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Epidemiological study of the socioeconomic characteristics of syphilis in pregnant women in the city of São Paulo

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ABSTRACT

OBJECTIVE

To analyze the incidence of syphilis in pregnant women based on reported data.

METHODOLOGY

A longitudinal observational study on syphilis was conducted in the municipality of São Paulo from 2019 to 2023, using variables such as race, education level, and age. Data were obtained from the DataSus platform via Tabnet and the HIV/AIDS Epidemiological Bulletin of the State of São Paulo.

RESULTS

The study analyzed gestational syphilis data in São Paulo, highlighting that between 2019 and 2023, cases varied from 45% to 50% among mixed-race women, 33% to 35% among white women, and 13% to 15% among Black women. Asian and Indigenous women represented less than 1%. Around 60% of reported cases involved non-white women. Surprisingly, most cases occurred in women with a high school education (31% to 43%), contradicting the expectation of higher prevalence among less-educated individuals. This finding reflects changes in the socioeconomic profile of pregnant women, indicating gaps in sexual education and increased exposure to sexually transmitted infections among more educated women. Regarding age, 74% to 82% of cases affected women aged 20 to 39, followed by those aged 15 to 19 (15% to 23%). Syphilis reinfection underscores the need to involve partners in treatment. Additionally, deficiencies in completing notification forms limit data analysis.

CONCLUSION

Syphilis is multifactorial, requiring comprehensive educational and preventive measures, including partner involvement in prenatal care and improvements in data collection, to address this silent epidemic.

DESCRIPTORS

Syphilis, Pregnant women, Socioeconomic factors, Epidemiology.

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1. INTRODUCTION

Syphilis is an ancient sexually transmitted infection (STI) caused by the bacterium *Treponema pallidum*, which can be transmitted sexually (acquired syphilis) or vertically (congenital syphilis) during pregnancy or childbirth[1]. It manifests in three stages: primary, secondary, and tertiary syphilis. Surveillance of syphilis in pregnant women is crucial, and its notification has been mandatory since July 2005. Epidemiological monitoring aims to control the vertical transmission (VT) of *Treponema pallidum* and track the infection's behavior in pregnant women and mothers to support planning, evaluation of interventions, treatment, prevention, and control measures[2].

Although syphilis is a disease with accessible, effective, and efficient treatment, it still presents high incidence rates, posing a challenge for public health. It is considered a chronic systemic infection that primarily affects populations in low-income regions; however, it also impacts individuals in both developing and developed countries. This global concern is exacerbated by its impact on all age groups, from fetuses (in congenital syphilis) to the elderly. According to the World Health Organization (WHO), syphilis affects over 12 million people worldwide, and its eradication remains a major challenge for healthcare systems[3].

This STI in pregnant women is associated with significant risks for both the mother and fetus due to vertical transmission, leading to complications such as miscarriage, premature birth, neonatal death, low birth weight, neurological impairments in newborns—including cognitive delays, vision loss, seizures, and bone malformations. Congenital syphilis (CS) is a preventable condition when syphilis cases are properly controlled in women and their sexual partners during family planning or prenatal care[4]. Prenatal care encompasses the medical attention and guidance provided throughout pregnancy, primarily aimed at ensuring maternal and fetal well-being and the birth of a healthy baby[2]. This period is critical for screening various diseases, including syphilis. Pregnant women diagnosed with syphilis are referred to high-risk prenatal care, with the responsibility for monitoring their condition falling on physicians and the Family Health Strategy (ESF) team[2].

It is estimated that globally, 12 million new cases of syphilis occur annually in adults, with 90% of cases in underdeveloped countries. Congenital syphilis remains a significant public health issue, affecting 10% to 15% of pregnant women. The disease also has a high prevalence and incidence in developed countries such as the United States, Australia, and several European nations. Data indicate that congenital syphilis leads to over 500,000 fetal deaths annually worldwide[2].

Each year, approximately 930,000 cases of congenital syphilis are reported globally, resulting in an estimated 350,000 adverse birth outcomes, most occurring in low- and middle-income countries. Due to the high morbidity and mortality rates associated with syphilis and its clinical repercussions for both mother and fetus, the WHO has established strategies to ensure the diagnosis and treatment of pregnant women with syphilis. The goal is to reduce congenital syphilis cases to fewer than 50 per 100,000 live births in at least 80% of countries by 2030[5]. In 2016, the global estimated prevalence of maternal syphilis was 0.69%, with 988,000 cases, a global congenital syphilis rate of 473 per 100,000 live births, and a total of 661,000 cases. In Brazil, in 2019, there were 61,127 reported cases of syphilis in pregnant women, with a detection rate of 20.8 per 1,000 live births, and 24,130 cases of congenital syphilis, with an incidence rate of 8.2 per 1,000 live births[1].

