

Epidemiological profile of Acquired Syphilis Cases in Paraíba, Brazil (2015 – 2021)

Perfil Epidemiológico dos Casos de Sífilis Adquirida na Paraíba, Brasil (2015- 2021)

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Abstract

Syphilis is a sexually transmitted disease caused by *Treponema pallidum*. The infection is chronic and characterized by periods of intermittent latency, generating primary, secondary and tertiary stages of the disease. It is transmitted predominantly via sexual route, but vertical transmission, from a pregnant woman to the developing fetus or during childbirth, can occur. Parenteral transmission is also possible, however on a smaller scale. The present study aimed to contextualize *T. pallidum* infection and provide a descriptive epidemiological analysis of the distribution of cases of the disease in the state of Paraíba, in Brazil, according to age group, sex, education, race/ethnicity and cities with the highest concentration of confirmed cases. Between 2015 and 2021, a total of 6150 cases of acquired syphilis were reported. The year of 2019 concentrated the highest number of cases of the disease (1820), with 29.58%. Brown individuals were responsible for 3586 cases (58.31%), men comprised 4016 cases (65.30%), the age group 20-39 years had 3668 cases (59.64%), people with complete high school presented 825 cases, but there was a significant percentage of notifications as "ignored/blank", comprising 2928 cases in the variable "education" and significantly hindering the interpretation of data.

Keywords: Syphilis; Epidemiology; Treponemal infections; *Treponema pallidum*.

Resumo

A sífilis é uma doença sexualmente transmissível causada pela *Treponema pallidum*. A infecção é crônica e caracterizada por períodos de latência intermitentes, gerando quadros primário, secundário e terciário da doença. Tal enfermidade possui transmissão predominantemente sexual, porém pode ser transmitida verticalmente, de uma gestante para o feto em desenvolvimento ou durante o parto. É possível, também, a transmissão parenteral, entretanto em menor escala. O presente trabalho teve por objetivo realizar uma contextualização, com posterior análise epidemiológica descritiva da distribuição do número de casos de sífilis adquirida no estado da Paraíba, no Brasil, apresentando a distribuição segundo a faixa etária, sexo, escolaridade, raça/etnia e municípios com maior concentração do número de casos da doença. Entre 2015 e 2021, foram notificados ao todo 6150 casos de sífilis adquirida. O ano de 2019 concentrou o maior número de casos da doença (1820), com 29,58%. Indivíduos de raça/etnia parda apresentaram 3586 casos (58,31%), homens compreenderam 4016 casos (65,30%), a faixa etária de 20-39 anos manifestou 3668 casos (59,64%), pessoas com ensino médio completo apresentaram 825 casos, porém

houve um percentual expressivo de notificações como "ignorado/em branco", compreendendo 2928 casos na variável "escolaridade" e dificultando significativamente a interpretação de dados.

Palavras-chave: Sífilis; Epidemiologia; Infecções por treponema; *Treponema pallidum*.

Resumen

La sífilis es una enfermedad de transmisión sexual causada por *Treponema pallidum*. La infección es crónica y se caracteriza por períodos de latencia intermitente, generando estados primarios, secundarios y terciarios de la enfermedad. Esta enfermedad tiene una transmisión predominantemente sexual, pero puede transmitirse verticalmente, de una mujer embarazada al feto en desarrollo o durante el parto. La transmisión parenteral también es posible, aunque a menor escala. El presente estudio tuvo como objetivo contextualizar, con posterior análisis epidemiológico descriptivo de la distribución del número de casos de sífilis adquirida en el estado de Paraíba, en Brasil, presentando la distribución según grupo de edad, sexo, escolaridad, raza/etnia y municipios con mayor concentración del número de casos de la enfermedad. Entre 2015 y 2021 se notificaron un total de 6150 casos de sífilis adquirida. El año 2019 concentró el mayor número de casos de la enfermedad (1820), con un 29,58%. Los mestizos/etnia presentaron 3586 casos (58,31%), los hombres 4016 casos (65,30%), el grupo de edad de 20 a 39 años 3668 casos (59,64%), las personas con secundaria completa presentaron 825 casos, pero hubo un porcentaje significativo de notificaciones como "ignorado/en blanco", comprendiendo 2928 casos en la variable "educación" y dificultando significativamente la interpretación de los datos.

