detection rate among infants under 1 year of age in the DF, the following formula was used<sup>(2)</sup>: number of children less than 1 year of age diagnosed with congenital syphilis while living in the DF and recorded in the SINAN/DF in 2010/number of live births registered in the SINASC in 2010 while living in the DF × 1,000. The coefficient of specific mortality from congenital syphilis was calculated using the following formula<sup>(2)</sup>: number of deaths and stillbirths due to congenital syphilis registered in the SINAN/DF in 2010/number of live births registered in the SINASC in 2010 while living in the DF × 1,000. The software package Epi Info™ 7.1.5 (<https://www.cdc.gov/epiinfo/html/downloads.htm>) was used for data processing and analysis, and data tables were constructed in Microsoft® Excel 2010 (Microsoft Corp, Redmond, WA, USA).

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A total of 137 children with congenital syphilis were reported in 2010; 4 of these patients had inconsistent records, and they were excluded, resulting in 133 children. The congenital syphilis detection rate among DF residents was 2.0/1,000 live births, and the coefficient of specific mortality from congenital syphilis was 0.1 deaths/1,000 live births.

Characteristics of the cases with congenital syphilis, including gender, skin color, age, state and area of residence, diagnostic test results are described in **Table 1**. Of the 133 cases, 84.9% (n=113) were reported as live births, 3.8% (n=5) as stillbirths, 3.8% (n=5) as deaths, 2.3% (n=3) as deaths specifically from congenital syphilis, and 3% (n=4) as abortions. The age (average  $\pm$  standard deviation) at diagnosis was  $1.72 \pm 12.9$  days (range, 0-148 days), and newborns aged <2 days had the highest incidence (87.3%, n=116). Of the patients, 9% (n=12) exhibited clinical symptoms (jaundice, 3%, n = 4; anemia, 3%, n = 1; and hepatomegaly, 3%, n=1). Nontreponemal tests were used to analyze peripheral blood samples from 106 (79.7%, n=124) children, with 63% (n=78) reacting positively. Treatment was administered to 119 children, and 79.1% (n=87) were treated according to the MoH recommendations.

Characteristics of the maternal syphilis cases, including sex, skin color, age, diagnosis, and treatment are shown in **Table 2**. Of the 133 mothers of children with congenital syphilis, the highest rates (per 1,000 live births) were observed in mothers who were blackskinned (11.3/1,000 live births) or  $\geq 40$  years old (4.0/1,000 live births). Most of the mothers had less than 9 years of education (28.6%, n=38), and the majority (54.9%, n=73) were homemakers. Prenatal consultations occurred in 87.2% (n=116) of the mothers, and 52.6% (n=70) received confirmed diagnoses in the prenatal period. Another 12.8% (n=17) did not undergo diagnostic tests, or the information was ignored even if they had undergone prenatal consultations. Treatment was inadequate for 88% of the mothers (n=117), and 75.2% (n=100) of their partners had not received treatment.

The coefficient of specific mortality from congenital syphilis, which was lower in the DF than in other states in Brazil<sup>(2)</sup>, might suggest underreporting.

Similar to other studies, child and maternal factors that are considered to increase the risk and vulnerability for congenital syphilis, such as black or brown skin color, low socioeconomic status, and maternal age between 20 and 30 years<sup>(6)</sup>, were observed in the present study<sup>(6) (7) (8)</sup>. Greater efforts should be undertaken to minimize inequalities for these vulnerable populations through strategies that enable greater access to health services.

Clinical manifestations in newborns are usually delayed, potentially occurring months or years later<sup>(9)</sup>. The high frequency of asymptomatic cases at birth in the present study supports the use of a surveillance system to identify more cases based on laboratory results. Furthermore, not all of the cases that were identified were treated in accordance with the MoH recommendations for the treatment of newborns with congenital syphilis<sup>(1)</sup>. The therapeutic regimens for newborns depend on the clinical, laboratory, and radiographic findings and range from a single application to up to 10 daily doses of penicillin<sup>(1) (8)</sup>.

**TABLE 1 - Characteristics of congenital syphilis cases (n = 133) in the Federal District, Brazil, 2010.**

Variable	Number	Percentage
Sex		
male	72	54.1
female	56	42.1
unavailable	5	3.8
Skin color		
brown	55	41.4
white	12	9.0
black	1	0.7
unavailable	65	48.9
Age at diagnosis (days)		
<2	116	87.3
2-3	11	8.3
4-5	2	1.5
6-10	1	0.7
>10	3	2.2
State of residence		
Federal District	88	66.2
Goiás	42	31.6
Minas Gerais	2	1.5
Maranhão	1	0.7
Area of residence		
urban	113	84.9
rural	9	6.8
peri-urban	9	6.8
unavailable	2	1.5
Blood nontreponemal test results		
<1:4	41	30.8
$\geq 1:4$	37	27.8
non-reactive	28	21.1
untested	20	15.0
not informed	7	5.3
CSF nontreponemal test results		
reactive	3	2.3
non-reactive	50	37.5
untested	53	40.0
not informed	27	20.2
CSF abnormalities		
yes	5	3.8
no	50	37.6
not evaluated	52	39.1
not informed	26	19.5
Long bone radiograph abnormalities		
yes	3	2.3
no	70	52.6
not evaluated	28	21.1
not informed	32	24.0
Treatment (n = 119)		
adequately treated	87	79.1
inadequately treated	21	11.7
other treatment regimen	14	11.8
untreated or unavailable	11	9.2

CSF: cerebrospinal fluid.

