



Gestational and congenital syphilis in the state of Paraná from 2017 to 2021: cross-sectional study

Sífilis gestacional e congênita no estado do Paraná de 2017 a 2021: estudo transversal

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ABSTRACT

To characterize and delimit the prevalence and epidemiological profile of gestational and congenital syphilis in the state of Paraná in the years 2017 to 2021. Cross-sectional and descriptive study, with analysis of the epidemiological data of gestational and congenital syphilis in the state of Paraná from 2017 to 2021. The data available in the Department of Informatics of the Unified Health System (DATASUS) were used. In the period 2017-2021, 12,258 cases of gestational syphilis and 3,691 cases of congenital syphilis were reported in Paraná. The health regional with the highest notification rate of gestational syphilis was the 7th, and the one with the highest rate of congenital cases was the 9th. The epidemiological profile of infected pregnant women highlighted those living in urban areas, with complete high school education, white, aged between 20 and 39 years, tertiary syphilis and diagnosed in the third trimester of pregnancy. Gestational and congenital syphilis is a public health problem in Paraná, and it is of utmost importance the strengthening of effective public policies and strategies for prevention, early detection and adequate treatment, besides the improvement of screening and testing programs.

Keywords: Congenital syphilis. Pregnant women. Sexually transmitted infections.

RESUMO

Caracterizar e delimitar a prevalência e perfil epidemiológico da sífilis gestacional e congênita no estado do Paraná nos anos de 2017 a 2021. Estudo transversal e descritivo, com análise dos dados epidemiológicos da sífilis gestacional e congênita no estado do Paraná de 2017 a 2021. Foram utilizados os dados disponíveis no Departamento de Informática do Sistema Único de Saúde (DATASUS). No período de 2017-2021 foram notificados 12.258 casos de sífilis gestacional e 3.691 casos de sífilis congênita no Paraná. A regional de saúde com maior taxa de notificação de sífilis gestacional foi a 7ª, e a com maior taxa de casos congênitos foi a 9ª. O perfil epidemiológico das gestantes infectadas, destacou aquelas que residiam na zona urbana, com ensino médio completo, brancas, com idade entre 20 a 39 anos, sífilis terciária e diagnosticada no terceiro trimestre de gestação. A sífilis gestacional e congênita é um problema de saúde pública no Paraná, e é de suma importância o fortalecimento de políticas pública efetivas e estratégias de prevenção, detecção precoce e tratamento adequado além de aprimoramento dos programas de triagem e testagem.

Palavras-chave: Sífilis congênita. Gestantes. Infecções sexualmente transmissíveis.

INTRODUCTION

Syphilis is an infectious and systemic disease that has challenged humanity for centuries. Its etiological agent is a bacterium, *Treponema pallidum*, with a chronic and curable course, exclusive to the human race. It can be transmitted through unprotected sexual contact, blood or blood products (contaminated needles or transfusion with untested blood). It can also be transmitted from mother to child during pregnancy (vertical transmission), at the time of delivery (congenital syphilis), and through breastfeeding if there are active lesions in the breast area¹.

Despite having an effective, low-cost, and primarily free treatment provided by the Unified Health System (SUS), syphilis remains a public health problem to this day². It can be classified, based on the disease stage, into primary, secondary, latent, or tertiary syphilis, with the primary and secondary stages having the highest transmission potential^{3,4}.

Currently, worldwide, syphilis affects one million pregnant women per year, causing over 300,000 fetal and neonatal deaths and exposing more than 200,000 children to the risk of premature death⁵. It is considered a serious public health problem due to perinatal complications, including prematurity, abortion, fetal or neonatal death, as well as ophthalmological, auditory, and neurological impairments. In Brazil, from 2005 to 2019, 324,321 cases of gestational syphilis were reported, with 45.0% of the cases occurring in the Southeast region, 21.0% in the Northeast region, 14.7% in the South region, 10.4% in the North region, and 8.9% in the Central-West region⁶.