Palabras clave: Sífilis; Epidemiología; Infecciones por treponema; *Treponema pallidum*.

1. Introduction

Syphilis is a sexually transmitted disease (STD) that affects exclusively humans and is caused by the bacteria *Treponema pallidum*, a gram-negative spirochete known for its invasiveness and ability to evade the host's immune system (Shah et al, 2015; Peeling et al., 2017). Sexual transmission of the disease can occur within 1 to 2 years after the initial infection (period in which the individual will be in the primary, secondary or initial tertiary stages). The inoculation of the pathogen occurs in skin lesions, resulting from sexual practice, which generates an immune response that causes superficial erosion and then the formation of an ulcer, usually painless (Goh, 2005; Peeling et al., 2017). After the initial infection, the bacteria access regional lymph nodes and spread hematologically to other tissues and/or organs of the human body, where it can manifest latency (Goh, 2005).

The bacteria can also be transmitted vertically, from an infected pregnant woman to a developing fetus or during childbirth. However, recent studies indicate that in-utero transmission manifests the highest concentration of the number of gestational infections (Peeling et al., 2017). Syphilis can be responsible for causing multiple adverse scenarios during pregnancy and its vertical transmission characterizes congenital syphilis, which has considerable severity associated to it, generating complications such as fetal loss, premature birth and neonatal death if it is not treated properly (Macêdo et al., 2017; Luppi et al., 2020).

In 2012, there was an estimate that 350.000 adverse cases during pregnancy were related to *Treponema pallidum* infection. During such period, about 143.000 fetal deaths, 62.000 neonatal deaths and 44.000 preterm births, or low birth weight, were reported, as well as 102.000 infected babies (Barros et al., 2018). The risk of vertical transmission is high during the primary and secondary stages of the syphilis. However, the risk remains elevated during the first 4 years after the initial exposure, with the risk declining over time (Peeling et al., 2017).

Individuals infected by the sexual route typically present the disease in stages, which will manifest characteristic clinical features, directly related to the period of infection, which can be primary, secondary and tertiary. The latter developing over a period greater than or equal to 10 years (Peeling et al., 2017; Silveira et al., 2020). In the primary stage, the individual will manifest painless skin rashes, which can be single or multiple, but can appear in regions that are difficult to access, such as the anus or cervix, making diagnosis difficult and increasing the chances of progression to the secondary stage (Peeling et al., 2017). In the secondary stage of the disease, there is a generalized rash, affecting the palms of the hands and soles of the feet,

generalized lymphadenopathy, and orogenital mucosal lesions (Goh, 2005). If the infection is not treated, 40% of the patients will manifest a tertiary stage of the disease, which is characterized by involvement of the cardiovascular and nervous systems (Goh, 2005; Peeling et al., 2017; Schmidt et al., 2019; Silveira et al., 2020).

The infection predominantly affects individuals who manifest high-risk behaviors, such as the use of illicit and injecting drugs, alcohol consumption, inconsistent use of condoms, multiple sexual partners and sexual practice in order to obtain money and/or drugs (Peeling et al., 2017; Lino et al., 2021). Furthermore, the biological association and synergy manifested between syphilis and the Human Immunodeficiency Virus (HIV) is particularly alarming, given the increased risk of transmission, when co-infected, and acquisition of HIV, when infected only by *T. pallidum* (Peeling et al., 2017; Schmidt et al., 2019; Pinheiro et al., 2021; Neto et al., 2021).

After analyzing the exposed information, it is possible to visualize the severity and complexity associated to *Treponema pallidum* infection. Thus, its combat and constant vigilance is of great importance. The present study aimed to promote a descriptive epidemiological analysis of the distribution of the number of syphilis cases between the years of 2015 to 2021, in the state of Paraíba, Brazil, presenting the distribution according to age group, sex, education, race/ethnicity and municipalities with higher concentration of the disease.

