

## Clinical and epidemiological aspects of gestational syphilis in northern Brazil



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### ABSTRACT

Syphilis is an infectious disease exclusive to humans, caused by a bacterial etiological agent of the species *Treponema pallidum*. Its main route of transmission is sexual and due to its pathophysiology, it presents several clinical manifestations. Among its classifications, there is congenital syphilis, a problem of interest to public health, due to its ability to trigger serious complications for the fetus and newborn. Thus, the measurement and monitoring of congenital syphilis are of interest for epidemiological surveillance, with notification being compulsory, as notification forms provide information that allows analyzing the

effectiveness of prevention, detection and treatment strategies for the disease. These data can be used to guide public health policies, improve prenatal care, and develop more effective prevention measures to reduce rates of congenital syphilis. This epidemiological analysis of the disease evaluated the social and demographic profile of users of the Unified Health System (SUS), affected by gestational syphilis in the Brazilian population in the North region, based on data from the Notifiable Diseases Information System (SINAN), in a period of four years, between 2018 and 2021. To collect the data, the information available in the TABNET software, from the Department of Informatics of the Unified Health System (DATASUS), was used. To conduct this study, data regarding age group, race, education and performance of treponemal and non-treponemal tests were analyzed. After analyzing the data, it was observed that the 3 main reporters of the problem are Pará, Amazonas and Acre, respectively. The profile of the most affected pregnant women is mixed race, with low education, between 20-39 years old. Given the theoretical support and research results, the study concluded that it is important to highlight the importance of gestational syphilis and its impact on public health due to the risk it represents for pregnant women and their babies. It was also noted, according to the theoretical support consulted, the need to understand the epidemiological profile in each region, as it is essential to create or improve prevention and control strategies according to regional needs.

**Keywords:** Public health, Gestational Syphilis, *Treponema pallidum*.

### 1 INTRODUCTION

Syphilis is an infectious bacterial disease caused by *Treponema pallidum*, which can be transmitted during sexual intercourse without the use of a condom or through contact with mucocutaneous lesions. In addition, it can be transmitted vertically during pregnancy or childbirth, and is then called Congenital Syphilis (CS). Other forms of transmission include indirect methods, such as contaminated objects and transfusions with infected blood (TAVARES, 2022).



Gestational Syphilis (GS) is a re-emerging disease of worldwide distribution and a challenge for public health globally, due to the significant increase in the number of cases that has occurred in the last decade. The World Health Organization (WHO) attributes this growth to three main factors: the increase in syphilis screening related to the quality of prenatal care, finding more positivity; unavailability of penicillin; and the fact that almost half of the Primary Care Units do not treat patients with syphilis, referring them to secondary care, with death or abandonment of treatment by the patients in the process (RIBEIRO, 2023).

The main cause of gestational syphilis is the failure to diagnose or treat the maternal infection, which can result from the lack of prenatal care and the disqualification of the service and, thus, without the diagnosis of syphilis during pregnancy, the baby is susceptible to the disease. Gestational congenital syphilis can carry serious risks for the mother and child, such as miscarriage, death of the fetus and newborn, premature birth, health problems, both social and psychological, to the newborn (VIANA, 2019).

For this reason, it is of paramount importance to correctly diagnose and follow up in order to understand the procedures that should be taken appropriately for treatment. In turn, the diagnosis is made through immunological tests for syphilis, composed of treponemal and non-treponemal tests (FERREIRA, 2023).

Among the treponemal tests available are the fluorescent antitreponemal antibody binding test (FTAABS), ELISA, and rapid tests that identify IgM and IgG antibodies against *Treponema pallidum*. These tests are more accurate and useful for diagnosis than non-treponemal tests, but they are not used for therapeutic response control or relapse diagnosis because they are difficult to reverse when positive (RIBEIRO, 2023).

Therefore, considering gestational syphilis as a public health condition that results in considerable costs for the government health system, understanding the characteristics of the population affected by this disease gains significant importance. This is due to the fact that such knowledge can contribute to the enrichment of the field of study and provide crucial *insights* for the development of innovative strategies for the prevention and control of the disease. Therefore, this research presents the following problem: what are the social and demographic characteristics of the public affected by gestational syphilis in the North region, according to information from the Notifiable Diseases Information System (SINAN), in the period from 2018 to 2021?

In view of the projection of an increase in the identification rates of gestational syphilis in the Brazilian territory, with greater emphasis on the North region, and as a direct result, the increase in GS rates, the focus of this study is on the elaboration of a comprehensive description of the epidemiological profile of gestational syphilis in the North region of Brazil, involving the time interval between the



years 2018 and 2021. Data were extracted from the TABNET software of the Department of Informatics of the Unified Health System (DATASUS).

The study aimed to analyze the number of reported cases of gestational syphilis in the northern region of Brazil, with data from 2018 to 2021 in the Unified Health System (DATASUS), in order to achieve a more integrated and detailed understanding of the situation of gestational syphilis in the region, identify risk groups by age group, race, schooling and performance of treponemal and non-treponemal tests. Thus, to know the main forms of diagnosis for gestational syphilis and indicate the need for prevention strategies.

## 2 MATERIAL AND METHODS

The study consists of a retrospective, descriptive research with a quantitative approach, using secondary information from syphilis notifications in pregnant women between 2018 and 2021. The survey encompassed all the states of the Northern region of Brazil, namely: Acre, Amapá, Amazonas, Pará, Roraima, Rondônia and Tocantins.