Gestational syphilis represents a serious public health issue in Brazil, as it is one of the most prevalent infectious diseases during the pregnancy and postpartum period, with infection rates exceeding 80%, depending on the clinical stage of the disease and gestational age^{1,7}.

Therefore, knowing the epidemiological profile of gestational syphilis in the state of Paraná may broaden the understanding of the pathological events involving the mother and child during pregnancy, as well as the quality of services provided to pregnant women with preventive actions and health promotion. Thus, the objective of this study was to characterize the population affected by gestational and congenital syphilis in the state of Paraná in the years 2017 to 2021.

METHODO

This study is characterized as cross-sectional and descriptive, with a quantitative approach, in which the epidemiological data of gestational and congenital syphilis in the state of Paraná, Brazil, were analyzed over a five-year period, from January 2017 to December 2021. The state of Paraná is located in the southern region of Brazil, has an area of 199,298.979 km² and a population of approximately 11,516,840 inhabitants (Brazilian Institute of Geography and Statistics [IBGE], 2020)⁸.

We used the data available at the Departamento de Informática do Sistema Único de Saúde (DATASUS)⁹, collected from May to June 2022, specifically from the Sistema de Informação de Agravos e Notificação (SINAN)¹⁰ available from 2017 to December 2021. Subsequently, the data were tabulated in Microsoft Excel® 7.0 software.

For the analysis of gestational and congenital syphilis, in building the database, the 399 municipalities of the state of Paraná and the following variables were selected: year of notification, health regional, infection by area of residence, age group, education, race, color, and clinical classification. Thus, the variables could be analyzed and separated by Health Regional (SR). The state of Paraná is divided into 22 Regional Health Areas, being the 1st RS - Paranaguá, 2nd RS - Metropolitan, 3rd RS - Ponta Grossa, 4th RS - Irati, 5th RS - Guarapuava, 6th RS - União de Vitória, 7th RS - Pato Branco, 8th RS - Francisco Beltrão, 9th RS - Foz do Iguaçu, 10th RS - Cascavel, 11th RS - Campo Mourão, 12th RS - Umuarama, 13th RS - Cianorte, 14th RS - Paranavaí, 15th RS - Maringá, 16th RS - Apucarana, 17th RS - Londrina, 18th RS - Cornélio Procopio, 19th RS - Jacarezinho, 20th RS - Toledo, 21st RS - Telêmaco Borba and 22nd RS - Ivaiporã.

The target population included in this study were pregnant women aged 15 to 49 years, and also reported cases of congenital syphilis up to one year of age. The detection rate of syphilis in pregnant women was calculated by the ratio between the number of cases detected in a given year of diagnosis and the total number of live births of mothers residing in the same place and year, multiplied by one thousand.

The incidence rate of congenital syphilis was identified by the ratio between the number of new confirmed cases of congenital syphilis in children under one year of age and the total number of live births of mothers residing in the same year, multiplied by one thousand. Ethical aspects were respected and, since this was secondary data, there was no registration with the Ethics and Research Committee, with a waiver of appreciation according to the ethical

standards of Resolution No. 466/2012 of the National Health Council and international ethical guidelines.

RESULTS

Analyzing the data obtained, it was possible to observe a high incidence of Syphilis in pregnant women and children in all existing Health Regions (SR) in Paraná during the years studied. In the period from 2017 to 2021, 12,258 cases of gestational syphilis and 3,691 cases of congenital syphilis were reported. A growth in the incidence of gestational syphilis cases was identified, especially from 2017 to 2020, and a reduction of 1,747 (61.8%) cases for 2021. However, congenital syphilis also showed a high incidence of cases from 2017 to 2020 and a significant decline of 40.4% in the year 2021, with 350 reported cases (Figure 1).

