



## Epidemiological profile of syphilis in health macro-regions of Bahia, 2018–2022

## Perfil epidemiológico da sífilis em macrorregiões de saúde da Bahia, 2018–2022

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**ABSTRACT | OBJECTIVE:** To describe the epidemiological profile of acquired syphilis by macro-region in the state of Bahia, Brazil, in the years 2018–2022. **MATERIALS AND METHODS:** Retrospective, descriptive, ecological study, using the SINAN database, by health macro-region, considering the variables: year of notification, race/color, sex, and age group. The data was organized, and prevalence and lethality were calculated in Microsoft Excel. **RESULTS:** The state presented an average of 9 thousand cases per year. The East macro-region recorded 21,416 cases, representing more than half of the cases in the five years. Between 2020 and 2021, there was a reduction in the number of cases reported in all macro-regions, a period concomitant with the COVID-19 pandemic. There was a higher prevalence in males (56.7%), in the age group of 20 and 34 years (43.8%), and self-declared brown race/color (45.31%) in all macro-regions. The highest fatality rates were recorded in the Central-North (2.34%) and Northeast (1.93%) macro-regions. **CONCLUSIONS:** The Northeast and Central-North macro-regions have the lowest notifications. The highest fatality rates were recorded in the Central-North and Northeast macro-regions. There is a need to carry out active searches, testing campaigns, and health education for the young and male population, mainly in the Eastern macro-region.

**KEYWORDS:** Syphilis. Prevalence. Mortality. Health Information System. Epidemiology.

**RESUMO | OBJETIVO:** Descrever o perfil epidemiológico da sífilis adquirida por macrorregião no estado da Bahia-Brasil, nos anos 2018–2022. **MATERIAIS E MÉTODOS:** Estudo ecológico, descritivo, retrospectivo, utilizando a base de dados do SINAN, por macrorregião de saúde, considerando as variáveis: ano de notificação, raça/cor, sexo e faixa etária. Os dados foram organizados e calculou-se a prevalência e letalidade no *Microsoft Excel*. **RESULTADOS:** O estado apresentou uma média de 9 mil casos por ano. A macrorregião Leste contabilizou 21.416 casos, representando mais da metade dos casos nos cinco anos. Entre os anos de 2020 e 2021, observa-se redução no número de casos notificados em todas as macrorregiões, período concomitante a pandemia do COVID-19. Houve maior prevalência no sexo masculino (56,7%), na faixa etária de 20 e 34 anos (43,8%) e raça/cor autodeclarada parda (45,31%) em todas as macrorregiões. As maiores taxas de letalidade foram registradas nas macrorregiões Centro-Norte (2,34%) e Nordeste (1,93%). **CONCLUSÕES:** As macrorregiões Nordeste e Centro-Norte apresentaram menores notificações. As maiores taxas de letalidade foram registradas nas macrorregiões Centro-Norte e Nordeste. Verifica-se a necessidade de realizar busca ativa, campanhas de testagem e educação em saúde para população jovem e do sexo masculino, principalmente na macrorregião Leste.

**PALAVRAS-CHAVE:** Sífilis. Prevalência. Mortalidade. Sistema de Informação em Saúde. Epidemiologia.

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## 1. Introduction

Syphilis is a systemic, chronic, curable, and exclusive bacterial infection of the human being. Its etiological agent, *Treponema pallidum*, was discovered in 1905. When the disease is not treated, it evolves to stages of varying severity and may affect different organs and body systems. Its transmission occurs through sexual contact—acquired syphilis—however, the infection can occur by vertical transmission, called congenital syphilis.<sup>1</sup>

Syphilis is a long-standing public health problem, and despite accessible and effective prevention measures and treatment options, it has not yet been eradicated. In addition to being associated with serious complications in untreated patients, it is characterized by the presence of lesions that facilitate the entry of the human immunodeficiency virus (HIV). In Brazil and worldwide, the number of cases increases every year.<sup>2</sup>

In Brazil, 1,115,529 cases of acquired syphilis were reported from 2011 to 2022. The case detection rate ranged from 9.3/100 thousand inhabitants (2011) to 78.5/100 thousand inhabitants (2021). It is worth mentioning that during this period, there was an increase in the number of cases, culminating in 2021 with the highest detection rate recorded.<sup>3</sup>

