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Analysis of Sexually Transmitted Infections during the COVID-19 pandemic in Brazil

Análise das Infecções Sexualmente Transmissíveis durante a pandemia da COVID-19 no Brasil

Análisis de las Infecciones de Transmisión Sexual durante la pandemia de COVID-19 en Brasil

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ABSTRACT

Objective: To analyze the trend and impact that COVID-19 had on the notifications of STIs (HIV/AIDS, Syphilis, HBV, and HCV) in Brazil. **Methods:** This is an ecological study, analyzing the temporal trend of STIs notifications based on the detection rate of infections across the five geographical regions of Brazil from 2015 to 2021. The trend analysis from 2015 to 2021 was conducted using a linear regression model for historical series. To assess the impact of the pandemic, the expected cases were compared with the observed cases for the years 2015 to 2021. A significance level of 5% was established, with trend analyses conducted using the Joinpoint Regression Program, and the expected values were estimated using the R software. **Results:** The results demonstrate that there was a sharp decrease in the detection rates of mandatory notifiable STIs in Brazil during the COVID-19 pandemic period, and this trend was reflected across all regions of the country. **Conclusion:** During the COVID-19 pandemic, there was a reduction in STIs notifications. These results support the establishment of surveillance and health care strategies to minimize the impact of delays in the diagnosis and treatment of these infections.

Keywords: Sexually Transmitted Infections, COVID-19, Public health, Notification.

RESUMO

Objetivo: Analisar a tendência e o impacto que COVID-19 teve nas notificações de IST (HIV/Aids, Sífilis, HBV e HCV) no Brasil. **Métodos:** Trata-se de um estudo ecológico, de tendência temporal das notificações de IST pela taxa de detecção das infecções no Brasil, de 2015 a 2021. A análise de tendência de 2015 a 2021 foi realizada por meio de um modelo de regressão linear para séries histórica. Para avaliar o impacto da pandemia, os casos esperados foram comparados com os casos observados para os anos de 2015 a 2021. Foi estabelecido um nível de significância de 5%, as análises de tendência foram conduzidas usando o Programa Joinpoint Regression e os valores estimados por meio do Programa R. **Resultados:** Os resultados demonstram que houve um decréscimo acentuado das taxas de detecção de IST de notificação compulsória no Brasil durante o período pandêmico da Covid-19 e isso se refletiu em todas as regiões do Brasileiras. **Conclusão:** Durante a pandemia de COVID-19 houve uma redução das notificações de IST. Esses resultados corroboram para estabelecimento de estratégias de vigilância e atenção à saúde para minimizar os impactos no atraso do diagnóstico e tratamento dessas infecções.

Palavras-chave: Infecções Sexualmente Transmissíveis, COVID-19, Saúde pública, Notificação.

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RESUMEN

Objetivo: Analizar la tendencia y el impacto que tuvo la COVID-19 en las notificaciones de ITS (VIH/Sida, Sífilis, VHB y VHC) en Brasil. **Métodos:** Se trata de un estudio ecológico, con tendencia temporal de las notificaciones de ITS por la tasa de detección de infección no Brasil, de 2015 a 2021. El análisis de tendencia de 2015 a 2021 se realizó mediante el uso de una regresión lineal. Modelo para series históricas. Para evaluar el impacto de la pandemia se compararon los casos esperados con los casos observados para los años 2015 a 2021. Se estableció un nivel de significancia del 5%, además del programa versión R. **Resultados:** Los resultados demuestran que hubo una fuerte disminución en las tasas de notificación obligatoria de ITS en Brasil durante el período de la pandemia de Covid-19. La reducción gradual de las tasas de detección de ITS en todas las regiones brasileñas durante el período de pandemia. **Conclusión:** Durante la pandemia de COVID-19 hubo una reducción de las notificaciones de ITS. Estos resultados respaldan el establecimiento de estrategias de vigilancia y atención médica para minimizar los impactos del retraso en el diagnóstico y tratamiento de estas infecciones.

Palabras clave: Infecciones de Transmisión Sexual, COVID-19, Salud pública, Notificación.