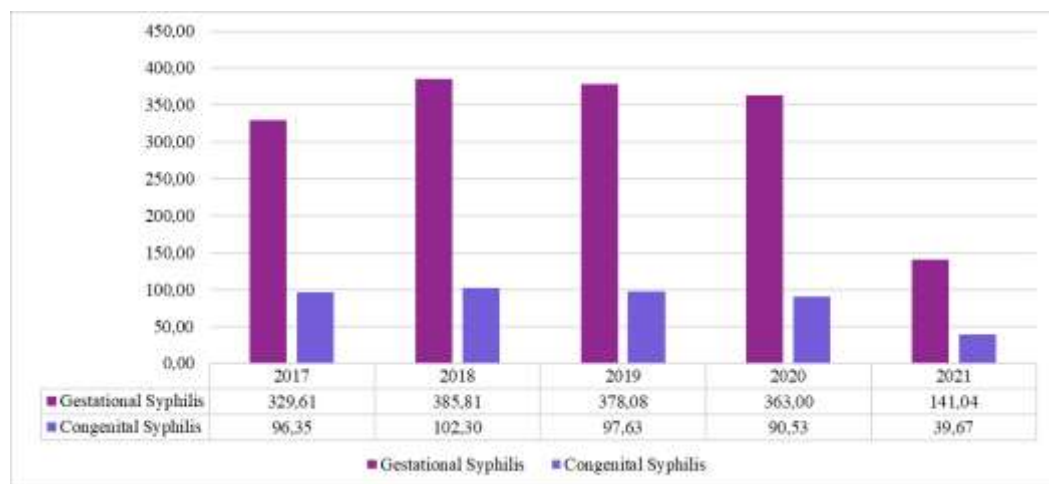


Figure 1. Gestational syphilis rate and congenital syphilis rate (per 1000 live births) in Paraná, 2017-2021. Source: DATASUS/2022.

Of the 22 Health Regions of the State, it is observed that the macroregion of Pato Branco (7th SR) occupies first place with the highest rate of gestational syphilis from 2017 to 2021 (164.1/ 1000 pregnant women). In second place is the 10th RS (Cascavel) with the rate of 103.7 cases per 1000 live births, followed by the 9th RS (Foz do Iguaçu) with 101.0/1000 live births. The other regions did not exceed the rate of 100 cases. However, the 19th RS (Jacarezinho) was the region with the lowest number of reported cases of gestational syphilis, totaling 34 cases per 1000 live births (Figure 2).

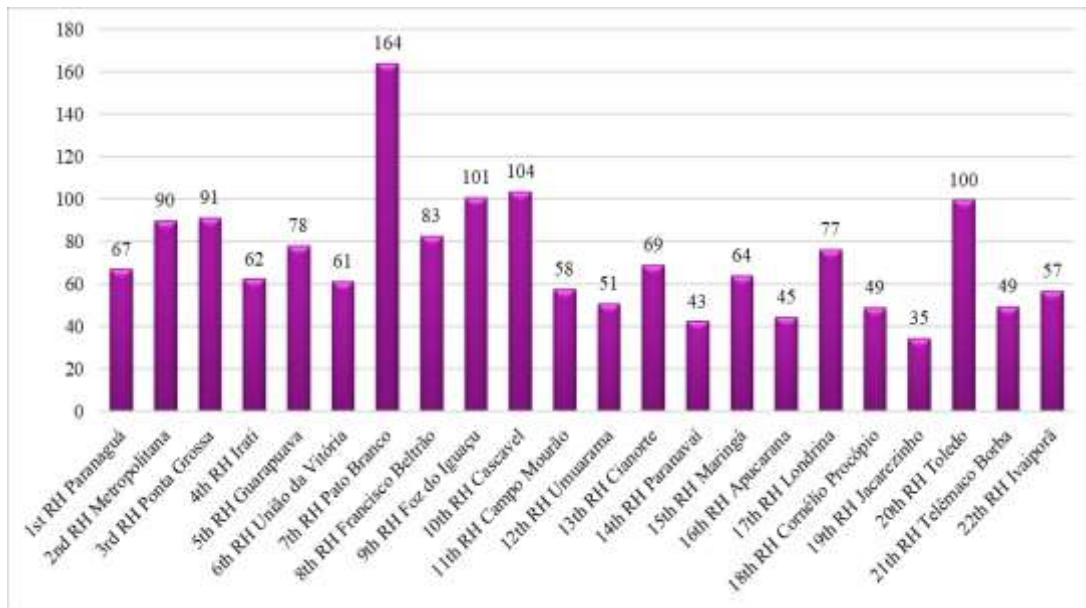


Figure 2. Gestational Syphilis detection rate by health macro-region of Paraná in the period from 2017 to 2021. Source: DATASUS/2022.