2. Methodology

This is a descriptive, retrospective epidemiological study, focused on the quantitative-qualitative approach of secondary data of all cases of acquired syphilis (AS) in the state of Paraíba during the period of 2015 to 2021. By accessing the Sistema de Informação de Agravos de Notificação/ Notifiable Diseases Information System (SINAN), it was possible to construct tables and verify the current information present in the literature. The main source of information regarding syphilis comes from the Notifiable Diseases Information System, through the TabNet Win32 3.0 program, available for consultation on the SUS Department of Informatics (DATASUS) and maintained by the Brazilian Ministry of Health.

SINAN has as its main objectives the collection, transmission and dissemination of information continuously generated by the national Epidemiological Surveillance System, allowing the performance of analyses, epidemiological studies and decision-making by the public and private authorities with regard to the various diseases that afflict the different regions of the country. This way data is produced, analyzed and consolidated at local, municipal and national levels (<http://datasus.saude.gov.br/informacoes-de-saude/tabnet>).

Data were disaggregated and tables were assembled, using Microsoft Word® software, aiming at presentation and analysis, according to the following variables: "Gender", "Age Group", "Education" and "Ethnicity/Race". The mentioned variables were applied to the Brazilian state of interest, namely Paraíba. Calculations of percentage were performed, as well as comparisons of the obtained results with national and international studies.

Bibliographical research was also conducted in national and international databases, with LILACS, PubMed and Google Scholar being chosen. It is important to point out that, as this is an epidemiological study that uses secondary, public and freely accessible data, made available by the Ministry of Health, an evaluation by a Research Ethics Committee (CEP) was not necessary, as there is no identification of subjects.

3. Results

During the period of 2015 to 2021, among the 223 municipalities of the state of Paraíba, 165 manifested at least one case of syphilis, demonstrating the wide presence of the pathogen throughout the territory of such Brazilian Northeastern State. The total number of infections was 6150, of which 3462 (56.29%) were concentrated in the capital of Paraíba, João Pessoa.

Municipalities such as Campina Grande, Cabedelo and Santa Rita, had, respectively, 346, 314 and 244 cases of acquired syphilis. Table 1 presents the total number of cases, per year, in the state of Paraíba.

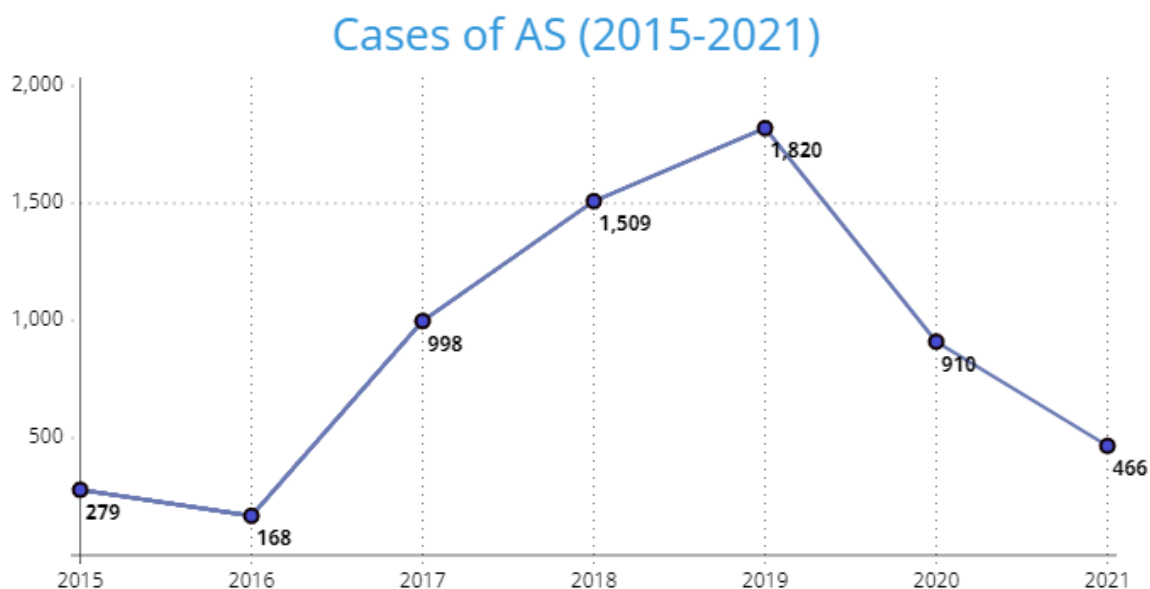
Table 1 - Distribution of the total number of cases, per year, in the state of Paraíba.