Regarding the strategies implemented by Brazil's Ministry of Health to enhance syphilis surveillance in pregnant women, between 2009 and 2019, the congenital syphilis rate in Brazil increased from 2.1 to 9.0 cases per 1,000 live births, with regional differences. In 2019, the South and Southeast regions reported congenital syphilis rates above the national average of 8.2 cases per 1,000 live births[5].

Syphilis in pregnant women remains a sensitive topic, often considered a societal taboo. As a result, it is frequently ignored, posing a serious risk to both mother and child, given the severe consequences of congenital syphilis. Women who have previously undergone syphilis treatment can become reinfected during pregnancy, a particularly vulnerable period, especially during the first trimester. Additionally, serological scarring—where a woman has been effectively treated but continues to show reactive test results—can complicate diagnosis and management. Partner involvement is another crucial factor, as many pregnant women fail to adhere to prenatal care due to their partners' absence from medical consultations and their reluctance to undergo treatment, increasing the risk of reinfection and congenital syphilis.

Thus, this study aims to analyze the incidence of syphilis in pregnant women in the municipality of São Paulo from 2019 to 2023.

2. METHODOLOGY

2.1 Study Design

This is an observational epidemiological study based on data retrieval from virtual platforms.

2.2 Inclusion and Exclusion Criteria

The study included reported incidence data of syphilis in pregnant women in the municipality of São Paulo from 2019 to 2023, obtained through the Tabnet DATASUS platform. Data related to other infections or different time periods were not considered.

2.3 Studied Variables

The study analyzed socioeconomic variables such as age, education level, and race in relation to the frequency of syphilis cases among pregnant women in São Paulo from 2019 to 2023.

2.4 Data Analysis Method

The research results were evaluated through relative analysis by comparing data across the studied years.

3. RESULTS

Regarding the race of pregnant women diagnosed and reported with syphilis, it was observed that, regardless of the reporting year, even considering the pandemic period, there was consistency in the relative data. Between 45.37% and 50.12% of cases occurred in mixed-race women, 33.39% to 35.31% in white women, and 13.51% to 15.38% in Black women. The relative frequency of cases among Asian and Indigenous women remained similar, not exceeding 1% of total cases. A more detailed classification of this information was noted over the years, as the number of cases marked as "unknown" decreased, as shown in Table 1.

Table 1 - Race of pregnant women diagnosed with syphilis in the Municipality of São Paulo.

Year of diagnosis	Blank	White	Black	Yellow	Brown	Indigenous
2019	3,96%	35,31%	14,39%	0,71%	45,37%	0,27%
2020	2,54%	33,80%	13,51%	0,90%	49,12%	0,13%
2021	1,17%	33,88%	15,38%	0,63%	48,83%	0,11%
2022	0,85%	34,28%	14,42%	0,51%	49,83%	0,12%
2023	0,51%	33,39%	15,37%	0,48%	50,12%	0,14%

Source: Tabnet, DATASUS, 2024

Regarding the education level of women diagnosed and reported with syphilis during pregnancy, 31.17% to 43.03% of cases occurred in women with a completed high school education, 19.38% to 21.40% in women with incomplete high school education, 8.93% to 14.48% in those with incomplete 5th to 8th grade education, and 9.98% to 11.53% in women

with incomplete elementary education. Less than 0.2% of cases involved illiterate women. The relative frequency of cases among women with incomplete 1st to 4th grade education, completed 4th grade education, incomplete higher education, and completed higher education was similar, ranging between 2% and 3% in each category. In 6.03% to 13.70% of reported cases, education level was not recorded on the notification form. A more detailed classification of this information was observed over the years as the number of cases marked as "unknown" decreased, as shown in Table 2.

Table 2 - Education level of pregnant women diagnosed with syphilis in the Municipality of São Paulo.