In Brazil, the detection rate was increasing until 2018, then suffered stability, except in 2020, when a decline in the rate occurred, due to the COVID-19 pandemic. Most of the reported cases were concentrated in males (60.6%), age groups from 20 to 29 years old (35.6%), and 30 to 39 years old (22.3%).<sup>4</sup>

In developed countries, as in the United States, the epidemiological situation of syphilis is no different. From 2017 to 2021, almost 500 thousand cases were reported, and in 2021 alone, the country reported 176,713 cases. Even though the number of cases decreased in 2000 and 2001, the rate increased in the following years, reaching 28.6% in 2021. The increase in reported cases in this period may reflect greater transmission of the disease due to reduced access to care for people diagnosed with Sexually Transmitted Infections (STI) during the COVID-19 pandemic.<sup>5</sup>

The COVID-19 pandemic caused changes in the service profile, monitoring, and quality of syphilis notifications in Brazil. This fact is proven when analyzing the significant decrease in the incidence of cases reported in 2020 and 2021. Measures of isolation and social distancing contributed to the underreporting of cases due to a decrease in population testing since the basic units were overloaded with the care of patients with respiratory symptoms.<sup>6</sup>

Epidemiological information is used to conduct actions, so it is required in Brazil that acquired syphilis is compulsorily notified by all health facilities. Ordinance n. 2,472, dated August 31, 2010, included syphilis acquired in the Compulsory Notification List (CNL).<sup>7</sup> In October 2016, the Ministry of Health declared syphilis a silent epidemic in the face of high rates of new cases of the disease in the country.<sup>8</sup>

The acquired syphilis symptomatology can be classified according to the time of infection—recently acquired syphilis (less than one year of evolution) and late acquired syphilis (more than one year of evolution)—and its clinical manifestations— primary, secondary, latent, and tertiary syphilis.<sup>8</sup> Its diagnosis is made from the combination of clinical data, results of diagnostic tests, history of previous infections, and investigation of recent risk sexual exposure. For its detection, direct tests and immunological tests can be used, which are classified into treponemal and nontreponemal. Among the treponemal tests, we highlight the Rapid Tests (RT), which detect specific antibodies produced against *T. pallidum* antigens in up to 30 minutes.<sup>9</sup>

The use of RT in health units is a public health strategy in Brazil aimed at rapid diagnosis, early treatment, and interruption of the transmission chain. The treatment of syphilis is done with safe and low-cost antibiotics offered by the Sistema Único de Saúde - SUS (Unified Health System).<sup>1</sup>

However, syphilis is still a worrying cause of maternal and child morbidity and mortality, with a different geographical distribution between the health regions in the state of Bahia, Brazil, a problem that needs a different look among the macro-regions of the state. Therefore, considering these characteristics and the importance of studies on acquired syphilis, drawing

an epidemiological profile in Bahia from the last five years is relevant from the perspective of integrating research and epidemiological surveillance, control, and prevention methods to be observed by locoregional management.

This study is justified, considering that syphilis is a disease with impacts on a national scale from a biological, psychological, and social point of view. Regional issues related to it are still poorly understood and need to be further explored. In this sense, because it constitutes a silent epidemic, acquired syphilis becomes a current and important problem.

Given the above, we present as a research question: What is the epidemiological profile of acquired syphilis by macro-region in the state of Bahia? This study aims to describe the epidemiological profile of acquired syphilis by macro-region in the State of Bahia-Brazil in the years 2018–2022.

## 2. Methodology

This is a retrospective, descriptive, ecological study since it presents data on whole populations to compare the frequencies of the disease between different groups during the same period. In addition, it examines the relationship between disease variables in a population group.<sup>10</sup>

The research was developed from secondary data from the Health Department of the state of Bahia between the years 2018 and 2022. This period characterizes a temporal cut of the last five years, which comprises an earlier moment and another concomitant with the COVID-19 pandemic, being calculated the prevalence rate of these years and lethality until the year 2021. The prevalence calculation is used to measure the proportion of sick individuals in a population at a given time, that is, a time-clipping photograph.<sup>10</sup>

The samples were collected on July 26, 2023, from data from the Sistema de Informação de Agravos e Notificação - SINAN (System of Diseases and Notification), made available through the page of the Superintendência de Vigilância em Saúde do Estado da Bahia - SUVIVA (Superintendence of Health Surveillance of the State of Bahia), which provides data

divided by municipality, macro-region and Regional Health Center. In what interested this research, data were collected from macro-regions.