INTRODUCTION

Sexually transmitted infections (STIs) are a significant public health issue worldwide. These infections are caused by a wide variety of microorganisms, including viruses, bacteria, and parasites, which can be transmitted from one person to another primarily through unprotected sexual contact (WAGENLEHNER FME, et al., 2016; ZHENG Y, et al., 2022). It is estimated that there are over 30 agents responsible for sexually transmitted infections (STIs), with some of these pathogens being associated with the highest incidence rates of these infections. Among them, the curable include syphilis, gonorrhea, chlamydia, and trichomoniasis; while the others are incurable infections such as hepatitis B, Herpes simplex virus (HSV), Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), and human papillomavirus (HPV) (SILVA EFO et al., 2021; SILVA DL et al., 2023).

According to the World Health Organization (WHO), these infections cause approximately 2.5 million deaths and 1.2 million cases of cancer annually on a global scale. The four curable STIs together are responsible for more than 1 million infections daily. Additionally, it is estimated that there are 3.5 million cases of HIV, hepatitis B and hepatitis C transmission each year (SHIFERAW W et al., 2024; SINKA K, 2024; SOE NN et al., 2024; WHO, 2023, 2024). Many STIs can be transmitted concurrently, and the presence of one infection significantly heightens the susceptibility to contracting other types of STIs.

These infections frequently present with asymptomatic or subtle clinical manifestations, often remaining undetected by individuals and thus posing a considerable challenge for healthcare services in terms of timely detection, diagnosis, and treatment. This asymptomatic nature often leads to underdiagnosis and untreated infections, further complicating efforts to control the spread of STIs and manage public health effectively (WIHLFAHRT K, et al., 2023).

In addition to this, the advent of the COVID-19 pandemic has placed healthcare systems worldwide in an unprecedented crisis (EIBSCHUTZ LS, et al., 2023). In Brazil, the first cases of COVID-19 were confirmed in February 2020, and many measures were implemented with the aim of containing and mitigating the spread of the disease (CAVALCANTE JR, et al., 2020). It is important to highlight that before the COVID-19 pandemic, the number of new cases of mandatory reportable STIs was steadily increasing in many regions of Brazil (BOTTURA BR, et al., 2019; PEREIRA GFM, et al., 2019).

However, due to the pandemic, social distancing measures and the reallocation of financial resources for pandemic containment led to an interruption or discontinuation of surveillance services and healthcare related to sexual health. Given this context, there is limited information on how these interruptions or discontinuations of services have affected epidemiological reports on STIs, and few studies are available that investigate the trends and impact of STIs during the pandemic (CRANE MA, et al., 2021). Thus, with the aim of identifying possible underreporting or delays in diagnoses, this article seeks to analyze the impact of the pandemic on the detection rates of compulsory notifiable STIs (HIV/AIDS, Syphilis, HBV, and HCV) in Brazil.

METHODS

This ecological study describes and analyzes the trends in STIs notifications before and during the pandemic, according to the five geographical regions of Brazil, from 2015 to 2021. The database on STIs notifications was obtained from the Department of Chronic Conditions and Sexually Transmitted Infections at the Ministry of Health.

Data on the resident population in the regions and the number of live births were collected from the Department of Informatics of the Unified Health System (DATASUS) and the Live Births Information System (SINASC), respectively. The detection rates of HIV/AIDS, Syphilis (acquired, gestational, and congenital), HBV, and HCV were calculated for the regions of Brazil as follows:

HIV/AIDS: Number of reported cases of HIV/AIDS in a given year of diagnosis and place of residence divided by the total number of residents in that region for the same year, multiplied by 100,000 inhabitants.

Acquired Syphilis: Number of reported cases of acquired syphilis in a given year of diagnosis and place of residence divided by the total number of residents in that region for the same year, multiplied by 100,000 inhabitants.

Syphilis in Pregnant Women: Number of reported cases of syphilis in pregnant women in a given year of diagnosis and place of residence divided by the total number of live births to mothers residing in the same location for the same year, multiplied by 100,000 live births.

Congenital Syphilis: Number of reported cases of congenital syphilis in children under 1 year of age in a given year of diagnosis and place of residence divided by the total number of live births to mothers residing in the same location for the same year, multiplied by 100,000 live births.

HBV and HCV: Number of reported cases of Hepatitis B and C (separately) in a given year of diagnosis and place of residence divided by the total number of residents in that region for the same year, multiplied by 100,000 inhabitants.

To assess the trend and impact of the pandemic on STIs notifications in Brazil, the analyses were divided into three approaches, considering the pre-pandemic and pandemic periods:

Analysis of Detection Rates: Comparison of the average detection rates from 2015-2019 (pre-pandemic) with the rates for 2020 and 2021 (during the pandemic).