Of these gestational syphilis cases, 30.1% had vertical transmission, causing congenital syphilis. And of the 22 health regions, the 9th RS (Foz do Iguaçu) followed by the 1st RS (Paranaguá) and the 7th RS (Pato Branco) had the highest number of notified cases. And again, it is worth mentioning the 19th RS (Jacarezinho), also with the lowest number of congenital syphilis cases (Figure 3).

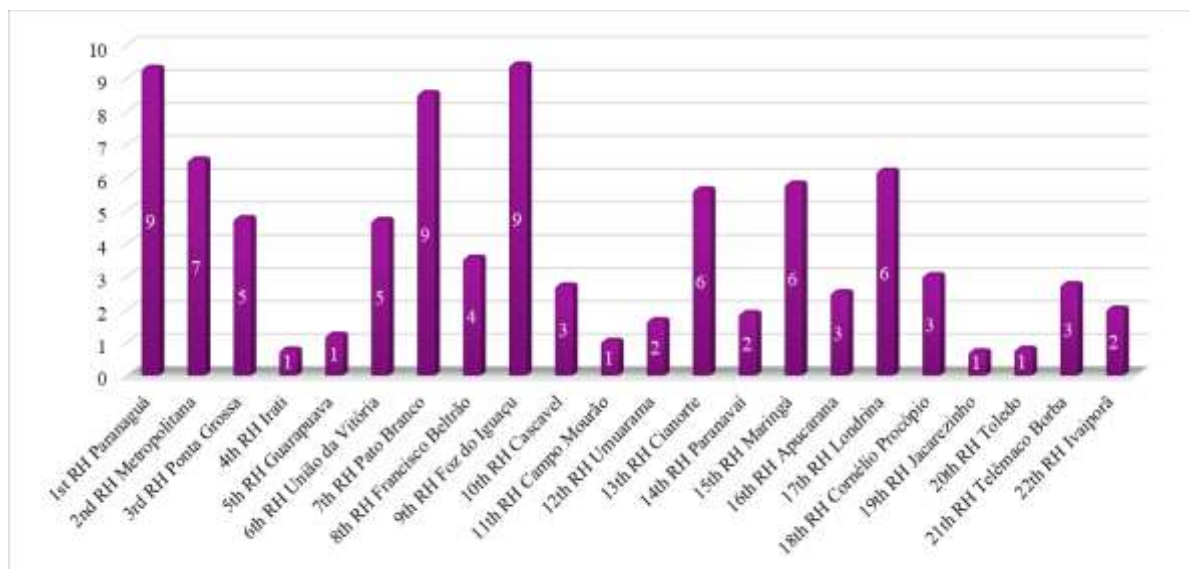


Figure 3. Congenital syphilis detection rate by health macro-region of Paraná in the period 2017 to 2021. Legend: RH: Regional Health Care. Source: DATASUS.

Regarding the sociodemographic characteristics, the highest prevalence was found in women aged 20 to 39 years, who self-reported to be white, living in urban areas, and with complete high school education (Table 1).

Table 1. Sociodemographic characteristics of reported cases of Syphilis in Paraná.