The sampling process of the research was non-probabilistic, where the numbers of cases in nine macro-regions of the state were selected, namely: Center-East, Center-North, Far South, East, Southeast, South, West, North, and Northeast. Data collection included reported cases containing the variables: year of notification, race/color, sex, and age group in 2018 and 2022. And for data on deaths, only year and place of residence. Exclusion criteria: notified cases not closed.

For data collection, the Departamento de Informática do Sistema Único de Saúde - DATASUS (Department of Informatics of the Unified Health System) platform of the Ministry of Health was used, which houses the SUVISA/SINAN data. In the TABNET section are found open data on epidemiology and morbidity, where the variables mentioned above were selected, by macro-regions of residence, to compose the calculation basis for prevalence. For the calculation of lethality, data were collected directly on the SINAN platform, which provides the numbers of deaths only in the years 2018–2021.

After accessing the databases, a file was produced in CSV format and converted into Microsoft Excel file version 2016, which enabled data organization, generation of graphs, and calculation of prevalence and lethality. To calculate the prevalence, we used the sum of the cases of sick people in each period, multiplied by 10,000,000, divided by the population of the period. To obtain the lethality was used the number of deaths in each area and period, multiplied by one thousand, divided by the total number of reported cases.<sup>10</sup>

Through the calculations, it was possible to analyze the results in each year/macro-region and the totality of cases and lethality in the years available. For data analysis, we chose to compare the findings in each macro-region and year with the performance of the state of Bahia and Brazil in the same period.

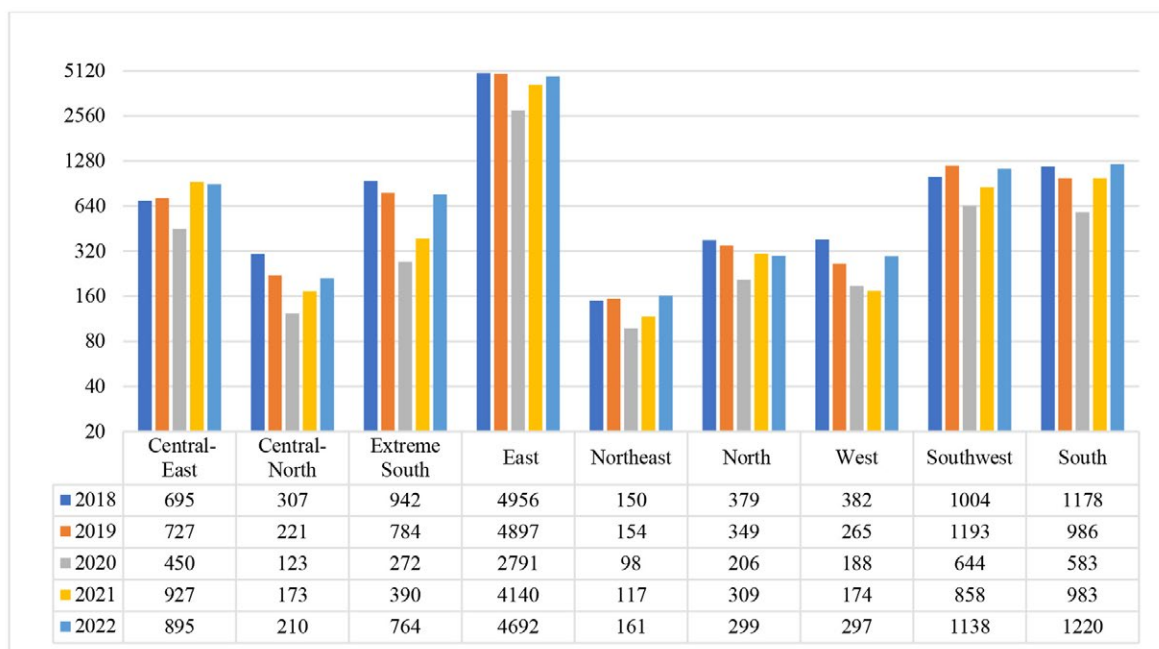
Given the use of secondary data in the public domain, this study does not fit for analysis recommended by resolution n° 466/2012 of the Ethics Committee on Research with Human Beings but followed the rigor and ethical aspects necessary for its realization.

