

# Epidemiological aspects of syphilis in pregnant women in northeastern Brazil

Aspectos epidemiológicos de sífilis em gestantes do nordeste brasileiro

Aspectos epidemiológicos de la sífilis en mujeres embarazadas en el noreste de Brasil

## RESUMO

**Objetivo:** Analisar o número de casos de sífilis em gestantes no Nordeste do Brasil. **Método:** Estudo ecológico com uso de dados obtidos através do Departamento de Informática do Sistema Único de Saúde, referentes aos casos de sífilis em gestantes durante o período de 2009 a 2019 no Nordeste brasileiro. **Resultados:** Ocorreram 305.383 mil casos de sífilis gestacional notificados no Brasil no período analisado. No que se refere à idade gestacional do diagnóstico dos casos de sífilis em gestantes, o presente estudo destacou que o maior índice de diagnóstico ocorreu no terceiro trimestre gestacional. Isso pode ser explicado pelo fato de grande parte desses podem estar sendo identificados de forma tardia. **Conclusão:** os achados podem significar maiores riscos ao binômio mãe-bebê, as regiões norte e nordeste são as que apresentam menor proporção de notificação no início da gestação, fato que as destacam com maior vulnerabilidade social.

**DESCRIPTORIOS:** Sífilis; Levantamento Epidemiológico; Infecções Sexualmente Transmissíveis.

## ABSTRACT

**Objective:** To analyze the number of syphilis cases in pregnant women in Northeast Brazil. **Method:** Ecological study using data obtained through the Department of Informatics of the Unified Health System, referring to cases of syphilis in pregnant women during the period from 2009 to 2019 in the Brazilian Northeast. **Results:** There were 305,383 thousand cases of gestational syphilis reported in Brazil in the analyzed period. Regarding the gestational age of diagnosis of syphilis cases in pregnant women, the present study highlighted that the highest diagnosis rate occurred in the third gestational trimester. This can be explained by the fact that most of these may be lately identified. **Conclusion:** the findings may mean greater risks to the mother-baby binomial, the north and northeast regions are the ones with the lowest proportion of notification at the beginning of pregnancy, a fact that highlights them with greater social vulnerability.

**DESCRIPTORS:** Syphilis; Health Surveys; Sexually Transmitted Diseases.

## RESUMEN

**Objetivo:** Analizar el número de casos de sífilis en mujeres embarazadas en el Nordeste de Brasil. **Método:** Estudio ecológico utilizando datos obtenidos a través del Departamento de Informática del Sistema Único de Salud, referentes a casos de sífilis en gestantes durante el período de 2009 a 2019 en el Nordeste brasileño. **Resultados:** Hubo 305.383 mil casos de sífilis gestacional notificados en Brasil en el período analizado. En cuanto a la edad gestacional de diagnóstico de casos de sífilis en gestantes, el presente estudio destacó que la mayor tasa de diagnóstico ocurrió en el tercer trimestre gestacional. Esto puede explicarse por el hecho de que la mayoría de estos pueden ser identificados recientemente. **Conclusión:** los hallazgos pueden significar mayores riesgos para el binomio madre-bebê, las regiones norte y noreste son las que presentan menor proporción de notificación al inicio del embarazo, hecho que las destaca con mayor vulnerabilidad social.

**DESCRIPTORIOS:** Sífilis; Encuesta epidemiológica; Infecciones de transmisión sexual

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**INTRODUCTION**

Syphilis is a systemic, chronic infection, exclusive to humans. Its etiological agent is *Treponema pallidum*, and its transmission occurs mainly through sexual contact, however, it can be transmitted vertically to the fetus during pregnancy, when the woman has untreated or inadequately treated syphilis. It is believed that the rate of vertical transmission of syphilis to the fetus is up to 80% in utero. 1

In this context, syphilis in pregnant women is one of the millennium goals proposed by the United Nations (UN) by the year 2030. 2 Given this scenario, Brazil, through public health policies, established that the screening of syphilis should be carried out by Primary Health Care (PHC),

determining the use of treponemal tests, such as the rapid test, mainly because it does not require a large work structure for its operation, in addition to a quick reading and interpretation of the results and low cost. And later non-treponemal tests like the Venereal Disease Research Laboratory (VDRL) 3, the same must be performed at least twice during pregnancy (first and third trimester). 4