The sample of this study was composed of documented records of syphilis cases in pregnant women in the Northern region of Brazil, during the time interval between 2018 and 2021. The source of the data derived from the Notifiable Diseases Information System (SINAN), which is accessible online and free of charge, is made available by DATASUS.

This research takes a quantitative approach, focusing on measurable analysis of specifications to turn opinions and information into numerical data. The quantitative methodology is highlighted by the use of quantification both in the collection of information and in its treatment, using statistical techniques. In addition, the main objective is to measure information and enable the evaluation of hypotheses, since the results obtained are concrete and less susceptible to misinterpretations. Searches conducted on databases provide up-to-date and reliable information according to the user's need, thus meeting the demand for specific information effectively.

The population proven in this study consists of all reported cases of syphilis in pregnant women in the Northern region of Brazil, covering the period from 2018 to 2021, totaling 26,038 cases. The data used were obtained from SINAN and are publicly available in an accessible and free way on the DATASUS website.

The data were extracted in August 2023 and, subsequently, they were compiled and analyzed in Microsoft Excel®, descriptive statistical analysis (absolute and relative frequency) was performed by the software. The variables analyzed refer to the epidemiological profile of the disease, to analyze the sociodemographic characteristics of pregnant women affected by syphilis, variables were used that included age group, educational level, ethnicity, as well as the performance of treponemal (TST) and non-treponemal (TNT) tests, used to identify and diagnose the pathology. The purpose of the research



is to trace the epidemiological and demographic profile of pregnant women with syphilis in the northern region of Brazil.

Considering the resolution of the National Health Council n°. 466/2012, this study was not submitted to the Research Ethics Committee, as it uses secondary data available online and free of charge.

### 3 RESULTS AND DISCUSSION

In view of the data collection, there was an analysis of the information of interest present in the notifications of syphilis over the years. From 2018 to 2021, 26,038 cases of syphilis were reported in pregnant women in the northern region of Brazil. Regarding the total number of annual notifications, there was an increase in the number of cases year after year, among which 5,739 were reported in 2018, 6,138 notifications in 2019, 6,150 notifications were entered in 2020 and 8,011 confirmed cases in 2021, as shown in table 1 (BRASIL, 2022).

Table 1 - Number of cases and percentage of detection (per 1,000 live births) of pregnant women with syphilis by year of diagnosis and the Federative Unit (UF). Brazil, 20018-2021.

FU/Region of residence	2018		2019		2020		2021		Total
	n	%	n	%	n	%	n	%	n
Rondônia	345	12,3	414	15,3	454	17,6	692	26,8	1.905
Acre	626	37,8	557	34,2	499	33,0	702	46,4	2.384
Amazonas	1.595	20,4	1.694	21,8	1.723	22,8	2.081	27,5	7.093
Roraima	196	14,7	282	19,3	353	25,7	386	28,1	1.217
Pará	2.084	14,7	2279	16,5	2.210	16,6	2.998	22,6	9.571
Amapá	270	17,0	340	22,1	300	20,5	576	39,4	1.486
Tocantins	623	24,5	572	23,4	611	25,7	576	24,3	2.382
<b>Total</b>	<b>5.739</b>		<b>6.138</b>		<b>6.150</b>		<b>8.011</b>		<b>26.038</b>

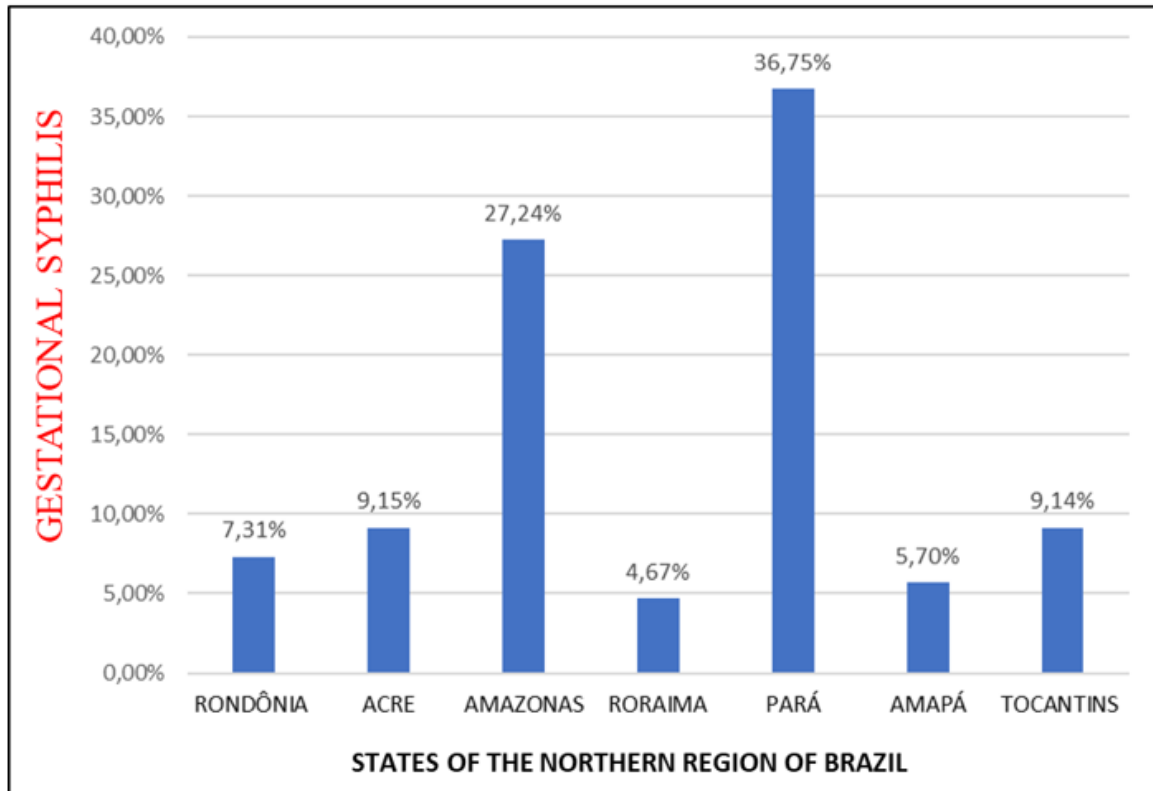
Source: Ministry of Health/ Syphilis Epidemiological Bulletin (2022).