### 3. Results

In the five years studied, the state of Bahia totaled 42,671 reported cases. The year 2018 is the period with the highest number of reported cases of acquired syphilis, affecting 9,993 people among the nine macro-regions of the state. Then the year 2022, with 9,676 reported cases. In 2019, before the pandemic, there were 9,576 reported cases, maintaining a trend of approximately 9,000 cases per year. It is observed that in the years 2020 and 2021 reduced numbers were reported—5,355 and 8,071, respectively—, a period concomitant to the COVID-19 pandemic.

Of this total, the Eastern region accounted for 21,416 cases, that is, more than half of the cases (50.19%). This macro-region maintained the trend of reducing notification, from 4,956 (2018) to 2,791 cases (2020). The South, Southeast, Central-East, and Far South macro-regions presented a reduced number of cases in the pandemic period. The Northeast and Center-North macro-regions present, throughout the studied period, the lowest number of notifications (Graphic 1).

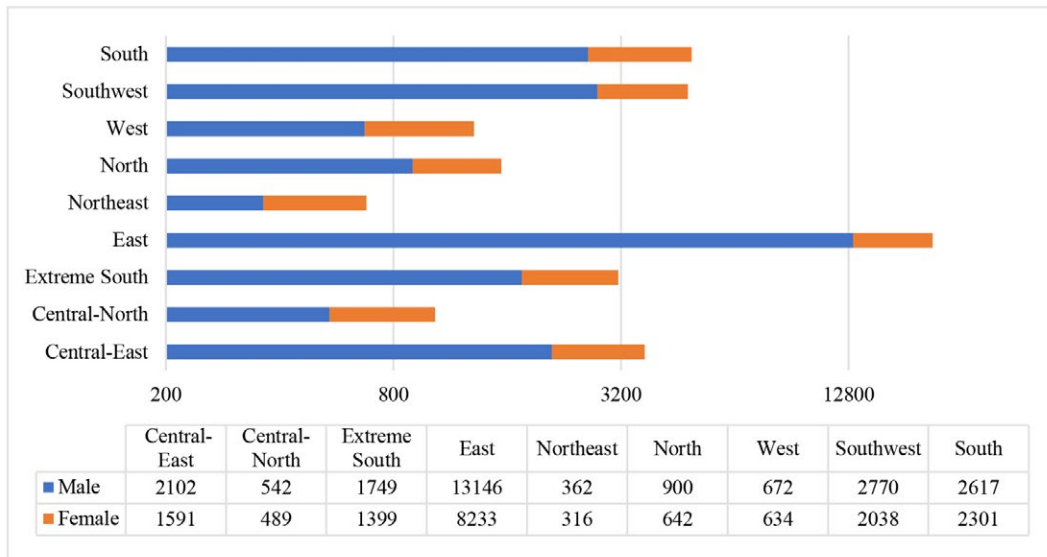
**Graphic 1.** Number of reported cases of acquired syphilis as reported in SINAN, by health macro-region, Bahia, Brazil, 2018–2022



Source: SESAB/SUVISA/DIVEP/SINAN - Notifiable Diseases Information System (2023).

Regarding the gender of people affected by acquired syphilis, Graph 2 shows a prevalence in males in all macro-regions. In the Eastern and Central-Eastern macro-regions, 61.4% and 56.9% of the cases were occupied, respectively. Among the notifications, only 168 did not have data on gender.

