Epidemiological profile of non-pregnant women in Pelotas, Brazil: a cross-sectional study on syphilis

Perfil epidemiológico de mulheres não gestantes em Pelotas: um estudo transversal sobre sífilis

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ABSTRACT

Introduction: Syphilis is a sexually transmitted infection of high public health relevance, with increasing incidence in Brazil. Although screening protocols exist for pregnant women, there are gaps in knowledge regarding non-pregnant women. **Objective:** To describe the sociodemographic and behavioral profile of non-pregnant women receiving care in health services in Pelotas, Rio Grande do Sul, and the factors associated with positivity in treponemal tests for syphilis. **Methods:** A cross-sectional study was conducted between August 2023 and December 2024 with non-pregnant women aged 15–70 years attending outpatient clinics and Primary Health Care Units affiliated with the Federal University of Pelotas. Sampling was non-probabilistic. Sociodemographic, behavioral, and syphilis-related knowledge data were collected using a standardized questionnaire and rapid treponemal tests. Descriptive analyses and chi-square tests were performed ($p<0.05$). **Results:** A total of 2,021 women were included (mean age: 32.6 years; standard deviation: 8.3 years). The prevalence of reactive treponemal tests was 3.2% (64/2,021). An educational gradient was observed, with higher prevalence among women with lower schooling levels (4.7% in incomplete primary education *vs*. 0.85% in higher education; $p<0.05$). Single women and those in relationships with multiple partners showed higher prevalence. No significant differences were observed across age groups. **Conclusion:** The high prevalence of syphilis among non-pregnant women, particularly those with lower educational attainment, reinforces the need for screening and prevention strategies beyond the prenatal context.

Keywords: syphilis. epidemiology. women. sexually transmitted diseases. public health.

RESUMO

Introdução: A sífilis é uma infecção sexualmente transmissível de alta relevância em saúde pública, com crescente incidência no Brasil. Embora haja protocolos de rastreamento em gestantes, há lacunas no conhecimento sobre mulheres não gestantes. **Objetivo:** Descrever o perfil sociodemográfico e comportamental de mulheres não gestantes atendidas em serviços de saúde de Pelotas, RS, e os fatores associados à positividade em testes treponêmicos para sífilis. **Métodos:** Foi realizado um estudo transversal entre agosto de 2023 e dezembro de 2024 com mulheres não gestantes (15–70 anos) atendidas em ambulatórios e Unidades Básicas de Saúde vinculadas à Universidade Federal de Pelotas. A amostragem foi não probabilística. Dados sociodemográficos, comportamentais e de conhecimento sobre sífilis foram coletados por meio de questionário padronizado e testes treponêmicos rápidos. Análises descritivas e teste do qui-quadrado foram realizados ($p<0,05$). **Resultados:** Foram incluídas 2.021 mulheres (média de idade: 32,6 anos; desvio padrão: 8,3 anos). A prevalência de testes treponêmicos reagentes foi de 3,2% (64/2.021). Houve gradiente educacional, com maior prevalência entre mulheres com menor escolaridade (4,7% no ensino fundamental incompleto *vs*. 0,85% no ensino superior; $p<0,05$). Mulheres solteiras e em relações com múltiplos parceiros apresentaram maior prevalência. Não houve diferença significativa entre as faixas etárias. **Conclusão:** A elevada prevalência de sífilis em mulheres não gestantes, especialmente entre as de menor escolaridade, reforça a necessidade de estratégias de rastreamento e prevenção para além do contexto pré-natal.

Palavras-chave: sífilis. epidemiologia. mulheres. infecções sexualmente transmissíveis. saúde pública.

INTRODUCTION

Syphilis is a chronic and treatable bacterial infection caused by *Treponema pallidum* that presents variable clinical manifestations and serious implications for public health. Symptoms include initial lesions, such as the chancre in primary syphilis, and may progress to neurological complications in neurosyphilis when not adequately treated[1]. Despite being a curable disease, syphilis continues to impact the global population. Data from the World Health Organization (WHO) indicate that, in 2021 there were 12 million new cases worldwide, with the Americas as the third most affected region[2].

In Brazil, in the first half of 2022 alone, more than 122,000 new cases were reported, highlighting a concerning upward trend in incidence rates, especially due to reduced condom use[3].