Continuing the analysis of the data shown in Table 1, it is observed that, among the notifying states, Pará, Amazonas and Acre had a greater relevance in terms of number of cases, when compared to the other states in the north. Among the states, Pará stood out with the highest number of notifications over the 4 years, reaching a number of 9,571 (36.75%) confirmed cases.

The others, Amazonas in second place with 7,093 (27.24%), Acre in third with 2,384 (9.15%), Tocantins in fourth with 2,382 (9.14%), followed by Rondônia, Amapá and Roraima with 1,905 (6%), 1,486 (5%), 1,217 (4.67%), respectively, as shown in graph 1 and previously in table 1.



Graph 1 - Number of cases (per 1,000 live births) of gestational syphilis in the seven states of northern Brazil, expressed as percentages.



Source: Ministry of Health/ Syphilis Epidemiological Bulletin (2022).

According to Santos (2022), the growing number of cases of pregnant women with syphilis in the state of Pará can be influenced by a combination of factors that may include, lack of health education and, consequently, the lack of awareness about this infectious, sexually transmitted disease, being preventable with safe sexual practices, through the use of condoms, medical appointments and laboratory screening for regular check-up.

According to Lima (2022), the lack of comprehensive sex education and awareness of the importance of prevention may contribute to the increase in cases. Also according to the author, the state of Pará has several remote and difficult to access areas, which can make it difficult for patients to travel to health centers and hospitals to receive the appropriate diagnosis and treatment.

The same is confirmed by Araújo (2019), according to the research, the higher number of cases reported in Pará can be understood by the profile of pregnant women diagnosed with syphilis. The author identified that most of the women had a low level of education, did not have their own income, were married and had a history of previous births, and adherence to prenatal care decreased during pregnancy.

According to the theoretical contributions, the rejection of the use of condoms during sexual intercourse in any of the genders is still common, as described by Nascimento et al (2017) and Spindola et al (2021), among the justifications, the main one was "knowing the partner". The authors also state



that even people with a higher level of education have insufficient information about infections transmitted through sexual contact.

Another factor that may be associated with the recent notification of cases is the prenatal care provided to pregnant women monitored by the Family Health Strategy and effectiveness in identifying the disease through the means of prevention developed by the Pará State Secretariat (SESPA, 2021).

According to Ribeiro (2022), to reduce the prevalence rates of gestational syphilis, health agencies recommend at least two serological tests in the gestational period, at the beginning of prenatal care, second and third trimesters of pregnancy. Sexual partners must also be tested, and testing is mandatory. These actions occur in view of the fact that the prevalence of the disease is high among pregnant women, and this diagnostic procedure, as well as the treatment and re-education of pregnant women in this matter, are essential tools for early diagnosis and consequent reduction of this prevalence.

Several studies confirm the importance of adequate screening for syphilis throughout the prenatal period, and health education on this topic contributes to the reduction of cases of the disease, as well as reducing sequelae in the baby. Gestational syphilis has a negative impact on the mother-child binomial, during pregnancy, the effects of the disease cause miscarriages, death of the fetus and the newborn, until the occurrence of serious consequences for the child, such as blindness, deafness, and mental problems (BORGES, 2023).

Despite having a lower number of reported cases, according to the results obtained by De Melo (2021) and Lins (2014), Roraima has an epidemiological profile similar to that found in the other northern states and in this study.

When analyzed by age group, 21,191 cases of syphilis were reported in pregnant women aged 10 to 59 years, in the period from 2018 to 2021, as can be seen in table 2.

Table 2 - Cases of pregnant women with syphilis according to age group, by year of diagnosis in the seven states of the northern region in the period 2018-2021.