**Graphic 2.** Number of cases by health macro-region and sex as reported in SINAN, Bahia, Brazil, 2018–2022

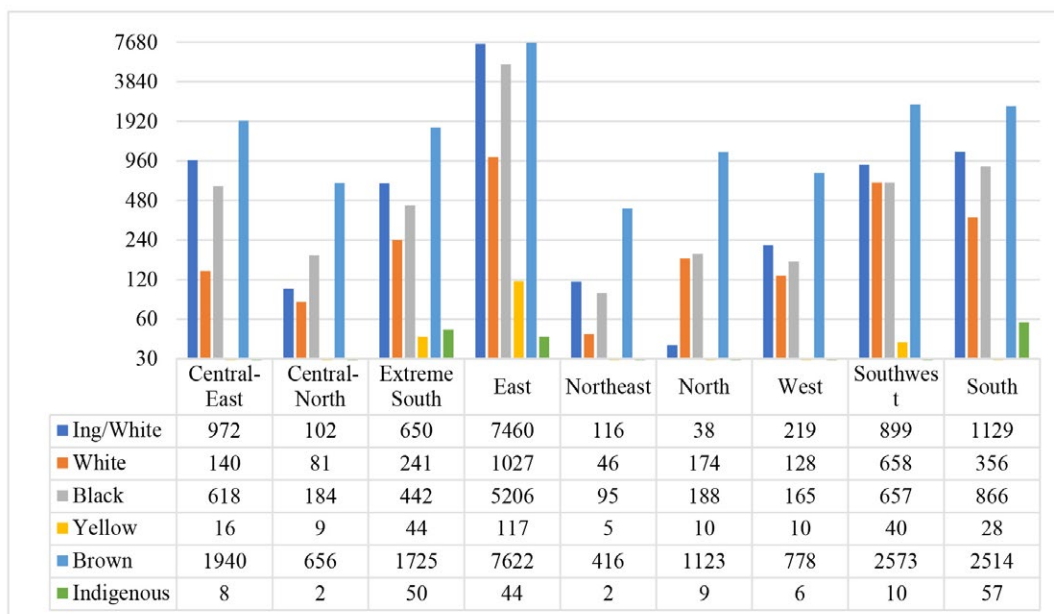


Source: SESAB/SUVISA/DIVEP/SINAN - Notifiable Diseases Information System (2023).

Regarding the age group, the young public, aged between 20 and 34 years, stands out in relation to the other ages, marking a total of 18,692 cases reported in this age group. Then, the public aged between 35 and 49 with a total of 10,320. The lowest indexes were in the ages between 10–19 years and 64 years and more, which corresponds to 7.28% total.

Of the reported cases with information on race/color, about 19,347 are of self-declared brown people, which corresponds to 45.31% of the notifications and 8,421 in black people (19.75%), and together a total of 65.06%. However, it is noteworthy that this marker presents difficulty in its completion since 11,585 cases were reported as ignored (27.1%).

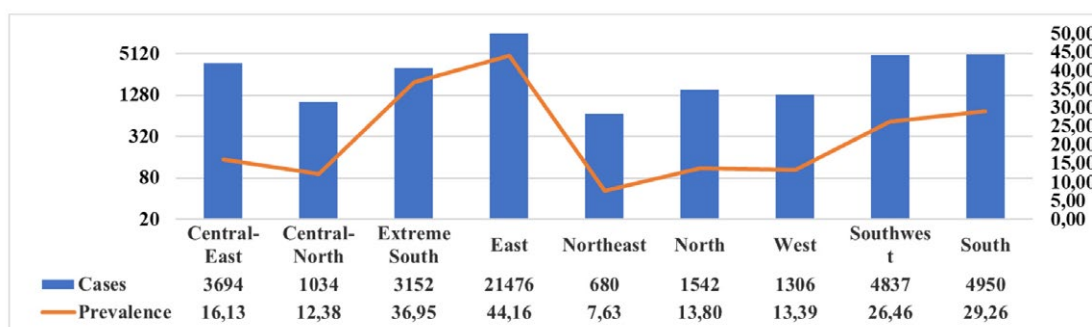
**Graphic 3.** Number of cases by race/color, as reported in SINAN, by health macro-region, Bahia, Brazil, 2018–2022



Source: SESAB/SUVISA/DIVEP/SINAN - Notifiable Diseases Information System (2023).