Year of Notification	%	TOTAL
TOTAL	100%	6150
2015	4,54%	279
2016	2,73%	168
2017	16,23%	998
2018	24,54%	1509
2019	29,58%	1820
2020	14,80%	910
2021	7,58%	466

Source: System of Notifiable Diseases Information - SINAN/ Ministério da Saúde (2022).

During 2016 the number of confirmed syphilis infections in the state skyrocketed, jumping from just 168 in that year to 998 in 2017, an increase of approximately 494.05%. Such increase may be related to the consolidation and strengthening of the local surveillance system regarding the cases of AS in Paraíba. Figure 1 presents the distribution of AS cases over the years to facilitate visualization.

Figure 1 - Distribution of the total number of cases of Acquired Syphilis (2015-2021) in the state of Paraíba.



Source: System of Notifiable Diseases Information - SINAN/ Ministério da Saúde (2022) (Adapted).

It should be noted that, by analyzing Table and Figure 1, the year of 2019 showed the highest number of infections (1820). Then, there was a significant drop in the following years, with 910 cases in 2020 and 466 cases in 2021. Such decrease may be associated with the SARS-CoV-2 pandemic period, in which individuals substantially reduced their exposure to risky encounters and, consequently, unprotected sexual practices. However, the drop may be associated with the absence of

diagnoses, since infected people may have expressed fear of attending health care establishments during the pandemic, making it impossible to see a result close to the true reality of Paraíba, regarding AS during the pandemic.

When analyzing the race/ethnicity that manifested the highest number of cases of acquired syphilis, it is possible to observe that brown individuals comprised 3586 cases, about 58.31% of the total number. Then white individuals comprised 737 cases, approximately 12%. Indigenous people were responsible for only 18 cases. Table 2 shows the distribution of AS cases according to race/ethnicity.

Table 2 - Distribution of acquired syphilis cases, according to the individual's race/ethnicity.

Year of Notification	Ignored	White	Black	Yellow	Brown	Indigenous	Total
TOTAL	1356	737	387	66	3586	18	6150
2015	64	35	21	4	155	-	279
2016	26	33	7	4	97	1	168
2017	272	122	60	9	532	3	998
2018	306	164	92	31	910	6	1509
2019	447	217	83	8	1060	5	1820
2020	146	99	72	3	587	3	910
2021	95	67	52	7	245	-	466

Source: System of Notifiable Diseases Information - SINAN/ Ministério da Saúde (2022).

In the analyzed period, a high number of cases were found in which “race/ethnicity” was ignored or left blank. This reality has a significant potential to hinder the interpretation of data related to the infection by *Treponema pallidum* and the subsequent identification of groups more vulnerable to the acquisition of the disease, being of paramount importance the correct notification and filling of data.

Regarding the distribution between male and female individuals, the literature shows, mostly, that the largest number of cases are manifested among men, especially those who perform risky sexual practices, without the use of condoms and with multiple sexual partners, intensifying the chances of acquiring syphilis and other sexually transmitted diseases. Thus, during the analyzed period, men were responsible for concentrating 4016 cases, 65.30%. Table 3 presents the distribution of all cases of AS, according to sex in the state of Paraíba from 2015 to 2021.

Table 3 - Distribution of all acquired syphilis cases, according to sex in the state of Paraíba from 2015 to 2021.