<b>Year of Diagnosis/Rondônia</b>	<b>10 a 14</b>	<b>15 a 19</b>	<b>20 a 39</b>	<b>40 a 59</b>
2018	5	95	238	4
2019	6	135	269	5
2020	7	124	309	11
2021	3	66	138	1
<b>Total</b>	<b>21</b>	<b>420</b>	<b>954</b>	<b>21</b>
<b>Year of Diagnosis/Acre</b>				
	<b>10 a 14</b>	<b>15 a 19</b>	<b>20 a 39</b>	<b>40 a 59</b>
2018	8	192	417	10
2019	10	182	355	10
2020	13	160	311	11
2021	5	88	153	3
<b>Total</b>	<b>36</b>	<b>622</b>	<b>1.236</b>	<b>34</b>
<b>Year of Diagnosis/Amazonas</b>				
	<b>10 a 14</b>	<b>15 a 19</b>	<b>20 a 39</b>	<b>40 a 59</b>
2018	24	438	1.094	38
2019	20	476	1.154	36



2020	23	485	1.175	37
2021	15	245	636	24
<b>Total</b>	<b>82</b>	<b>1.644</b>	<b>4.059</b>	<b>135</b>
<b>Year of Diagnosis/Roraima</b>	<b>10 a 14</b>	<b>15 a 19</b>	<b>20 a 39</b>	<b>40 a 59</b>
2018	2	54	137	2
2019	-	90	190	2
2020	5	65	269	7
2021	-	31	96	1
<b>Total</b>	<b>7</b>	<b>240</b>	<b>692</b>	<b>12</b>
<b>Year of Diagnosis/Pará</b>	<b>10 a 14</b>	<b>15 a 19</b>	<b>20 a 39</b>	<b>40 a 59</b>
2018	32	612	1.415	24
2019	29	630	1.589	31
2020	26	604	1.521	43
2021	21	346	871	17
<b>Total</b>	<b>108</b>	<b>2.192</b>	<b>5.396</b>	<b>115</b>
<b>Year of Diagnosis/Amapá</b>	<b>10 a 14</b>	<b>15 a 19</b>	<b>20 a 39</b>	<b>40 a 59</b>
2018	5	76	185	4
2019	1	113	216	10
2020	4	88	191	6
2021	6	52	144	3
<b>Total</b>	<b>16</b>	<b>329</b>	<b>736</b>	<b>23</b>
<b>Year of Diagnosis/Tocantins</b>	<b>10 a 14</b>	<b>15 a 19</b>	<b>20 a 39</b>	<b>40 a 59</b>
2018	10	184	423	6
2019	8	146	406	11
2020	2	152	438	9
2021	2	77	184	3
<b>Total</b>	<b>22</b>	<b>559</b>	<b>1.451</b>	<b>29</b>

Source: Source: Ministry of Health/SVS - Sinan Net (2023).

In the analysis of table 2, according to the age group **between 10 and 14 years** in the period analyzed, 292 cases of GS were registered in the North region. The state with the highest number of cases was Pará, with 108 occurrences, followed by Amazonas with 82 cases, Acre with 36, Tocantins with 22, Rondônia with 21, Amapá with 16 notifications. The state with the lowest number of cases was Roraima, with 7 cases.

In the period explored, 6,006 cases of GS were registered in the region, the state with the highest number of cases was Pará, with 2,192 cases, consequent by Amazonas, with 1644 cases, Acre with 622, Tocantins with 559, Rondônia with 420, Amapá with 329. The state with the lowest number of cases was Roraima, with 240 cases.

In the age range of **20 to 39 years**, 14,524 cases of GS were recorded. The state with the highest number of cases was Pará, with 5,396 cases, followed by Amazonas, with 4,059 cases, Acre with 1236, Tocantins with 1451, Rondônia with 954, Amapá with 736. The state with the lowest number of cases was Roraima, with 692 cases.

Regarding the age range of 40 to 59 years, in the period analyzed, 369 cases of GS were registered in women of this age in the northern region. The state with the highest number of cases was





Amazonas, with 135 cases, followed by Pará, with 115 cases, Acre with 34, Tocantins with 29, Amapá with 23, Rondônia with 21 and the lowest number of cases was Roraima, with 12 cases.

The data shown in Table 2 show a lower number of notifications of syphilis cases in the age group of 10 to 14 years and 40 to 59 years. According to Filho (2011), the low incidence of syphilis infection in pregnant women in these age groups can occur for several reasons. Among them, less sexual activity in this group may contribute, since syphilis is a sexually transmitted disease.

In addition, according to the author, this age group between 10 and 14 years affected by the disease suggests an early onset of sexual activity and indicates the possibility of difficulties in the implementation or execution of strategies related to the prevention of sexually transmitted infections and reproductive planning (FILHO, 2011).

Also according to table 2, there is a trend of increase in the rate among the age group between 15 and 19 and 20 to 39 years. According to Pedrosa (2022), a higher number of cases in this age group is the period of active sexual intercourse. For the 15-19 age group, the author considers it to be the result of the onset of sexual activity, being a critical period of transition in the life of an adolescent, marked by significant physical, emotional and social changes. During this time, teens may feel a strong curiosity about their own body and their partner's body, leading to sexual exploitation.

The period between 20 and 39 years was the most reported age group in cases of gestational syphilis and shows a higher prevalence of syphilis in pregnant women considered young, where the total number of cases of 14,524 were reported, with cases prevailing in Pará, Amazonas and Tocantins. According to Sousa (2022), this is due to the fact that it is the most intense sexual stage of women.

Also according to the author, Sousa (2022), the high incidence of gestational syphilis among women aged 15 to 39 years, despite the ease of diagnosis and efficacy of treatment, reveals deficiencies in providing accurate diagnosis. This points to significant failures in antenatal care delivery, where lack of adequate attention during pregnancy emerges as a critical problem.