Year of diagnosis	Blank	Illiterate	1st to 4th incomplete grade of ES	4th complete grade of ES	5th to 8th incomplete grade of ES	Complete Elementary School	Incomplete High School	Complete High School	Incomplete Higher Education	Complete Higher Education
2019	13,70%	0,13%	2,42%	2,80%	14,48%	11,53%	19,38%	31,17%	2,31%	2,08%
2020	13,51%	0,18%	2,74%	2,74%	13,01%	9,71%	20,32%	32,89%	2,46%	2,44%
2021	7,79%	0,13%	2,47%	2,47%	12,01%	12,40%	20,08%	37,50%	2,85%	2,29%
2022	7,36%	0,17%	1,78%	1,98%	10,02%	9,72%	21,10%	42,42%	2,83%	2,62%
2023	6,03%	0,03%	2,25%	2,28%	8,93%	9,98%	21,40%	43,03%	3,41%	2,66%

ES: Elementary School
Source: Tabnet, DATASUS, 2024

Regarding the age group of pregnant women diagnosed with syphilis, a noticeable variation in data was observed. There was a significant 8.04% reduction in cases among women aged 15 to 19 between 2019 and 2023. Conversely, there was a 7.93% increase in cases among women aged 20 to 39 over the same period, as illustrated in Table 3.

Table 3 - Age group of pregnant women diagnosed with syphilis in the Municipality of São Paulo.

Year of diagnosis	10-14	15-19	20-39	40-59
2019	0,57%	23,00%	74,39%	2,04%
2020	0,95%	22,67%	74,25%	2,13%
2021	0,54%	20,50%	77,20%	1,76%
2022	0,64%	17,98%	79,44%	1,94%
2023	0,37%	14,96%	82,32%	2,35%

Source: Tabnet, DATASUS, 2024

4. DISCUSSION

This research was conducted in the context of a silent syphilis outbreak, where the population is often unaware of its risks, the importance of treatment, and even the factors that can compromise its effectiveness. Throughout the study period, data were collected from the TabNet DATASUS platform regarding reported cases of syphilis in pregnant women across the municipality of São Paulo.

Regarding the race of pregnant women diagnosed with syphilis, nearly half of the reported cases involved mixed-race (parda) women, followed by white and Black women. Since racial identification is subjective—each individual self-declares their race, and Brazil has a highly mixed population—it is more appropriate to analyze the data by categorizing women as either white or non-white (including mixed-race, Black, Asian, and Indigenous women). Using this approach, approximately 60% of notifications involved non-white women, while nearly 40% involved white women.

Additionally, it was expected that lower education levels would correlate with higher rates of syphilis infections during pregnancy, as lower educational attainment is often associated with greater vulnerability, including economic dependence on partners. However, the data present a different reality. According to a study by Correia[7], until the past decade, syphilis during pregnancy was more prevalent among women with lower education levels. Today, this trend has shifted significantly. Women with a completed high school education now have the highest syphilis rates during pregnancy compared to those with lower levels of education. Correia[7] also analyzed the Human Development Index (HDI) over different periods, demonstrating a significant increase in both HDI and the educational level of pregnant women diagnosed with syphilis.

Education should be considered within a broader socio-economic and health vulnerability framework, especially in the context of co-infections such as syphilis, gonorrhea, chlamydia, and trichomoniasis[7]. A possible explanation is that more educated women may rely on contraceptive methods other than condoms, such as oral contraceptives or intrauterine devices (IUDs), thereby increasing their risk of exposure to sexually transmitted infections. This situation highlights a potential failure in sexual education programs in schools—if comprehensive sexual health education were effectively implemented, the number of syphilis cases might be different[8]. Furthermore, a considerable percentage of cases lacked detailed information about the woman's education level.

Finally, regarding the age group of pregnant women with syphilis, three-quarters of reported cases occurred among women aged 20 to 39, which represents the majority of women in their reproductive years. The second most affected group was adolescents aged 15 to 19, accounting for 14.96% to 23% of cases.

Based on the collected data, it is evident that pregnant women who self-identify as mixed-race are the most affected, regardless of the year. Additionally, syphilis cases are more prevalent among women who have completed high school, contradicting the assumption that lower educational attainment corresponds to a higher risk of infection. Lastly, the most affected age group among pregnant women is between 20 and 39 years old.

5. CONCLUSION

In the context of a silent syphilis epidemic, where the disease spreads across the country with little public discussion, there is a clear need for early health promotion initiatives

focused on sexually transmitted infections. Additionally, it is essential to include partners in all aspects of prenatal care, as reinfection with *Treponema pallidum* occurs primarily when partners do not complete their treatment.

Furthermore, inconsistencies in the completion of mandatory notification forms highlight gaps in data collection, with many key pieces of information left unrecorded. This underscores that syphilis is a multifactorial STI, deeply intertwined with socio-economic factors that significantly impact effective treatment and prevention efforts.

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