Risk factors for sexually transmitted infections (STIs), including syphilis, are closely linked to conditions of social vulnerability. Low educational attainment, early initiation of sexual activity, unprotected sexual practices, and having multiple partners are frequently associated with increased disease incidence[4]. Additionally, the mistaken perception of protection in monogamous relationships contributes to underreporting of cases among women[1].

Social inequity is a determining factor in the spread of STIs, especially in developing countries such as Brazil. Poverty, precarious housing conditions, and inequalities in access to health care reinforce the perpetuation of the disease, creating a vicious cycle that harms the most vulnerable groups[4]. Young women are particularly affected because of gender inequalities, which expose them to increased risks, either due to difficulty negotiating condom use or to lack of access to adequate prevention information[1].

Although there are several studies on syphilis in pregnant women due to established prenatal screening protocols, there is a significant gap in knowledge regarding the epidemiological profile of non-pregnant women[5]. Therefore, investigating the epidemiological profile of this population is essential to understand the factors associated with infection and to enable the development of more effective and targeted preventive strategies[6].

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In this context, the "Pelotas Prevenida" project sought to identify syphilis cases among women attending outpatient clinics and Primary Health Care Units affiliated with a university in a city in the state of Rio Grande do Sul by applying rapid tests. The project aimed not only to screen undetected cases but also to promote appropriate treatment and understand the distribution of determinants among participants. This knowledge allows the identification of vulnerable populations and guides more equitable public health policies[7].

OBJECTIVE

The objective of the study was to describe the sociodemographic and behavioral profile of participants in the "Pelotas Prevenida" project and to analyze factors associated with positivity in treponemal tests for syphilis.

METHODS

Study design

This was an observational epidemiological study with a cross-sectional and descriptive design.

Population and sample

The study population consisted of non-pregnant women residing in the city of Pelotas, state of Rio Grande do Sul, aged between 15 and 70 years, who attended health services affiliated with the Federal University of Pelotas, whether as patients, companions, or participants in large-scale testing campaigns. Sampling was non-probabilistic and based on invitations by a trained research team in the waiting rooms of the respective services and on voluntary participation by the women.

Data collection

Data collection was conducted between August 2023 and December 2024 using a standardized questionnaire and serological tests for syphilis, which were carried out by trained undergraduate medical students. The questionnaires addressed sociodemographic, behavioral, and disease-related knowledge aspects, while the laboratory method consisted of rapid treponemal testing (Syphilis BIO®, Bioclin® brand) provided by the Municipal Health Department.

Variables analyzed

The questionnaire used to collect epidemiological data was structured to include sociodemographic and behavioral variables. Information was collected on age (in complete years, categorized as 15–24, 25–34,35–44, 45–59, and 60 years or older), skin color (white, black, mixed, yellow, and Indigenous), schooling level (incomplete primary education, complete primary education, complete secondary education, and complete higher education) and marital status (married; divorced, separated or widowed; and never married).

Questions on sexual behavior explored aspects related to the type of sexual relationship (single partner or multiple partners), use of contraceptive methods (barrier, hormonal, barrier and hormonal, and none), history of unprotected sexual intercourse in the past year (yes or no), and use of injectable drugs (yes or no). All questions included a "not informed" option in case of refusal by the participant to answer.

Statistical analysis

Analyses were performed using Stata 14.2 (StataCorp., College Station, TX, USA). Absolute and relative frequencies of reactive treponemal tests for syphilis were described according to sociodemographic and behavioral variables. The chi-square test was used to investigate the association between reactive treponemal test results for syphilis and the independent variables. Additionally, in cases of evidence of linear trend for ordinal categorical variables, the chi-square test for trend was applied. Statistical significance was set at 0.05.

Ethical aspects

This project was submitted to the Research Ethics Committee of the Federal University of Pelotas (UFPEL) under Certificate of Presentation for Ethical Appreciation Nº 74373923.6.0000.5317, in accordance with Resolution No. 466/2012 of the National Health Council[8]. All participants signed the Informed Consent Form. Women identified with syphilis during the study were referred for care within the specialized health care network, thereby ensuring access to appropriate treatment.

RESULTS

Data analysis revealed a diverse sociodemographic profile among the 2,021 study participants. The mean age of women was 32.6 years (standard deviation: 8.3 years), with a predominance of the 45–59 age group (33.35%). The sample was predominantly composed of single (48.43%) and white (65.22%) women and of those with complete secondary education (45.61%). Additionally, most participants (48.43%) did not use any contraceptive method, and only 24.79% reported using barrier methods.