Much of this deficit is related to inadequate communication of essential information by health professionals, highlighting the need to improve communication and access to health services to efficiently address gestational syphilis, as noted by Dalla Libera (2021).

According to SINAN, the age group between 40 and 59 was the second with the lowest incidence of confirmed cases. Because it is a phase in which the woman is in the period of menopause, she has a decrease in libido, hormonal drop and even pain during sexual intercourse.





Table 3 - Confirmed cases by schooling according to year of diagnosis in the seven states of the northern region, in the period 2018-2021.

<b>Year of Diagnosis/Rondônia</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	58	57	83	52	250
Illiterate	2	2	2	-	6
1st to 4th incomplete grade of EF	17	9	8	6	40
Complete EF 4th Series	16	9	12	5	42
5th to 8th grade incomplete EF	80	83	100	36	299
Complete elementary school	30	38	38	14	120
Incomplete high school	49	97	77	40	263
Completed high school	69	106	111	43	329
Incomplete higher education	14	8	12	5	39
Completed higher education	7	6	8	7	28
<b>Year of Diagnosis/Acre</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	58	61	55	41	215
Illiterate	4	4	9	7	24
1st to 4th incomplete grade of EF	34	39	26	9	108
Complete EF 4th Series	12	15	13	4	44
5th to 8th grade incomplete EF	118	96	107	41	362
Complete elementary school	60	54	40	24	178
Incomplete high school	139	102	96	52	389
Completed high school	166	148	129	60	503
Incomplete higher education	23	20	9	6	58
Completed higher education	13	18	11	5	47
<b>Year of Diagnosis/Amazonas</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	332	251	241	155	979
Illiterate	7	9	11	6	33
1st to 4th incomplete grade of EF	54	93	149	81	377
Complete EF 4th Series	42	87	66	24	219
5th to 8th grade incomplete EF	375	351	344	182	1.252
Complete elementary school	210	154	171	75	610
Incomplete high school	242	287	304	150	983
Completed high school	300	395	383	219	1.297
Incomplete higher education	18	34	29	9	90
Completed higher education	14	25	22	19	80
<b>Year of Diagnosis/Roraima</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	33	61	85	20	199
Illiterate	1	-	2	1	4
1st to 4th incomplete grade of EF	8	3	10	3	24
Complete EF 4th Series	3	9	12	4	28
5th to 8th grade incomplete EF	29	34	53	16	132
Complete elementary school	11	19	25	9	64
Incomplete high school	33	59	59	25	176
Completed high school	62	78	85	46	271
Incomplete higher education	10	10	10	-	30
Completed higher education	5	9	5	4	23
<b>Year of Diagnosis/Pará</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	384	504	508	316	1.712
Illiterate	12	19	6	8	45
1st to 4th incomplete grade of EF	149	130	101	45	425
Complete EF 4th Series	85	83	74	52	294
5th to 8th grade incomplete EF	464	513	498	241	1.716
Complete elementary school	187	213	205	113	718
Incomplete high school	347	326	267	188	1.128
Completed high school	401	416	463	261	1.541
Incomplete higher education	31	48	41	16	136



Completed higher education	23	27	31	15	96
<b>Year of Diagnosis/Amapá</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	63	87	85	42	277
Illiterate	3	1	1	2	7
1st to 4th incomplete grade of EF	11	19	8	6	44
Complete EF 4th Series	4	9	7	6	26
5th to 8th grade incomplete EF	56	71	45	41	213
Complete elementary school	23	36	30	11	100
Incomplete high school	48	47	50	41	186
Completed high school	51	54	53	45	203
Incomplete higher education	5	11	6	9	31
Completed higher education	6	5	5	2	18
<b>Year of Diagnosis/Tocantins</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	118	101	114	66	399
Illiterate	3	2	2	-	7
1st to 4th incomplete grade of EF	25	6	7	8	46
Complete EF 4th Series	14	6	17	2	39
5th to 8th grade incomplete EF	115	125	94	32	366
Complete elementary school	51	56	51	21	179
Incomplete high school	134	95	114	46	389
Completed high school	145	145	177	79	546
Incomplete higher education	10	18	12	6	46
Completed higher education	8	17	13	6	44

Source: Ministry of Health/SVS - Sinan Net (2023).

In Rondônia, the most impacted educational levels were complete high school and elementary school from 5th to 8th grade, while the illiteracy rate was less affected. In Acre, the levels of complete and incomplete secondary education were the most affected, in contrast to the lower number of illiterate people.

In Amazonas, the most significant number of cases was found in high school, followed by the 5th to 8th grades of elementary school, with a lower incidence of illiteracy cases. In Roraima, complete high school predominated, followed by the 5th to 8th incomplete grade of elementary school.

In Pará, the most expressed categories of schooling were complete high school and incomplete 5th to 8th grade of elementary school. In all states of the North region, the illiteracy rate was lower.

In Amapá, the levels of complete and incomplete secondary education, as well as the incidence of illiteracy, were the most pronounced. In Tocantins, the categories of complete and incomplete secondary education were the most evidenced, with a lower presence of illiterate people, in accordance with the other states in the North region (Table 3).