Graph 4 corresponds to the number of reported cases and the prevalence rate per health macro-region of Bahia in the analyzed time. Considering that the eastern macro-region is the most populous (4,863,025), it stands out with the highest prevalence rate of 44.16 to 10,000 inhabitants. The macro-regions with the lowest prevalence rate were the Northeast (7.63), followed by the Center-North (12.38). Noting that the population of the Center-North (835,126) is proportional to the population of the Far South of Bahia macro-region (853,039), which presented a prevalence rate of 36.95 per 10,000 inhabitants.

**Graphic 4.** Number of cases and prevalence rate of acquired syphilis by health macro-region, Bahia, Brazil 2018–2022

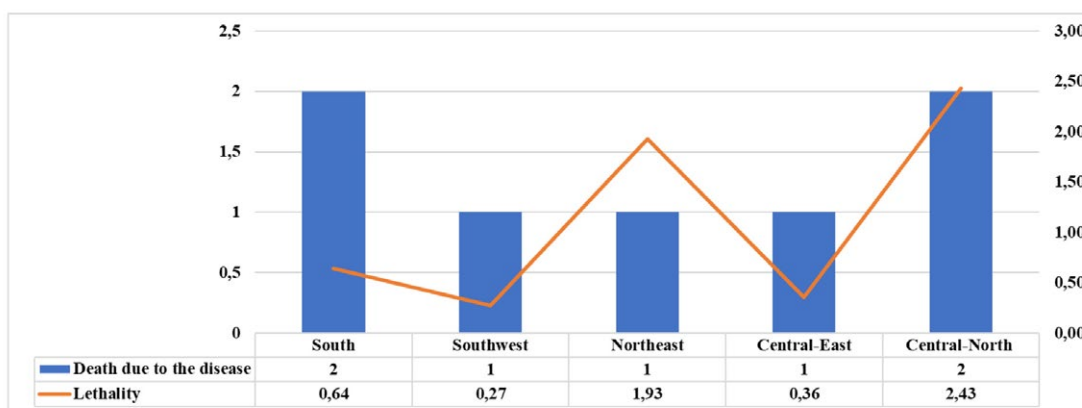


Source: SESAB/SUVISA/DIVEP/SINAN - Notifiable Diseases Information System (2023).

In the state of Bahia, 2018, compared to the other years, configures the highest prevalence rate (7.07/10,000 inhabitants), followed by 2019 and 2022 with a proportional prevalence rate (6.77 and 6.84/10,000 inhabitants). The year 2020 had the lowest prevalence (3.79/10,000 inhabitants). In Brazil, there was a decrease in prevalence in 2020 (6.16/10,000 inhabitants), followed by a return to the 2018–2019 standard, with a further decrease in 2022 (3.92/10,000 inhabitants) characterizing the lowest rate recorded in this period.

It is noteworthy that the North, East, West, and Far South macro-regions did not register deaths in the period studied. The highest lethality rates were recorded in the Central-North (2.34%) and Northeast (1.93%) macro-regions (Graphic 5). Considering the higher number of deaths, the cities of Ilhéus (South Region) and Jacobina (Center-North), which registered two deaths due to syphilis among the seven deaths that occurred in the state, stand out.

**Graphic 5.** Number of deaths from the disease and case fatality rate by health macro-region, Bahia, Brazil, 2018–2022



Source: SESAB/SUVISA/DIVPEP/SINAN - Notifiable Diseases Information System (2023).

#### 4. Discussion

Regarding the number of reported cases of syphilis in the last five years in the state of Bahia, it was possible to notice that in the years 2020 and 2021 there was a sharp drop in comparison to the other years studied. This fact can be explained by the most critical period of the SARS-CoV-2 pandemic, which contributed to the underreporting of syphilis cases and, consequently, a drop in notifications.<sup>11</sup>

Similarly, in 2020, Brazil had a drop in reported cases of syphilis, but in 2021, unlike Bahia, case reports returned to the pre-pandemic annual average. The flexibility of the isolation and social distancing measures that occurred in 2021 favored the increase in the number of cases and, consequently, the number of notifications.<sup>12</sup>