In the world, there are about one million pregnant women with undiagnosed syphilis. It is estimated that about a third of these pregnancies will have serious complications, in which the rate of vertical transmis-

sion can be from 70 to 100% in untreated recent syphilis and 30% in late syphilis. When the pregnant woman is affected by this infection, it can lead to outcomes such as stillbirth, neonatal death, prematurity, low birth weight and congenital syphilis. 3

In 2016, the World Health Organization (WHO) launched a new strategy to combat sexually transmitted infections (STIs) from 2016 to 2021. The strategy prioritizes the elimination of congenital syphilis through the implementation of comprehensive syphilis screening and treatment in pregnant women as well as in specific populations, with the goal of a 90% reduction in the incidence of syphilis globally and 50 or fewer cases of congenital syphilis per 100,000 live births in 80% of countries by 2030. 5

General population prevalence data for syphilis are mostly limited to high-income countries. Especially among low and middle income countries (LMICs), currently available data likely underestimate the true burden of syphilis due to poor documentation and underreporting. Most country-representative data come from studies conducted with women at their first antenatal visit and reported by the WHO. 6

A review of STIs among pregnant women reported that the prevalence of syphilis was 6.5% (95% confidence interval 4.70–8.30) in southern Africa, 4.6% (95% confidence interval, 3.7–5.4) in East Africa and 4.0% (95% confidence interval,

1.7–6.3) in West Africa. 7 Another review and meta-analysis conducted among pregnant women attending antenatal care facilities in sub-Saharan Africa reported that the prevalence of syphilis was 4.5% (95% confidence interval, 3.9–5.1) at Eastern and Southern Africa and 3.5% (95% confidence range, 1.8–5.2) in West and Central Africa. A review of STIs among pregnant women reported that the prevalence of syphilis was 2.6% (95% confidence interval, 1.2–3.9) in Latin America. 8

Research carried out with pregnant women in the West Zone of Rio de Janeiro reveals another worrying fact, which is the low level of schooling among them, which makes it very difficult to understand the pathology, and in most cases, pregnant women even undergo treatment, but their partners do not, due to some factors such as: failure to communicate with the partner who is affected by the disease and for fear of using the medication. 9

According to the Epidemiological Bulletin of Syphilis, carried out by the Ministry of Health from 2005 to June 2019, 324,321 cases of syphilis were reported in pregnant women throughout the national territory. 1 In this context, the exacerbated number of cases of syphilis in pregnant women throughout Brazil and the great consequences that are linked to this disease justify the performance of this study. This study promotes a targeted population diagnosis and guide health services, and the ministry of

health, the best approach to this problem.

Given the above, given the magnitude of the disease as an important public health problem and its high incidence in the country and Northeast Brazil, it is essential to know its epidemiological characteristics. This study aimed to analyze the number of syphilis cases in pregnant women in Northeast Brazil.

## METHOD

This is an ecological, retrospective study, using secondary data, obtained through the portal of the Information Technology Department of the Brazilian Unified Health System (DATASUS), in which it has the compulsory notification data integrated to the Information System of Diseases and Notification (SINAN). The period of time analyzed was between the years 2009 to 2019, in which the collection and analysis of data took place from March to June 2021.

The study scenario corresponds to the Brazilian Northeast, which has a population estimate of 46,995,094, and, with an annual population growth rate of 1.1%, distributed in its nine Federative Units, with a population estimate of: Alagoas (AL - 3,322,820 people), Bahia (BA - 9,075,649), Ceará (CE - 7,035,055), Maranhão (MA - 3,996,496), Paraíba (PB - 9,496,294), Pernambuco (PE - 3,264,531), Piauí (PI - 3,479,010), Rio Grande do Norte (RN - 2,278,308), Sergipe (SE - 2,278,308). Each state has a specific and distinct population quantity, as well as a wide territorial extension. The territorial extension in Km<sup>2</sup> of each state is: 27,843,295 in AL, 564,722,611 in BA, 148,894,757 in CE, 329,642,170 in MA, 56,467,239 in PB, 98,068,021 in PE, 251,616,823 in PI, 52,809,602 in RN and 21,926,908 in SE. 10-18