The data found in this study regarding schooling are present in table 3, confirmed cases were analyzed according to the level of education of the mothers, in the northern region of the country, between the years 2018 and 2021. According to the research, it shows that there was an incidence in pregnant women with complete high school education with a value of 4,690, following the 5th to 8th incomplete grade of elementary school, with a number of 4,340, the least affected education was illiterate with 126 cases and white people 4,031. Therefore, prevention strategies should be directed to



all groups, regardless of education level, to ensure a comprehensive and effective approach to reducing cases of gestational syphilis in the northern region of Brazil (Table 3).

According to Marques (2018), pregnant women with a lower level of education may have less access to quality information on sexual and reproductive health, including sexually transmitted diseases such as gestational syphilis, which does not corroborate the data obtained in the research, since the highest rates of notification of the disease were among women who had some level of education.

Among the cases with a higher level of education, there is more access to screening and adequate diagnosis, thus presenting a low number of cases, as can be seen in Table 3. In addition, the region of residence should also be considered, as rural populations have less availability of health services, especially maternal and child health follow-ups, which may be limited. This can result in a late diagnosis or even lack of it (MARQUES, 2018).

However, according to Marques (2018), it is evident that most reported syphilis cases occur in women living in urban areas, and this situation may contribute to a more timely diagnosis of syphilis during pregnancy. As highlighted by Paiva et al. (2020), it is important to highlight that geographic barriers in access to health services can result in an increase in syphilis case records, since they make it more difficult to actively seek to ensure continuity of care.

In addition, corroborating Marques (2018), Sousa (2022) states that it is possible to note that syphilis mainly impacts people who face greater social challenges, although it is essential to highlight that this condition is not limited exclusively to the most disadvantaged populations.

Table 4 - Confirmed cases by race, according to year of diagnosis, in the states of the northern region, in the period 2018-2021.

<b>Year of Diagnosis/Rondônia</b>	<b>IGN/White</b>	<b>White</b>	<b>Black</b>	<b>Yellow</b>	<b>Curtain</b>	<b>Indigenous</b>	<b>Total</b>
<b>2018</b>	6	54	25	5	248	4	<b>342</b>
<b>2019</b>	7	78	33	3	290	4	<b>415</b>
<b>2020</b>	13	92	38	4	301	3	<b>451</b>
<b>2021</b>	4	46	20	1	137	-	<b>208</b>
<b>Year of Diagnosis/Acre</b>	<b>IGN/White</b>	<b>White</b>	<b>Black</b>	<b>Yellow</b>	<b>Curtain</b>	<b>Indigenous</b>	<b>Total</b>
<b>2018</b>	5	64	17	8	523	10	<b>627</b>
<b>2019</b>	10	49	34	9	437	18	<b>557</b>
<b>2020</b>	8	25	24	11	412	15	<b>495</b>
<b>2021</b>	2	22	11	1	197	16	<b>249</b>
<b>Year of Diagnosis/Amazonas</b>	<b>IGN/White</b>	<b>White</b>	<b>Black</b>	<b>Yellow</b>	<b>Curtain</b>	<b>Indigenous</b>	<b>Total</b>
<b>2018</b>	62	100	60	12	1.304	56	<b>1.594</b>
<b>2019</b>	30	103	65	13	1.427	48	<b>1.686</b>
<b>2020</b>	30	101	46	5	1.482	56	<b>1.720</b>
<b>2021</b>	12	51	26	6	801	24	<b>920</b>
<b>Year of Diagnosis/Roraima</b>	<b>IGN/White</b>	<b>White</b>	<b>Black</b>	<b>Yellow</b>	<b>Curtain</b>	<b>Indigenous</b>	<b>Total</b>
<b>2018</b>	4	17	7	1	159	7	<b>195</b>
<b>2019</b>	3	25	14	-	232	8	<b>282</b>
<b>2020</b>	25	23	4	3	272	19	<b>346</b>



<b>2021</b>	3	6	4	2	104	9	<b>128</b>
<b>Year of Diagnosis/Pará</b>	<b>IGN/White</b>	<b>White</b>	<b>Black</b>	<b>Yellow</b>	<b>Curtain</b>	<b>Indigenous</b>	<b>Total</b>
<b>2018</b>	70	188	127	17	1.674	7	<b>2.083</b>
<b>2019</b>	110	157	132	10	1.863	8	<b>2.280</b>
<b>2020</b>	109	150	149	23	1.755	8	<b>2.194</b>
<b>2021</b>	49	79	93	8	1.024	2	<b>1.255</b>
<b>Year of Diagnosis/Amapá</b>	<b>IGN/White</b>	<b>White</b>	<b>Black</b>	<b>Yellow</b>	<b>Curtain</b>	-	<b>Total</b>
<b>2018</b>	12	42	22	2	192	-	<b>270</b>
<b>2019</b>	35	26	30	4	245	-	<b>340</b>
<b>2020</b>	11	25	21	1	232	-	<b>290</b>
<b>2021</b>	12	15	14	4	160	-	<b>205</b>
<b>Year of Diagnosis/Tocantins</b>	<b>IGN/White</b>	<b>White</b>	<b>Black</b>	<b>Yellow</b>	<b>Curtain</b>	<b>Indigenous</b>	<b>Total</b>
<b>2018</b>	4	63	67	18	460	11	<b>623</b>
<b>2019</b>	5	50	45	36	426	9	<b>571</b>
<b>2020</b>	5	67	61	24	438	6	<b>601</b>
<b>2021</b>	2	30	27	15	190	2	<b>266</b>

Source: Ministry of Health/SVS - Sinan Net (2023).