Variables	Syphilis cases notified by health region
Age group in years	N. of abs. cases, (N relative cases)
15-19 years	2.836 (22,95%)
20-39 years	9.268 (75,01%)
40-59 years	251 (2,03%)
Total	12.355
Education	N. of abs. cases, (N relative cases)
Illiterate	25 (0,96%)
Incomplete elementary school	2.554 (26,71%)
Elementary school complete	1.465 (15,32%)
High School Incomplete	2.221 (23,23%)
High school complete	2.752 (28,78%)
Higher education incomplete	318 (3,33%)
Tertiary education complete	226 (2,36%)
Not applicable	1 (0,01%)
Total	9.562
Race	N. of abs. cases, (N relative cases)
White	8.291 (67,97%)
Black	656 (5,38%)
Yellow	94 (0,77%)
Brownish	3.063 (25,11%)
Indigenous	94 (0,77%)
Total	12.198
Residence	N. of abs. cases, (N relative cases)
Urban	6.861 (86%)
Rural	1.118 (14%)
Ignored	1.023

Legend: N: Number; abs: absolute;

Source: Information System and Notifiable Diseases (SINAN)

Regarding the cases of pregnant women with syphilis by gestational age, cases were identified in all three trimesters of pregnancy. However, in the third trimester there were more cases diagnosed (Figure 4).

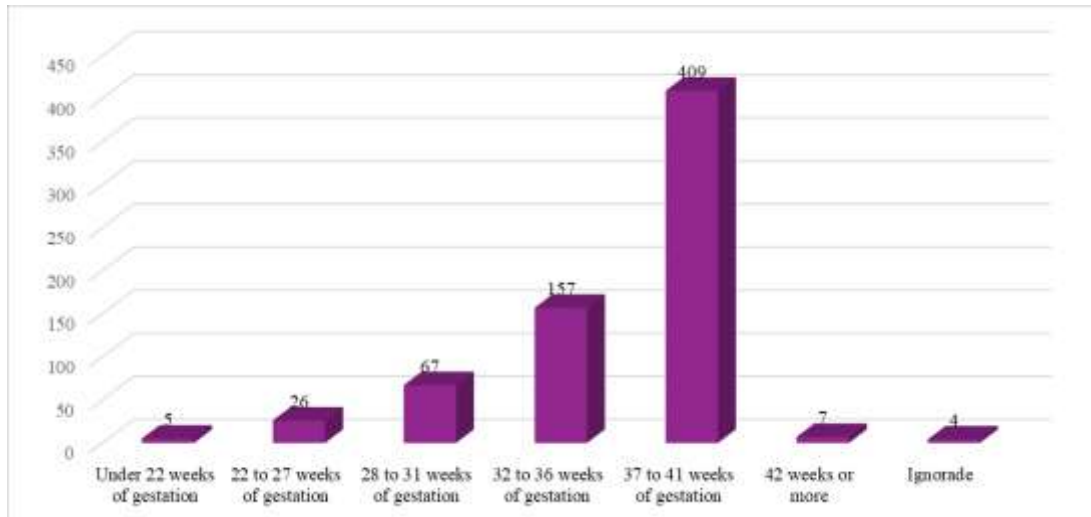


Figure 4. Cases of pregnant women with syphilis by gestational age by year of diagnosis in the state of Paraná, 2017 to 2021.
Source: DATASUS.

Regarding the frequency related to the clinical form of gestational syphilis detection, it was possible to observe a gradual decrease in the detection of syphilis in its primary form. On the other hand, there is an increase in the diagnosis of the latent clinical form until 2020, and a decrease in the year 2021, which in turn may reflect either an early or a late infection. Furthermore, the detection of secondary syphilis remained the least frequent, as did tertiary syphilis. However, it is worth noting a high rate of cases being reported as unknown or white (Figure 5).