Year of Notification	Ignored	Male	Female	Total
TOTAL	2	4016	2132	6150
2015	-	154	125	279
2016	-	101	67	168
2017	1	609	388	998
2018	-	947	562	1509
2019	-	1256	564	1820
2020	1	621	288	910
2021	-	328	138	466

Source: System of Notifiable Diseases Information - SINAN/ Ministério da Saúde (2022).

After analyzing Table 3, it is possible to observe that, with the exception of 2015, men manifested almost twice the number of cases of acquired syphilis, when compared to women, in the state of Paraíba. The literature points out that men who

have sex with men are one of the most vulnerable groups to infection by *Treponema pallidum*, considering the performance of risky sexual practices and greater chances of acquiring the disease through unprotected anal sex.

Regarding the age group, individuals aged between 20 and 39 years had the highest number of cases of AS, between 2015 and 2021, with 3668 infections, representing a percentage of 59.64% of the total value. Table 4 shows the distribution of total cases of acquired syphilis, according to the age group of the individuals.

Table 4 - Distribution of total cases of acquired syphilis between 2015 and 2021, according to age group.

Year of Notification	Ignored	10-14	15-19	20-39	40-59	60-64	65-69	70-79	80+	Total
TOTAL	1	23	666	3668	1376	172	113	106	25	6150
2015	-	1	29	160	67	11	3	6	2	279
2016	-	2	26	78	44	10	4	3	1	168
2017	-	9	132	614	192	22	12	10	7	998
2018	-	4	170	903	330	40	34	23	5	1509
2019	-	4	183	1076	430	53	37	31	6	1820
2020	-	3	81	542	216	24	17	25	2	910
2021	1	-	45	295	97	12	6	8	2	466

Source: System of Notifiable Diseases Information - SINAN/ Ministério da Saúde (2022).

After analyzing Table 4, it is possible to observe that there was a considerable increase in the number of cases of AS among individuals aged between 15 and 19 years, probably associated with the beginning of sexual life, in which unprotected sex and risky behaviors can occur.

In relation to schooling, in the observed period, it was possible to verify that individuals with complete high school (HS) manifested the highest number of AS cases (825). However, the number of cases among individuals with elementary education (EE), complete and not complete, was also significant. In addition, some studies conducted in Brazil have also pointed to such an association between schooling and a greater or lesser susceptibility to acquiring syphilis (Lino et al., 2021; Neto et al., 2021). Table 5 shows the number of total cases between 2015 and 2021, distributed according to the education level of the infected individuals.

Table 5 - Number of total cases, between 2015 and 2021, distributed according to the education of infected individuals.

Year of Notification	2015	2016	2017	2018	2019	2020	2021	Total
Ignored	114	82	485	752	847	452	196	2928
Illiterate	13	8	16	29	36	25	17	144
EE Incomplete 1- 4º year	30	18	73	92	80	61	25	379
EE Complete until 4º year	29	3	18	47	75	25	8	205
EE Incomplete 5-8º year	25	20	110	92	121	59	41	468
EE Complete	19	7	75	99	100	47	17	364
HS Incomplete	17	12	49	95	107	59	36	375
HS Complete	24	12	113	207	269	116	84	825
College Incomplete	5	5	28	47	82	32	17	216
College Complete	2	1	31	49	103	34	25	245
Not Applicable	1	-	-	-	-	-	-	1
Total	279	168	998	1509	1820	910	466	6150

Source: System of Notifiable Diseases Information - SINAN/ Ministério da Saúde.

After analyzing Table 5, it is possible to observe that in all years, with the exception of 2015 and 2016, individuals with complete high school concentrated the largest number of cases. However, the number of ignored or blank cases have concentrated an expressive contingent of 2928 cases in the state of Paraíba, about 48% of the total amount. It is of great

importance that such information be filled in more frequently, so epidemiological studies can be carried out and local information can be consolidated regarding the most vulnerable groups to *Treponema pallidum* infection.