Data were collected from SINAN, which corresponds to the Ministry of Health (MS) system, which contains information regarding diseases and health problems from the national list of notifiable diseases. The analysis of SINAN data allows for the identification, diagnosis and explanation of

a particular disease within a population, as well as the risks to which this studied population is exposed, finally providing a real analysis of the epidemiological situation in the region. All data analyzed and available at SINAN are in the public domain and allowed to any citizen who wants to know them, as long as they do not infringe on health bioethics, which are fed through the Compulsory Notification Forms of Gestational Syphilis in the Brazilian Northeast. That said, the data collected was used in its totality of cases made available by the system.

The data collected correspond to the number of reported cases of the disease being approached according to the following variables: year, region of the country, federation unit of the area being approached, age group, race, education, gestational age at the time of diagnosis, classification and clinical evolution. Thus, the records of women reported with gestational syphilis were included in the study. The notifications eligible for the study corresponded to the cases registered in the period from 2009 to 2019. Regarding the exclusion criteria, the records of pregnant women reported with syphilis from previous years were excluded, as were cases of duplicate or inconclusive notification.

The analysis observed the percentiles from the data tabulation in Microsoft Office 2013 Excel software to enable their insertion in the Statistical Package for the Social Sciences (SPSS) version 20.0 software. The percentiles related to the five major regions of the country were compared using absolute frequency. The option to address the Northeast region was due to the fact that it presented a small number of scientific productions related to syphilis in pregnant women. In this way, the number of cases reported per year was compared and the percentage rates of average growth were calculated year by year, using the following formula. 18

$$\frac{vf - vi}{vi} * 100$$

*We have the following representations:*

*vf - final value and vi - initial value.*

Data were presented in graphs, tables and expressed in absolute and relative frequencies. For a more specific analysis, the rates of gestational and congenital syphilis in the Brazilian Northeast were calculated from the data available in the DATASUS/SINAN database.

This research complied with the CEP/ CONEP Resolutions 510/2016 that regulate research involving human beings and, as it is a study that used secondary data, the analysis of the Ethics and Research Committee (CEP) was waived, 19 since no individual was identified and directly involved in this research, since all the necessary data are publicly available, in systems fed and made available by the MS, together with state and municipal governments.

## RESULTS

According to the data collected, there were 305,383 thousand cases reported in Brazil for the years 2009 to 2019, related to syphilis in pregnant women. These cases are distributed in the five major regions of the country: Southeast (46.21%), Northeast (20.51%), South (14.93%), North (9.95%) and Central-West (8.38%). The cases referring to the Northeast region are divided: Bahia (28.58%); Pernambuco (17.19%), Ceará (15.31%), Maranhão (11.53%), Paraíba (6.15%), Alagoas (5.98%), Sergipe (5.59%), Rio Grande do Norte (4.95%) and Piauí (4.59%). It is noteworthy that the states of Bahia, Pernambuco and Ceará have the highest percentage of syphilis cases in pregnant women.

Considering the aforementioned study period and other variables, the data could also be divided by year, resulting in a chronological analysis of the number of cases (graph 1).

As shown in Graph 1, it can be seen that an average percentage growth of at least 9% year on year, except for the decrease presented with a 61.48% reduction in the number of cases reported in 2019 compared to the previous year. However, it can be seen that the number of reported cases for this con-

dition increased from 2009 to 2018. And descending in relation to the years 2018 to 2019, with a reduction of 61.48% of the cases reported for this condition.