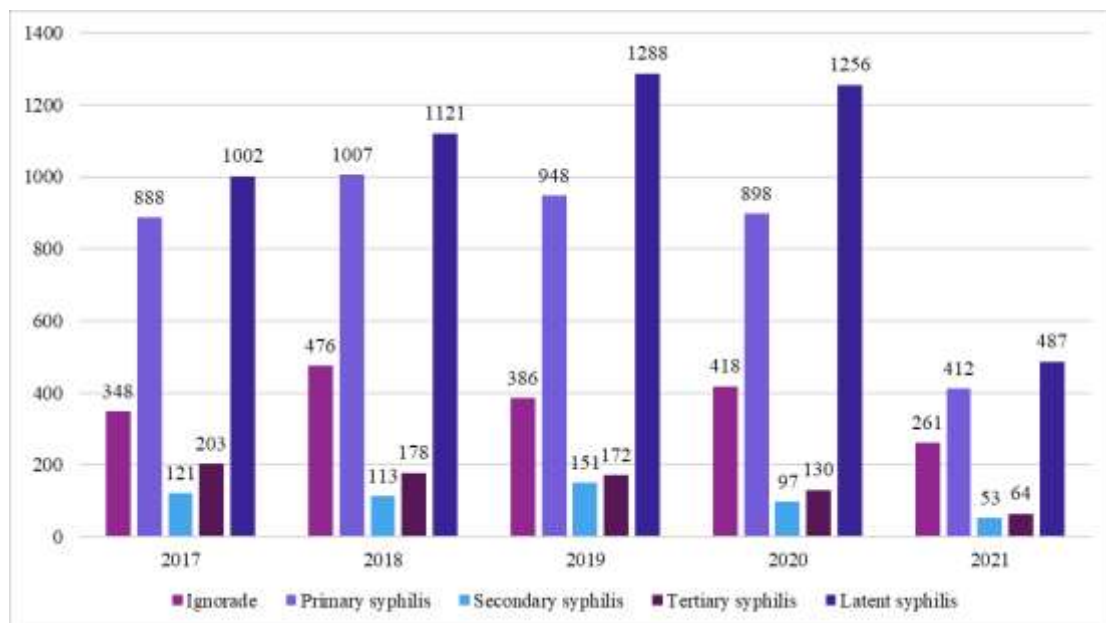


Figure 5. Frequency of clinical forms of syphilis in pregnant women in Paraná, 2017 to 2021.
Source: DATASUS.

In this study, it was possible to observe that at least 10% of the treponemal tests (FTA-abs) were not performed in pregnant women with syphilis, added to an increased frequency of positive results during pregnancy, something extremely favorable for the confirmation of the diagnosis and to avoid the treatment of false positives or an unconfirmed diagnosis (Figure 6).