In the last census conducted in 2022, it was found that the population of the state of Bahia was 14,136,417 inhabitants, and in Brazil is 203,062,512.<sup>13</sup> The Eastern macro-region has many reported cases. This region corresponds, proportionally, to the highest population index of the state, reaching almost 5 million inhabitants. A study that evaluates the epidemiological aspects of congenital and acquired syphilis in Maranhão shows that regions with a large population contingent favor the speed of transmission of the disease.<sup>14</sup>

The Eastern macro-region still presents the highest and greatest prevalence among the other macro-regions. When comparing the populations of the macro-regions, the Far South is much lower than the East, but they come to have close rates, and the prevalence rate in this macro reaches more than twice the rate of the macro-region Center-North, which has a population like the Far South. In fact, the rates of syphilis in the Far South region exceeded the state average in 2018 and 2019, according to the epidemiological bulletin of that year.<sup>15</sup>

The Northeast and Center-North macro-regions have the lowest number of cases reported during the 5 years analyzed, corresponding, respectively, to 680 and 1,034 cases of acquired syphilis. These macro-regions also have the lowest number of notifications of congenital syphilis, according to an analysis performed over the period of 10 years.<sup>16</sup>

Among socioeconomic factors, poverty is the condition that further vulnerabilizes the population and is significantly associated with the occurrence of syphilis in the population.<sup>19</sup> However, the Human Development Index (HDI) of most municipalities that make up the Far South macro-region is considered medium.<sup>17</sup>

The prevalence rate in the country in 2021 reached the highest index, pointing to 8.25/10,000 inhabitants; therefore, the following year, there was a significant reduction to 3.92/10,000 inhabitants. It is noteworthy that, in August 2020, the Ministry of Health agreed to the agenda of Strategic Actions for the reduction of Syphilis in Brazil in 2020/2021, where one of the proposals was the strengthening of health care networks and the surveillance system for combating syphilis in the country.<sup>18</sup> It is noted that the actions were not effective in reducing the disease in the country.

Regarding the gender variable, the study emphasized that cases were more prevalent in males in all macro-regions. The same has been happening in Brazil, considering the last five years, where 425,804 cases occurred in males, while in females, there were a total of 268,949 registered cases.<sup>4</sup>

The higher number of cases of syphilis in males may be due to misinformation about the disease, even due to the low frequency of health units. Men are more exposed to syphilis due to their limited knowledge about the disease, failing to use protection in their sexual relationships, and delaying in seeking effective treatment, or even discontinuity of this, for believing that when the symptoms disappear they are cured.<sup>19</sup>

In the same study, it is evidenced that actions to promote health and prevent diseases, among them STIs, are aimed at the female public. When it comes to health promotion for males, campaigns and lectures are focused more directly on prostate cancer, requiring a change in the planning of actions carried out in primary health care, focusing on the man as an integral and compound being who must be treated in

all aspects of his health, including sexual, so that he is aware of the possible risks of unprotected sexual intercourse and what the treatment is if he acquires the disease.<sup>20</sup>

Data from the Pan American Health Organization show that in 2016 about 2 million new cases of syphilis appeared in the Region of the Americas. It also points out that in 2017, 1 to 27% of cases of the disease were in gay men and other men who have sex with other men (MSM), and 0.5 to 14% in female sex workers.<sup>2</sup>

In all the macro-regions studied, about age group, it is observed that the young adult population (20–34 years old) has several notifications triggered in relation to the other ages. With a total of 18,692 people notified, this public is similar to the data presented both on the national and international scene. This is expected because it is a sexually transmitted disease, which affects this age group in greater numbers, either by lack of condom use and/or access to health education on prevention and self-care.<sup>21</sup>

In Brazil, acquired syphilis is also significant in the age group of 20 to 39 years. In the period from 2011 to 2022, this public reached a total of 645,926 people reported.<sup>4</sup> Data from the State of Bahia, as well as in Brazil, emphasize the need for and importance of active surveillance and monitoring of this public health event to ensure that strategies are created and determined among the young public.<sup>21</sup>

The early detection of syphilis in the young and adult population is a positive indicator, tracing timely treatment lines for each phase of the disease, preventing its progression to tertiary syphilis, which can take up to 40 years to manifest and is marked by positive serological reactions, in addition to avoiding the compromise of the cardiovascular and nervous systems.<sup>22</sup>