Table 4 above, for the state of Rondônia, shows that brown and white women have the highest number of syphilis cases, while the indigenous group has the lowest number of cases. In Acre, brown women are the most affected, followed by white women, with white women having the lowest number of cases.

In Amazonas, brown and white women are also the most affected by syphilis, while yellow women have the lowest number of cases. In Roraima, the pattern is similar, with brown and white women being the most contaminated, and yellow women having the lowest number of cases. In Pará, brown, white and indigenous women recorded the highest number of cases, while the group of yellow women had the lowest number of cases.

In the state of Amapá, brown and white women have the highest number of cases of GS, while yellow women have the lowest number of cases. In the state of Tocantins, data indicate that brown women were the most affected by syphilis, followed by white and black women. These patterns observed in the Northern region of Brazil are similar to the data reported by Raul (2021) in a national context.

Analyzing the variables, according to race, the notifications of gestational syphilis between the years 2018 and 2021 were predominantly described in women who declared themselves brown, with an increasing number of cases annually, followed by cases in white women, as observed in table 4. Other studies like this one confirm the same result where it says that the population profile of the North Region is predominantly brown, while the Brazilian population profile is predominantly white (DOS SANTOS, 2020).



Table 5 – Number of cases confirmed by nontreponemal test, according to year of diagnosis, in the period: 2018-2021.

<b>Year of Diagnosis/Rondônia</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
<b>IGN/White</b>	6	13	12	11	<b>42</b>
<b>Reactive</b>	300	353	365	151	<b>1.169</b>
<b>Non-reactive</b>	8	5	8	4	<b>25</b>
<b>Not carried out</b>	28	44	66	42	<b>180</b>
<b>Year of Diagnosis/Acre</b>					
<b>IGN/White</b>	19	16	11	20	<b>66</b>
<b>Reactive</b>	411	407	341	169	<b>1.328</b>
<b>Non-reactive</b>	13	6	7	4	<b>30</b>
<b>Not carried out</b>	184	128	136	56	<b>504</b>
<b>Year of Diagnosis/Amazonas</b>					
<b>IGN/White</b>	122	14	10	34	<b>180</b>
<b>Reactive</b>	1.089	1.334	1.318	642	<b>4.383</b>
<b>Non-reactive</b>	34	38	29	16	<b>117</b>
<b>Not carried out</b>	349	300	363	228	<b>1.240</b>
<b>Year of Diagnosis/Roraima</b>					
<b>IGN/White</b>	3	5	12	13	<b>33</b>
<b>Reactive</b>	183	261	299	98	<b>841</b>
<b>Non-reactive</b>	3	-	5	-	<b>8</b>
<b>Not carried out</b>	6	16	30	17	<b>69</b>
<b>Year of Diagnosis/Pará</b>					
<b>IGN/White</b>	59	95	86	61	<b>301</b>
<b>Reactive</b>	1.759	1.968	1.867	981	<b>6.575</b>
<b>Non-reactive</b>	53	42	40	31	<b>166</b>
<b>Not carried out</b>	212	175	201	182	<b>770</b>
<b>Year of Diagnosis/Amapá</b>					
<b>IGN/White</b>	5	8	21	14	<b>48</b>
<b>Reactive</b>	199	263	195	125	<b>782</b>
<b>Non-reactive</b>	6	7	13	2	<b>28</b>
<b>Not carried out</b>	60	62	61	64	<b>247</b>
<b>Year of Diagnosis/Tocantins</b>					
<b>IGN/White</b>	22	9	33	19	<b>83</b>
<b>Reactive</b>	492	487	427	191	<b>1.597</b>
<b>Non-reactive</b>	25	25	22	12	<b>84</b>
<b>Not carried out</b>	84	50	119	44	<b>297</b>

Source: Ministry of Health/SVS - Sinan Net (2023).

The data presented in Table 5 provide a comprehensive view of the situation of Syphilis in the northern region of Brazil, between the years 2018 and 2021. With a total of 15,347 reactive cases confirmed by non-treponemal tests, it is evident that the incidence of the disease is significant. However, it is alarming to note that there were 3,307 cases where testing was not performed, this may indicate challenges in accessing health services or raising awareness about the importance of testing for syphilis.

The state of Pará stood out with the highest number of reactive tests (6,575), followed by Amazonas with 4,383. This can be attributed to a range of factors, including population density, availability of healthcare services, and prevention practices. The states with the lowest number of



reactive drugs in the years surveyed were Roraima and Amapá, and there may be relatively better access to health services in these regions, which facilitates the diagnosis and early treatment of gestational syphilis.

Also according to table 5, it was noted that the reactive and non-performed tests had an increase during the spacing of years studied, between 2018 and 2021. In this scenario, according to Dalla (2021), it is the responsibility of health professionals not only to share information, but also to sensitize pregnant women to the importance of early diagnosis and the performance of detection tests, such as the venereal flocculation test (VDRL) and the indirect immunofluorescence test with treponemal fluorescent antibodies (FTA-Abs).

Dallas (2021) also states that health education should be done not only with pregnant women, but also extended to their partners. Awareness is a vital component in addressing this challenge, as understanding the risks and the need for prevention can motivate the search for appropriate care.