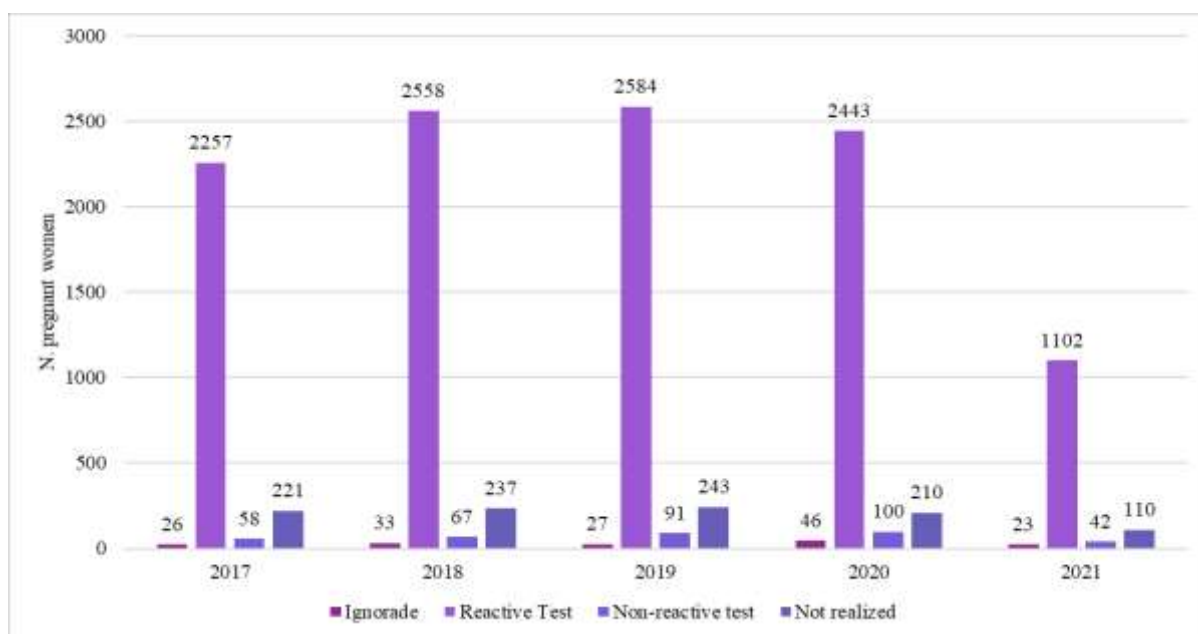


Figure 6. Frequency of the different results obtained in treponemal tests among pregnant women with syphilis in Paraná, in the period from 2017 to 2021.

Source: DATASUS.

DISCUSSION

Syphilis cases have seen a significant increase throughout Brazil. In the period from 2009 to 2019, 305,379 cases of syphilis in pregnant women were reported to SINAN. In addition, in 2018, a detection rate of 21.4 cases of syphilis in pregnant women/1,000 live births was observed, a number 25.7% higher than the rate observed in 2017¹⁰.

As seen in the present study, the number of reported cases of gestational syphilis was predominant in the year 2018 and there was a considerable drop in the year 2021. This may have occurred due to an underreporting or lack of diagnosis, since during the pandemic of COVID-19 the search for health care decreased and health services suspended the care protocols for other demands, such as STIs, HIV, hepatitis, causing the delay or non-performance of exams/rapid tests¹¹.

Syphilis is a compulsorily notifiable disease, and through these records, it is possible to plan surveillance measures, allowing a greater collection of data necessary for epidemiological

analysis and providing subsidies for planning control actions¹². Otherwise, underreporting hinders the understanding of the magnitude of the problem, interfering in the ability to control the diseases^{13,14}.

It is noteworthy that most infections occurred in the third trimester of pregnancy, and these data show a high risk of transmission to the fetus, since vertical transmission is greater in later stages of pregnancy due to greater permeability of the placental barrier in this period, especially if the pregnant woman presents early forms of infection¹⁵. Thus, it is understood that syphilis in pregnancy represents a serious public health problem and is responsible for high rates of intrauterine morbidity and mortality and maternal diseases¹⁶.

Regarding the increased incidence of syphilis cases in pregnant women between 2018 and 2020, the promotion of public policies and programs of maternal and child care is under discussion in order to reduce and minimize maternal and infant morbidity and mortality, besides offering safe and quality care¹⁷. The Maternal and Child Care Line, established by the Ministry of Health through the Stork Network, aims to organize the network of care and assistance in the processes of prenatal care, childbirth, puerperium, and monitoring of growth and development of children, especially during the first year of life¹⁸. Evidence indicates that adequate prenatal care is an important factor in reducing the incidence of diseases such as low birth weight, prematurity, congenital infections, and perinatal death¹⁷.

Among the 22 health regions of Paraná, the health regional of Pato Branco was the one with the highest number of reported cases of gestational syphilis. These findings corroborate with studies conducted by Pilger and collaborators (2019)¹⁹, where they recorded an increase of 475% for congenital syphilis cases and 618% for syphilis in pregnancy in the municipality of Pato Branco from the period 2014-2018. On the other hand, the Health Regional of Jacarezinho, which covers 21 municipalities, was the one with the lowest number of reported cases of gestational and congenital syphilis. According to Carvalho and Brito in the year 2014²⁰, in Rio Grande do Norte, it revealed that municipalities with lower availability of resources had a higher probability of underreporting, which may justify this low rate of notified cases in this regional.