Generally, people with syphilis do not have signs and symptoms of the disease, so it is necessary to implement strategies in primary care for early diagnosis and treatment, actions aimed at the young and adult population, for the recognition of possible signs and symptoms, which often do not seek appropriate treatment and continue to transmit to other individuals, requiring the cleverness of the professional who works in the service to understand all aspects of syphilis.<sup>21,22</sup>



In this study, the reported cases with information on race/color point to 45.31% of cases in self-declared brown people and 19.75% in black people. Race/color is an important marker in the study of syphilis since the history of discrimination and exploitation has become a socioeconomic determinant and an objective condition of inequality in living, health, and death conditions. In Brazil, although there is a lack of analysis on the subject, studies have shown worse health conditions of the black population (blacks and browns) compared to whites.<sup>23</sup>

Discussing the “race/color marker” is necessary because only in these data it was observed difficulty in its completion; about 27.1% of cases were reported having race/color as ignored. Highlighting the relevance of race/color information for the evaluation of health policies is a need of the Brazilian State. The recent National Health Information and Informatics Policy points to health information as a structuring element for strengthening the SUS, guaranteeing citizenship rights and equity in health.<sup>24</sup>

Quality information is necessary to enable objective analysis of the health situation, evidence-based decision-making, and programming of public actions aimed at the development of good health conditions for the general population. Brazil has a large network of Sistema de Informação em Saúde - SIS (Health Information Systems), which are available for managers and professionals to use this information in the preparation and implementation of policies aimed at improving the health of the population.<sup>25</sup>

The highest lethality rates were recorded in the Central-North and Northeast macro-regions. Syphilis lethality is an indicator that represents a way to express the severity of the disease. In addition, the lethality rate varies with age, gender, socioeconomic conditions, the individual’s immune resistance, and the effectiveness of treatment.<sup>15</sup>

Through systems that provide reliable information, it is possible to describe epidemiological aspects, monitor and evaluate the performance of health programs, and manage services and their offerings. The bases of the health information system in Brazil are composed of a variety of data, which allow us to analyze and make effective decisions to cope with acquired syphilis.<sup>25</sup>

It is worth noting that adequate notification of epidemiological data contributes to the correct investigation and, consequently, the mitigation of syphilis. Meanwhile, nursing is a profession that has frequent contact with the population and can, most of the time, develop actions still in primary care—through the awareness of safe habits—to avoid the transmission of syphilis through sexual contact at risk, avoiding multiple partners and using condoms, in addition to compulsory notification in cases of VDRL positivity.<sup>26</sup>

The study presented limitations related to the incompleteness of the variables due to unknown or missing information. These characteristics are already expected in studies that use secondary data from information systems. In addition, the SINAN notification form does not offer, for example, possibilities for exploiting data that address sexual behavior.

## 5. Conclusion

The state recorded an average of 9,000 cases per year, and the Northeast and Center-North macro-regions have the lowest notifications in the entire period studied. There was a higher prevalence in males, in the age group of 20 and 34 years old, and race/color self-declared brown in all macro-regions.

The highest lethality rates were recorded in the Central-North and Northeast macro-regions. The description of the findings points to specificities in the Eastern macro-region, for accumulating more than half of all cases reported in the years 2018–2022.

The observed profile points to the need for the involvement of health professionals with the School Health Program, the creation of public policies, and the implementation of prevention, diagnosis, and early treatment. There is a need to carry out active search, testing campaigns, and health education for young people and males, especially in the East macro-region. The findings presented in this study may contribute to the knowledge and conduct of strategies that cover the real needs of coping with acquired syphilis.

## Authors' contributions

Santos JBLO, Silva FS, Olivera TR, Batista ACS, Carvalho VT, and Suto CSS participated in the conception, structuring, analysis, and interpretation of the data, and developed or performed the critical review of the article to obtain intellectual content consistent with this journal.

## Conflicts of interest

No financial, legal or political conflict involving third parties (government, companies and private foundations, etc.) has been declared for any aspect of the submitted work (including but not limited to grants and funding, participation in advisory board, study design, manuscript preparation, statistical analysis, etc.).

## Indexers

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