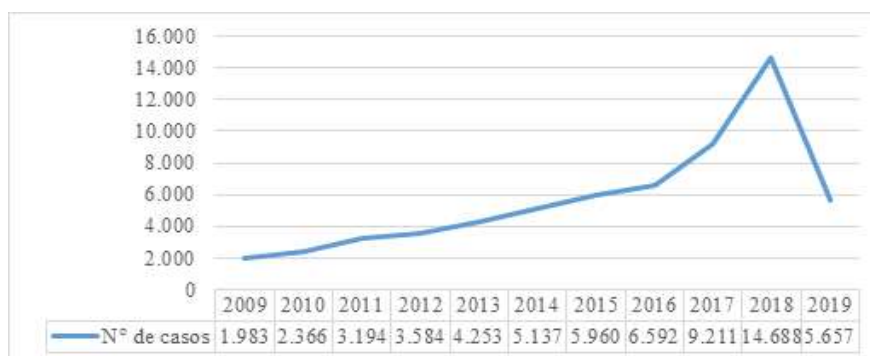
According to the data presented in Graph 2, most cases of syphilis in pregnant women are concentrated in the age group between 20 and 29 years old, with a percentage of 51.58%. It is observed that the state of Bahia has the highest percentage of the number of cases in this range, with 27.66%. On the other hand, the states of Alagoas, Paraíba, Piauí, Rio Grande do Norte and Sergipe together concentrate 26.96% of cases, which demonstrates the prominence of the state of Bahia in relation to the other states.

Among the other age groups, the highest percentage was observed among pregnant women aged between 14 and 19, with 24.88%, representing together with the age group from 20 to 29 years, more than 3/4 of the number of syphilis cases in pregnant women reported in Brazil in the years 2009 to 2019, with a total of 76.46%.

Regarding education in Bahia (32.1%) of the pregnant women had incomplete higher education, in Maranhão (19.7%) they had completed high school, in Ceará (19.4%) and in Paraíba (7.7%) complete primary education, in Pernambuco (17.2%) incomplete primary education, in Alagoas (14.8%) they were illiterate, in Piauí (9.8%) and in Rio Grande do Norte (5.7%) they had complete higher education and in Sergipe (9.3%), had incomplete primary education.

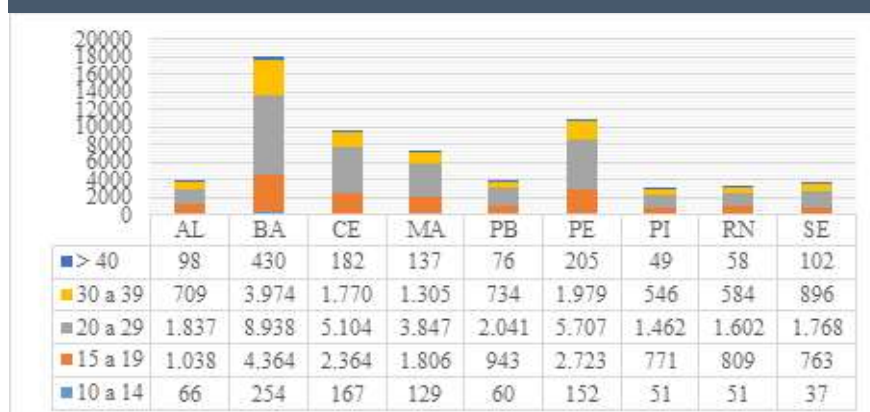
As for education, when excluding cases that did not respond to this point, with a percentage of (28.15%), the highest number of cases is comprised in the school range between the 5th and 8th incomplete grades, with a rate of 22.23%, with emphasis on the states of Bahia (5.89%), Pernambuco (3.81%) and Ceará (3.51%). It is worth mentioning that, the cases that make up the option of Complete High School, configured the second range with the highest number of cases, with a percentage of 13.79% of the total number of cases respectively, with emphasis on the states of Bahia (3.52%) and Maranhão with 2.71%. Regarding the

Graph 1. Number of reported cases of syphilis in pregnant women in the Northeast region, 2009-2019. N=62,625.



SOURCE: Research data.

Graph 2. Distribution of the occurrence of reported cases of syphilis in pregnant women in the Federative Units of the Northeast and according to age group, 2009-2019. N = 62,625.



SOURCE: Research data.

Table 1. Distribution of reported cases of syphilis in pregnant women in the Northeast from 2009 to 2019 in terms of gestational age at diagnosis. N= 62.625

Idade gestacional de diagnóstico	N	%
<b>1º trimestre</b>	<b>14287</b>	<b>100</b>
Alagoas	804	5,6
Bahia	3820	26,7
Ceará	2784	19,5
Maranhão	1580	11,1
Paraíba	755	5,3
Pernambuco	2320	16,2
Piauí	630	4,4
Rio Grande do Norte	757	5,3
Sergipe	837	5,9

# artigo

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range with the lowest number of cases, the Superior Complete with a percentage of 0.63% stands out, with the state of Paraíba with the lowest evaluated percentage of 0.03%, followed by the states of Rio Grande do Norte and Alagoas with 0.04% each.