Regarding the age range of pregnant women in all regions, we observed a prevalence between 20 and 39 years. Studies developed in the United States²¹, Paraná²², and Piauí²³ corroborate the predominant age range in our study. This data can be justified because at this age women are at the peak of their reproductive phase^{12,24}. With regard to the ethnicity or color

of the pregnant women, there was a significant predominance of white women. This finding is in agreement with other studies carried out in the state of Paraná²⁵.

As for the education of these women, complete high school education was prevalent, unlike a study conducted in the state of Tocantins during the years 2007 to 2017, and another conducted in the state of Sergipe during the years 2011 to 2015, which show that pregnant women had incomplete elementary school education^{26, 27}. And a study conducted in Peru shows that infected pregnant women also had low schooling²⁸. This is due, in part, to the increase in the general level of schooling in the population and the greater access to SUS health services. It is important to emphasize that low schooling and lack of information are considered risk factors for exposure to sexually transmitted infections, since pregnant women have a low understanding of the importance of prevention measures²⁶.

For the diagnosis of syphilis in pregnancy, it is necessary to correlate the pregnant woman's clinical data, laboratory test results, the patient's history, as well as possible exposure to the infection. The tests used for diagnosis are direct (dark-field examination and direct research with stained material) and immunobiological tests, which can be non-treponemal (VDRL, RPR, TRUST) and treponemal (FTA-Abs, ELISA/EQL, TPHA/TPPA/MHA-TP) and rapid tests (TR)²⁹.

According to the Ministry of Health 2022¹⁵, the testing of pregnant women for syphilis should occur during the first prenatal visit, at the beginning of the third trimester, around 28 weeks and at the time of delivery. In this study, it was found that most pregnant women diagnosed with syphilis by FTA-Abs test were in the latent period and at least 10% were not tested, which may lead to non-diagnosis in a timely manner and consequently an increase in cases of congenital syphilis.

The effective control of syphilis depends, among other measures, on the optimization of public policies and the commitment of managers to put into practice actions aimed at the quality of care provided to pregnant women and their sexual partners during prenatal care (PN)³⁰. In addition, it is essential to raise the awareness of the community in general and of health professionals about the importance of early diagnosis, as well as of effective treatment for pregnant women and their partners²⁹.

This work opens perspectives for new studies using predictive approaches on the databases related to congenital syphilis and social determinants, through the adoption of data science techniques applied to health. The limitations found in this study are related to the use of secondary data, which, given the possibility of underreporting, may underestimate the real

epidemiological situation of syphilis, since it is not possible to include in the study data of SG and CS not reported in SINAN¹⁰ in the period from 2017 to 2021.

CONCLUSION

During the period from 2017 to 2021, there was a high incidence of syphilis in pregnant women and children in all Health Regions of Paraná. 12,258 cases of gestational syphilis and 3,691 cases of congenital syphilis were reported in this period. Gestational syphilis showed a growth in incidence, especially from 2017 to 2020, followed by a reduction in 2021, suggesting the possible effectiveness of the control and prevention measures implemented in this period or an underreporting resulting from the pandemic period that many services could not be performed. However, congenital syphilis also showed a high incidence during the same period, requiring a more comprehensive and continuous approach to control vertical transmission.

The macroregion of Pato Branco was identified as the one with the highest incidence of gestational syphilis and Foz do Iguaçu as the macroregion with the highest case of congenital syphilis, highlighting the need for prevention and intervention strategies directed to these regions.

The epidemiological profile of most infected pregnant women was of women living in urban areas, with complete high school education, self-reported as white, aged 20 to 39 years and with the clinical classification of tertiary syphilis. These results suggest the need for public health approaches that consider socioeconomic, educational and geographic factors in the prevention and control of syphilis in pregnant women, intensifying prenatal actions, an opportune moment for guiding these women.

In summary, these findings reinforce the importance of effective public health policies and strategies for prevention, early detection, and adequate treatment of syphilis in pregnant women and children in Paraná. The implementation of measures targeted at regions of higher incidence, more affected demographic groups, and improvement of screening and testing programs are essential to reduce the burden of gestational syphilis and congenital syphilis.

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