4. Discussion

This study identified a substantial increase in the number of cases of acquired syphilis in the state of Paraíba, but also observed an important drop in notifications during the years of 2020 and 2021 (Table 1), in which the SARS-CoV-2 pandemic was in progress, during its moment of ascension and peak, possibly influencing the reduction of exposure to events, social encounters, and consequently the performance of risky sexual practices, without the use of barrier methods. However, such fall may also be associated with the absence of diagnostics, since infected people may have expressed fear of attending health care establishments during the pandemic period.

It was identified that male individuals had the highest proportion of reported cases of AS in the analyzed period (Table 3). Men were responsible for concentrating 4016 cases of *T. pallidum* infection, comprising about 65.30% of the total registered cases in Paraíba, during the analyzed period. The higher susceptibility of men to syphilis is well documented in the literature, especially among those who engage in risky sexual practices (Cáceres, 2016; Peeling et al., 2017; Gomes et al., 2017; Barros et al., 2018; Schmidt et al., 2019; Silveira et al., 2020; Santos et al., 2021).

An epidemiological study conducted in a municipality of Rio Grande do Sul, Brazil, reported that during the years of 2015 to 2017, from a total of 1797 patients, the profile of acquired syphilis was predominantly composed by male individuals, aged between 21 and 30 years, which was also identified in the present research (Table 4) (Pasqual et al., 2021). It should be noted that another Brazilian study, conducted in Goiânia, Goiás, also presented the same reality, with the highest number of cases occurring among men and individuals aged between 18 and 29 years (Godoy et al., 2021). It is important to present that the researchers also pointed to a ratio of two male cases to one female case (Godoy et al., 2021).

It is possible, however, to associate the greater number of cases of AS among men to the greater promiscuity present in such individuals, who may have multiple sexual partners, generally more frequently than women. In this way, it is of significant importance that there is a tracking of the sexual partners of the infected individuals, so that they are tested and treated, in case of positive results, aiming the break of the transmission chain (Silveira et al., 2020).

In addition, American researchers, aiming to analyze the resurgence of syphilis in the United States of America, identified that the largest number of cases of the disease was concentrated among homosexual men (Schmidt et al., 2019). A comparison of the incidence of syphilis in men who have sex with men (MSM) and men who have sex with women (MSW) was carried out, pointing out that the first group showed an increase of approximately 80% of cases of infections by *T. pallidum*, while in the second group there was an increase of approximately 35% (Schmidt et al., 2019).

A study conducted in Brazil, in the state of São Paulo, showed that factors such as: men who have sex with men, use of alcohol and drugs, as well as early onset of sexual activity and the presence of other sexually transmitted diseases, considerably increase the chances of infection by *T. pallidum* (Luppi et al., 2020). Coinciding with these results, a survey also showed greater male susceptibility, as well as presented that: individuals living in isolation, homeless people, drug users, MSM, people co-infected with HIV, and pregnant women, all presented themselves as groups of risk for acquiring syphilis (Gomes et al., 2017).

It should be also noted that male individuals have shown a predisposition to other infections and habits that increase the chances of acquiring syphilis. In addition, they have significant difficulty in accessing and looking for health care facilities, to diagnoses and/or treatments. Thus, it is possible that the number of male individuals infected by *T. pallidum* is, in fact, considerably higher when compared to the data presented by SINAN, in view of underreporting and behavioral factors.

Thus, it is important to emphasize the need for correct notification of cases in Paraíba, as well as the provision of a greater focus from the government and population, in general, to the health of men, who have been presented as a risk group for AS. In this way, the occurrence of advertising campaigns and events with the objective of disseminating information related to the disease and encouraging access to health care facilities is of extreme need and crucial to mitigate the cases of syphilis.

According to data from the census carried out by the Brazilian Institute of Geography and Statistics (IBGE), about 39.7% of the population in Paraíba is white, while 52.9% is brown. The present study identified that, in relation to the ethnicity/race of the reported cases, brown individuals were responsible for 3586 cases in the analyzed period (Table 2), about 58.31% of the total number, demonstrating a higher concentration of cases of infection in such a group. However, further studies are needed to better understand this reality.