Regarding race/color, brown is the most predominant (66.79%), which is equivalent to almost 3/4 of the total number of cases. Regarding the item in question, the state of Bahia has the highest percentage of reported cases of syphilis in pregnant women (17.18%), which is the state with the highest incidence of cases, followed by the states of Ceará and Pernambuco, with (11.56%) and (10.81%), respectively. Among the other options, the indigenous race prevails with the lowest number of cases, with a percentage rate of (0.43%), with the states of Piauí, Rio Grande do Norte and Sergipe having the lowest percentage, this one being (0,01%).

According to Table 1, the highest rate of syphilis diagnosis in pregnant women occurred in the 3rd gestational trimester, with a percentage equal to (37.83%), at the age that comprises the second request for laboratory tests for prenatal care. Regarding the states with the highest number of cases in this range, the state of Bahia has the highest percentage (9.85%), followed by the states of Pernambuco (7.01%) and Ceará (5.19%). It is noteworthy that the percentage difference between the diagnosis occurred in the 3rd quarter and the 2nd quarter is only (5.27%), since the 2nd quarter appears with 32.52% of the number of cases.

## DISCUSSION

In the analysis of the data, it was evidenced that the Northeast Region is the second region with the most cases of syphilis in pregnant women in Brazil from 2009 to 2019, in which the state of Bahia had the highest number of cases in the same period. Thus, the syphilis Epidemiological Bulletin released in 2019 shows that from 2017 to 2018, the number of notifications increased in all regions, with emphasis on the 59.6% increase in the Northeast Region. 1

2º trimestre	20394	100
Alagoas	1366	6,7
Bahia	5867	28,8
Ceará	3095	15,2
Maranhão	2431	11,9
Paraíba	1012	5
Pernambuco	3444	16,9
Piauí	1010	4,9
Rio Grande do Norte	869	4,3
Sergipe	1300	6,3
3º trimestre	23694	100
Alagoas	1437	6,1
Bahia	6171	26
Ceará	3252	13,7
Maranhão	2795	11,8
Paraíba	1796	7,6
Pernambuco	4393	18,5
Piauí	1152	4,9
Rio Grande do Norte	1375	5,8
Sergipe	1323	5,6
Idade gestacional ignorada	4267	100
Alagoas	141	3,3
Bahia	2045	47,9
Ceará	460	10,8
Maranhão	419	9,8
Paraíba	291	6,8
Pernambuco	612	14,3
Piauí	88	2,1
Rio Grande do Norte	103	2,4
Sergipe	108	2,5
Ignorado	0	100
Alagoas	0	0
Bahia	0	0
Ceará	0	0
Maranhão	0	0
Paraíba	0	0
Pernambuco	0	0
Piauí	0	0
Rio Grande do Norte	0	0
Sergipe	0	0

Fonte: Dados da Pesquisa

In addition, this increase can be attributed, in part, to the change in the criteria for defining cases, which started to consider notification during prenatal care, childbirth and puerperium as of October 2017. In the Northeast Region, there is an average percentage growth of at least 9% year on year of syphilis in pregnant women, except for the decrease in 2019 compared to 2018.

A worldwide survey carried out in 2018, in which 136 million laboratory tests for syphilis from 154 countries were used, estimated the global prevalence of the disease at 1.11%, it was found that, despite a significant reduction in the global prevalence of the disease over the last three decades, large differences in prevalence between regions still persist, with the African Region being the most affected by the infection. 20

The decrease in syphilis cases is notable, but it is not known whether these declines reflect decreases in incidence and/or shorter durations of active infection. Incidence may have declined due to expansion of primary prevention interventions, declines in risky sexual behavior in response to the threat of HIV infection, increased HIV-associated mortality, and shorter duration of active infection in sexual partners. Thus, factors that may have contributed to a shorter duration of active infection include progressive improvements in the coverage of syphilis screening and treatment especially in prenatal care and the spread of antibiotics. 21

In the present study, the sociodemographic profile of pregnant women with syphilis was of women aged between 20 and 29 years, with unknown education, followed by incomplete primary education and mixed race/color. A study that used SINAN data from compulsory notifications of cases of gestational and congenital syphilis of residents of the municipality of São José do Rio Preto/SP from 2007 to 2016, reported 396 cases of syphilis in pregnant women, with an evident increase in the number of notifications and, consequently, an increase in the detection rate of the disease.