The overall prevalence of reactive treponemal tests in the sample was 3.2% (64/2,021 women). Stratified analysis by sociodemographic characteristics revealed important variations in the distribution of positive treponemal tests, with significantly higher prevalence in specific population subgroups (**Table 1**).

A statistically significant association was observed between reactive treponemal tests and educational level, with rates of 4.7% in incomplete primary education, 3.55% in complete primary education, 2.83% in secondary education, and 0.85% in higher education ($p<0.05$), demonstrating a socioeducational gradient in infection distribution. Similarly, prevalence varied according to marital status and sexual relationship pattern, being lower among married women and those in relationships with a single partner compared to women with other marital statuses and multiple partners. No significant gradient in reactive treponemal tests by age group was observed.

Table 1. Sample and positive test description according to independent variables (n=2,021).

	Sample description		Syphilis positive testing*		p-value[a]
	n	%	n	%	
Age (n=2,021)					
15–24	277	13.71	12	4.33	0.082
25–34	400	19.79	14	3.50	
35–44	472	23.35	21	4.45	
45–59	674	33.35	14	2.08	
60+	198	9.80	3	1.52	
Skin color[b] (n=2,006)					
White	1,296	65.22	32	2.47	0.110
Black	378	19.02	17	4.50	
Mixed	313	15.75	11	3.51	
Schooling level (n=2,017)					
Incomplete primary education	468	23.20	22	4.70	0.042
Primary education	394	19.53	14	3.55	
Secondary education	920	45.61	26	2.83	
Higher education	235	11.65	2	0.85	
Marital status (n=2,005)					
Married	741	36.96	13	1.75	0.026
Divorced, separated or widowed	293	14.61	9	3.07	
Never married	971	48.43	39	4.02	
Sexual relationship pattern (n=1,613)					
One partner	1,503	93.18	44	2.93	0.047
Multiple partners	110	6.82	7	6.36	
Contraception method (n=1,904)					
Barrier	324	17.02	14	4.32	0.233
Hormonal	598	31.41	19	3.18	
Barrier and hormonal	148	7.77	8	5.41	
None	834	43.80	22	2.64	
Unprotected sexual activity (n=2,014)					
No	667	33.12	18	2.70	0.436
Yes	1,347	66.88	45	3.34	
Use of injectable drugs (n=2,018)					
No	1,993	98.76	62	3.11	0.166
Yes	25	1.24	2	8.00	
Total	2,021	100	64	3.17	

*Rapid treponemal test.
[a]Chi-squared test for differences between sample proportions and linear trends.
[b]Indigenous (n=10) and yellow people (n=15) were considered as missing data.

DISCUSSION

The findings of the present study are consistent with national and international literature on the topic, showing both convergences and specific characteristics. The prevalence of 3.2% of reactive rapid treponemal tests among non-pregnant women in Pelotas is a key finding for understanding the epidemiology of the disease in this population.

This result was higher than the projection of the multicenter study by Newman et al.[9], which reported an average prevalence of 0.5% based on WHO reports[10], suggesting possible epidemiological particularities of the Southern region or the city of Pelotas. According to the 2024 Epidemiological Bulletin on Syphilis, the incidence rate of congenital syphilis in the state was 14 cases per 1,000 live births in 2023, approximately four cases above the national average, indicating challenges in controlling vertical transmission[11].

The educational gradient observed in syphilis distribution corroborates findings from previous studies, such as that by Kops et al.[12], which highlighted lower socioeconomic status as a factor associated with syphilis among young Brazilians across the 26 state capitals and the Federal District. Similarly, the study by Barbosa et al.[13] found higher rates of syphilis among women who had not completed secondary education, indicating that lower educational attainment correlates with increased risk of syphilis infection.

This study has some limitations that should be considered when interpreting its results. First, the cross-sectional design does not allow causal relationships between the analyzed variables to be established and is limited to identifying associations at a specific point in time[14].

Additionally, the sampling may not have reached particularly marginalized or hard-to-access groups, such as sex workers or homeless women, potentially underestimating the true prevalence of syphilis among non-pregnant women in Pelotas. A study conducted among

homeless populations in São Paulo found an overall syphilis prevalence of 7.0%, demonstrating how certain urban population groups may present greater vulnerability to infection[15]. Similarly, the study by Silveira et al.[16] showed a prevalence of 8.4% of reactive syphilis tests among a sample of 322 sex workers, with an important finding regarding lack of treatment for previous positive serology in five individuals (18.5%), reinforcing the need for treatment follow-up in these populations.