The current research also identified that individuals aged between 20 and 39 years had the highest number of cases of acquired syphilis, between 2015 and 2021, with 3668 infections, representing a percentage of 59.64% of the total value (Table 4), a reality also manifested in several studies conducted across the country. This age group is associated with the consolidation of sexual practice by individuals, and most of them are sexually active, facilitating the acquisition of the disease and its dissemination to other people, especially when there is the occurrence of risky sexual practices (Silveira et al., 2020).

Regarding education, it was observed that individuals with complete high school had the highest number of cases of acquired syphilis, a total of 825 cases (Table 5). However, further studies are needed, since the number of ignored or blank cases concentrated a significant amount, in the analyzed period, of 2928 cases in the state of Paraíba, about 48%. It is very important that such information be filled in, with a view to carrying out epidemiological studies and consolidating information regarding the most vulnerable groups to the *Treponema pallidum* infection.

Several other national epidemiological studies also reported findings identical to those observed in the present study, with a higher concentration of AS cases in: male individuals; brown; age between 20 and 39 years (Escobar et al., 2020; Santos et al., 2020; Silveira et al., 2020; Menezes et al., 2021; Dantas et al., 2022).

A study that aimed to analyze the trend of acquired syphilis cases in all Brazilian regions, between 2010 and 2019, pointed out that all regions showed an abrupt drop in the number of AS cases in 2019 (Escobar et al., 2020). In Paraíba, however, as reported in the current research, the year of 2019 concentrated the highest number of infections (Table 1), demonstrating that this northeastern state of Brazil deviated from the pattern observed in the other regions of the country, including the Northeast region.

Syphilis remain as a STD and its transmission occurs almost predominantly through unprotected and risky sex, actions such as: the distribution of condoms; availability of rapid tests for the disease at health posts; adequate treatment and availability of penicillin; as well as the awareness of risk groups, through the dissemination of information related to the disease, are all fundamental measures regarding the fight and control of the spread of *T. pallidum* not only in the state of Paraíba, but in Brazil, country that currently experiences a silent epidemic of syphilis.

Finally, the present study was based on data made available by the Information System of Notifiable Diseases, SINAN, which can manifest itself as a limitation, since underreporting and data filled as “blank” or “ignored” can limit the visualization of the true reality in Paraíba. However, it is important to point out that the data provided by SINAN are of great importance, as they are used in several epidemiological studies across the country and are used for the development of public policies, being a highly relevant and useful tool for conducting scientific studies in Brazil.

5. Conclusion

Syphilis remains as a sexually transmitted disease that represents a significant risk to public health, especially when it is present in pregnant women or when the treatment doesn't occur, resulting in the progression to the tertiary stage, with several associated sequelae. The current research aimed to carry out a descriptive study of the data made available by SINAN, in relation to cases of syphilis acquired in the state of Paraíba between the years of 2015 to 2021.

T. pallidum infection is easily treatable; however, the disease remains a serious public health problem in Brazil, with a greater focus on the disease by the national public authorities being of great relevance. In this study, a significant increase in the number of cases of AS was observed in the state of Paraíba, with a subsequent drop in the years corresponding to the SARS-CoV-2 pandemic, making it possible to establish a connection between the pandemic period and a reduction of possible risky exposures to the acquisition of *T. pallidum*. In addition, men, brown individuals, as well as those aged between 20 and 39 years, manifested the highest number of cases of the disease in the state, during the analyzed period.

It is noteworthy that filling in the data correctly during the notification is of great importance for carrying out studies aimed at identifying the most vulnerable groups. In this study, we found a high number of individuals whose information was presented as "ignored" or "blank", making it difficult to generalize the findings. It is important to point out, however, that since it is a descriptive study that used secondary data, several limitations are present, and it is of significant relevance the conduction of new epidemiological researches in the state of Paraíba.

It is suggested that this study help researchers in the area to produce their analyzes and compare data, and also serve as a subsidy to contribute to health managers regarding the management, follow-up and notification of confirmed cases for the pathology, and subsequently outline strategies for prevention and promotion of health.

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