It is noteworthy that the infection by the disease occurred more in women between the ages of 20 and 29 years (55%),

with incomplete primary education (27%) and housewives (46%), which corroborated the results mentioned above in the aforementioned study, only in contrast to

**However, the 2019 Syphilis Epidemiological Bulletin analyzed the gestational age of detection of syphilis in pregnant women nationwide and observed that in 2018, the highest proportion of women (39.0%) were diagnosed in the first trimester, whereas ( 25.2%) represented diagnoses made in the second trimester and (29.6%) in the third trimester**

race/color, with white/Caucasian being highlighted (57%). 22

Another research that corroborates the

findings on the education of pregnant women was the study conducted by Cabral et al. (2017) 23 carried out in Santa Cruz/RN. This research stated that 31.7% of the participants in the sample had incomplete elementary education and 87.8% had low schooling, low schooling is a factor that directly interferes with syphilis contamination in pregnant women and consequently in their fetus.

Regarding the gestational age of diagnosis of syphilis cases, the present study highlighted that the highest rate occurred in the third gestational trimester. This fact is justified by the study by Costa et al. (2017), 24 which states that even with the increase in the number of diagnosed cases of gestational syphilis, a large part is identified late. In this way, these data can generate maternal consequences, as well as reflect on the large number of cases of congenital syphilis that affect newborns.

However, the 2019 Syphilis Epidemiological Bulletin analyzed the gestational age of detection of syphilis in pregnant women nationwide and observed that in 2018, the highest proportion of women (39.0%) were diagnosed in the first trimester, whereas ( 25.2%) represented diagnoses made in the second trimester and (29.6%) in the third trimester. When observing the diagnosis of syphilis in pregnant women by region, in the same year, it is noted that the diagnosis in the first trimester occurs with greater proportions in the South (50.2%) and Southeast (44.7%) regions and with a lower proportion in the Northeast (25.9%) and North (28.3%). 1

Gestational and congenital syphilis is a public health problem, it deserves to be highlighted in public policies in order to reduce the number of cases and the impact that it can have on the health of the mother and child. This problem may be related to low quality prenatal care, contrary to the principles and objectives of the Rede Cegonha Program, which seeks to guarantee quality care for pregnant women and ensure women's right to reproductive planning and humanized care for pregnancy, childbirth and puerperium; and to the child, the right to be born safely, to have healthy

growth and development. 25,26

In Brazil, as in many countries around the world, the rate of re-emergence of syphilis is relevant. In addition, most people with syphilis are asymptomatic and when they present signs and symptoms, they may not be noticed, and they can transmit the disease to their sexual partners. 27

## CONCLUSION

The Northeast has the second highest number of notifications of syphilis in the gestational period in the country, although

world data show a decline, it cannot be said whether there was a decrease in the incidence of contamination or the primary phase of infection is shorter, it is necessary to pay particular attention to regions with greater social vulnerability, where health resources are scarcer. The sociodemographic profile of gestational syphilis points to a greater number in women aged between 20 and 29 years, with unknown education, followed by incomplete primary education and mixed race/color, this fact reaffirms the importance of paying attention to populations that are more socially vulnerable.

It is noteworthy that despite the increase in recent years in the diagnosis of gestational syphilis in the first trimester, there are still a greater number of notifications in the third trimester of pregnancy, which may mean a greater number of risks to the mother-baby binomial, the north and northeast regions are specifically the ones with the lowest proportion of notifications at the beginning of pregnancy, a fact that highlights even more that the regions with greater social vulnerability may need greater dispensing of health resources in this aspect. ■

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