As for the cases confirmed by treponemal tests, the second year of diagnosis in the period 2018-2021, the reactive cases had a higher number of cases, with 15,216 notifications and the non-cases 4,291 and 1,664 Ign/816 non-reactive between the years that the survey was performed.

Table 6 - Cases confirmed by treponemal test according to year of diagnosis, in the period: 2018-2021.

<b>Year of Diagnosis/Rondônia</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
IGN/White	11	7	15	3	<b>36</b>
Reactive	275	329	330	168	<b>1.102</b>
Non-reactive	14	19	36	15	<b>84</b>
Not carried out	42	60	70	22	<b>194</b>
<b>Year of Diagnosis/Acre</b>					
IGN/White	9	14	15	10	<b>48</b>
Reactive	533	484	424	205	<b>1.646</b>
Non-reactive	26	16	28	7	<b>77</b>
Not carried out	59	43	28	27	<b>157</b>
<b>Year of Diagnosis/Amazonas</b>					
IGN/White	54	11	15	5	<b>85</b>
Reactive	1.054	1.113	1.270	685	<b>4.122</b>
Non-reactive	35	52	70	42	<b>199</b>
Not carried out	451	510	365	188	<b>1.514</b>
<b>Year of Diagnosis/Roraima</b>					
IGN/White	3	15	7	4	<b>29</b>
Reactive	112	214	309	108	<b>743</b>
Non-reactive	5	8	11	-	<b>24</b>
Not carried out	75	45	19	16	<b>155</b>
<b>Year of Diagnosis/Pará</b>					
IGN/White	158	172	133	88	<b>551</b>
Reactive	1.406	1.429	1.449	879	<b>5.163</b>



Non-reactive	80	125	130	46	<b>381</b>
Not carried out	439	554	482	242	<b>1.717</b>
<b>Year of Diagnosis/Amapá</b>					
IGN/White	7	24	10	9	<b>50</b>
Reactive	185	282	243	179	<b>889</b>
Non-reactive	5	10	18	9	<b>42</b>
Not carried out	73	24	19	8	<b>124</b>
<b>Year of Diagnosis/Tocantins</b>					
IGN/White	30	11	13	11	<b>65</b>
Reactive	405	390	469	210	<b>1.474</b>
Non-reactive	22	33	29	8	<b>92</b>
Not carried out	166	137	90	37	<b>430</b>

Source: Ministry of Health/SVS - Sinan Net (2023).

The data presented in Table 6 reveal crucial information about the treponemal reactive tests and their execution over the years analyzed. Between the years in which the research was conducted, 15,216 treponemal reactive tests were performed, generating a substantial detection of syphilis cases.

On the other hand, it is worrying to note that 4,291 tests were not performed, which may signal challenges in accessing health services or raising awareness about the importance of testing for syphilis. In addition, 1,664 tests were classified as non-reactive, which may indicate that the pregnant women were not infected with the bacteria that causes gestational syphilis. Still analyzing the data, it is observed that 816 tests were classified as Ign/blank, which suggests that there was an uncertainty or lack of clarity in the results.

Also according to table 6, when compared to non-treponemic tests, Pará and Amazonas have a high number of reactive tests. According to Dallas (2021), treponemal tests play a crucial role in the treatment of gestational syphilis, since they are critical for the effective diagnosis and monitoring of this infectious disease during pregnancy.

For Sousa (2022), the relevance of improving the training of health professionals in the recognition of clinical symptoms and in the categorization of the advances of the disease, as well as in the analysis of the results of exams and tests conducted are crucial instruments that are provided for the effective management of the condition, allowing the diagnosis to be established and the effectiveness of the treatment to be monitored.

Since, as explained by Marques (2018), the high number of reactive cases of gestational syphilis is definitely worrisome, as it indicates a significant prevalence of the disease in pregnant women. This can have several negative implications for both the pregnant woman and the fetus and newborn. Some reasons why a high number of reactive cases of gestational syphilis are alarming, include: concern due to the significant risks that this situation poses in co-occurring fetal deaths.

According to the literature, and reports of reported that most pregnant women suffer from primary or secondary syphilis that has not been treated and will eventually progress to fetal loss. In





addition, it is important to note that a significant number of newborns born to untreated or incorrectly treated mothers with syphilis end up showing no symptoms of the disease, which can prevent diagnosis at birth, with serious problems for the future of these children

#### **4 FINAL THOUGHTS**

Through this study, it was evidenced that, over the period 2018 to 2021, there was a gradual increase in syphilis records among pregnant women in the Northern region of Brazil, showing that gestational syphilis represents a serious public health challenge in Brazil, requiring effective attitudes for prevention and adequate diagnosis.

The increase in the number of reported cases is a cause for concern, and it is crucial to highlight that this condition disproportionately impacts the most vulnerable communities, including low-income pregnant women and those living in areas with limited access to health services, highlighting the need to implement more specific health interventions, particularly by health professionals working in primary care.

Therefore, it is extremely important that professionals in the area are trained to intervene early, including both screening and appropriate treatment of pregnant women and their partners, in order to reduce the incidence of gestational syphilis and, consequently, congenital syphilis.

In this sense, it is imperative to implement government policies and awareness campaigns aimed at the prevention and adequate treatment of syphilis, in order to contain the spread of this disease at the national level.



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