**TABLE 2 - Characteristics of maternal syphilis cases (n = 133) in the Federal District, Brazil, 2010.**

Variable	Rates per 1,000 live births	
	n	%
Skin color		
brown	88	3.7
white	17	1.6
black	4	11.3
not informed	24	2.5
Age (years; n = 128)		
<20	14	2.3
20–29	71	3.2
30–39	38	2.6
≥40	5	4.0
Education level (years)		
none	2	10.5
<9	38	28.6
9–11	24	18.1
12	22	16.5
≥13	2	1.5
unavailable	45	33.8
Occupation		
homemaker	73	54.9
other	29	21.8
unavailable	31	23.3
Prenatal care		
yes	116	87.2
no	15	11.2
not informed	2	1.5
Diagnosis at pregnancy		
yes	70	52.6
no	47	35.4
unavailable	16	12.0
Nontreponemal test results		
<1:4	53	39.8
≥1:4	72	54.1
non-reactive	2	1.5
untested	3	2.3
unavailable	3	2.3
Treponemal test results		
reactive	49	36.8
non-reactive	2	1.5
untested	62	46.6
unavailable	20	15.1
Treatment		
adequately treated	1	0.7
inadequately treated	117	88.0
unavailable	15	11.3
Treatment of partner		
yes	10	7.5
no	100	75.2
unavailable	23	17.3

The MoH recommends a minimum of six prenatal care consultations<sup>(10)</sup>. In the present study, prenatal assistance was provided to most of the mothers, at a similar frequency to other studies<sup>(6) (7)</sup>. However, this fact did not ensure early maternal diagnosis, ensure adequate treatment of the pregnant women and their partners, or prevent abortions, deaths, and stillbirths caused by congenital syphilis. The incidence of syphilis is considered an important indicator of the quality and accessibility of prenatal care<sup>(9) (10) (11)</sup>

Several studies have examined factors affecting the quality of prenatal assistance<sup>(9) (12) (13)</sup> like access of health care service. These factors should be monitored, with appropriate interventions to prevent congenital syphilis.

Early maternal diagnosis remains the most effective strategy to prevent congenital syphilis<sup>(14)</sup>, because transplacental transmission of *Treponema pallidum* can be prevented more effectively. Serological tests remain the method of choice for maternal diagnosis<sup>(2) (10)</sup>, and prenatal visits provide the perfect opportunity to conduct these tests. We observed a high proportion of positive nontreponemal tests during delivery, which suggests that the health care system in the DF is following the recommendation to perform rapid tests for maternal syphilis during labor. Nevertheless, it is necessary to improve the system for syphilis diagnosis during prenatal care for pregnant women and their sexual partners. Treatment that begins at the end of pregnancy doesn't allow enough time to cease treatment in the required time to prevent vertical transmission to the newborn, fetal death, and prematurity<sup>(15)</sup>.

In addition, the proportion of inadequately treated mothers was higher in the present study than in previous studies<sup>(6) (14)</sup>, and more than 90% of the partners in our study were inadequately treated, untreated, or the information was ignored. When partners are left untreated or are inadequately treated, the risk of vertical transmission increases as a consequence of the reexposure of pregnant women to the infectious agent<sup>(15)</sup>. In our country, the partner's visit to the Health Unit depends on the pregnant woman; therefore, it is necessary for the mother to be properly educated regarding the importance of treatment. As the mothers were also inadequately treated, it is assumed that the information provided and prenatal approach were insufficient to sensitize the mothers, which could hardly be expected to sensitize their partners. A more active approach is expected from health services in the education of partners because relying exclusively on one member of the couple can undermine prevention strategies.

Limitations of the study include its descriptive design and the lack of comparison groups; therefore, analysis of potential causal relationships between the risk factors and outcomes could not be conducted. It is also possible that cases are underreported to the surveillance system. Restricting the sample to the DF also limits the ability to generalize the results.

Efforts must be undertaken by public health authorities to improve the quality of prenatal care, including the allocation of sufficient human resources and investment in training and continuing education for the counseling of pregnant women and their partners. The infrastructure and service organizations should also be reassessed. Several sectors are responsible for

prenatal care, requiring joint discussion of strategies by these health and organized societies, or the aim to eliminate congenital syphilis will not be achieved.

### Ethical considerations

This study was approved by the Ethics Committee of the Research and Education Foundation in the Health Sciences, in accordance with the Declaration of Helsinki.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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