Another important limitation refers to the exclusion of Indigenous (n=10) and yellow (n=15) categories from some stratified analyses due to the small sample size. Although methodologically justified, this exclusion prevents the understanding of the epidemiological profile of syphilis in these specific population groups, which may present particular vulnerabilities[17].

The findings of this study have direct implications for public health policies in the municipality of Pelotas and potentially in similar contexts. Among its strengths is the high participation of women in the research and, consequently, their willingness to undergo testing, which may increase awareness of the importance of STI screening. In addition, the training of future health professionals and their awareness regarding STI diagnosis and treatment paradigms are noteworthy.

However, a limitation of the study is the impossibility of a definitive diagnosis of the disease using treponemal tests alone, requiring subsequent evaluation by health services with laboratory and non-treponemal tests such as the Venereal Disease Research Laboratory (VDRL)[18].

The high prevalence of reactive rapid treponemal tests among non-pregnant women, particularly among socially vulnerable groups, indicates the need for specific screening and prevention strategies for this population, which is traditionally not prioritized in syphilis control programs[19].

Regular testing programs outside the prenatal context could significantly contribute to early detection and timely treatment, thereby reducing the transmission chain of the disease[20]. It is important to recognize that effective disease control transcends strictly biomedical interventions and requires actions addressing structural conditions that shape differentiated vulnerabilities[21].

The most recent evidence available in Brazil from the 2025 Epidemiological Bulletin on Syphilis[22] reaffirms the persistence of a high syphilis burden in the country, with emphasis on acquired syphilis among young adults and persistent indicators of syphilis in pregnant women and congenital syphilis. Nationwide, in 2024, the highest detection rates of acquired syphilis were concentrated in the 20–29 and 30–39 age groups, and national indicators of syphilis in pregnancy and congenital syphilis remained at high levels, reinforcing the need to expand testing and prevention strategies beyond prenatal care and to incorporate approaches targeting groups with greater social vulnerability.

Strengths

This study reinforces the need to expand syphilis screening strategies for non-pregnant women in primary care, with special attention to populations in situations of greater social vulnerability, such as women with low educational attainment and those involved in relationships with multiple partners. The implementation of intersectoral educational actions, regular testing programs, training of health teams, and strengthening of epidemiological surveillance is recommended, as well as public policies addressing the social determinants of health.

Limitations

This study presents some limitations inherent to its cross-sectional design, which does not allow causal inference. The sample was selected by convenience, which may limit the generalizability of the findings. The exclusive use of rapid treponemal tests does not differentiate active infections from serological scars, potentially overestimating infection prevalence. In addition, self-reported information may be subject to social desirability bias. The possible underrepresentation of more vulnerable populations, such as Indigenous women, sex workers, and homeless women, should also be considered.

CONCLUSION

This study demonstrated that syphilis is present among non-pregnant women attending health services in Pelotas, with unequal distribution according to social and behavioral characteristics. Positivity in treponemal tests was associated with lower educational attainment and sexual relationship patterns, indicating that the infection is concentrated among more socially vulnerable groups. The findings reinforce the need to expand syphilis screening and prevention strategies beyond prenatal care, incorporating non-pregnant women into surveillance and care actions within primary health care.

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HUMAN RESEARCH ETHICS COMMITTEE

The project was approved by the Research Ethics Committee of the Federal University of Pelotas (UFPEL) under Certificate of Presentation for Ethical Appreciation No. 74373923.6.0000.5317.

AUTHOR'S CONTRIBUTIONS

PHEM: Conceptualization, Investigation, Methodology, Project administration, Data curation, Writing – original draft, Writing – review & editing. FSG: Formal analysis, Data curation, Writing – review & editing. TCA: Investigation, Data curation. HRH: Investigation, Data curation. IKTS: Conceptualization, Supervision, Validation, Writing – review & editing. MFS: Conceptualization, Supervision, Validation, Writing – review & editing.

All authors approved the final version and are responsible for the content.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

USE OF AI IN MANUSCRIPT CONSTRUCTION

No AI instruments were used in the preparation of this manuscript.

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