Trend Analysis: Examination of trends for the periods 2015-2019 and 2015-2021.

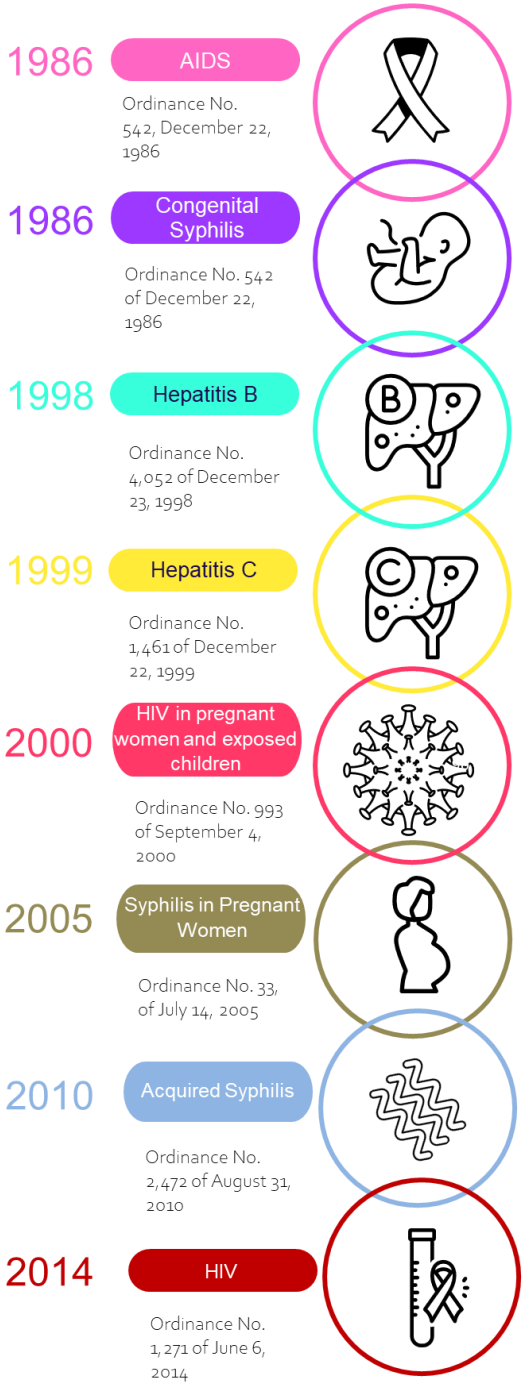
Comparison of Expected and Observed Values: Comparison of expected values from the pre-pandemic period with the observed values during the pandemic.

To assess the temporal variation of standardized STIs rates, the Relative Percentage Change (RPC) was calculated using the detection rates from the last year of the study period minus the values observed for the initial year, divided by the value observed for the initial year, multiplied by 100. Trend analysis was conducted using a log-linear model for historical series, with detection rates of infections (Y) as the dependent variable and time in years as the independent variable (X). Additionally, to describe and quantify these temporal trends, Annual Percent Changes (APCs) and their corresponding 95% Confidence Intervals (CIs) were calculated. Trends were classified as increasing (positive APC), decreasing (negative APC), or stable (statistically insignificant APC), considering a significance level of 5%. Expected values for 2020 and 2021 were estimated using a log-linear model from the 2015-2019 period and compared with the observed values. Trend analyses were conducted using the Joinpoint Regression Program (KIM H-J, et al., 2000), and expected values were estimated using R software.

RESULTS

In Brazil, the foundations for the prevention, diagnosis, and treatment of STIs are well established, as is its epidemiological surveillance model, which includes STIs notification, sentinel services, and cross-sectional studies in specific population groups. STIs that are part of the national notification list include HIV/AIDS, viral hepatitis, and syphilis (**Figure 1**) (DOMINGUES CSB, et al., 2021).

Figure 1- Ordinances that establish the notification of STIs in Brazil.



Note: The layout was developed using CorelDRAW Graphics Suite 2024 software.
Source: Sousa RFV, et al., 2024.

Between 2015 and 2019, Brazil reported an average of 39,340 cases of HIV/AIDS, 121,415 cases of acquired syphilis, 49,822 cases of syphilis in pregnant women, 23,820 cases of congenital syphilis, 14,333 cases of HBV, and 24,759 cases of HCV. **Table 1** presents the detection rates of STIs in Brazil, divided by region, and compares the pre-pandemic and pandemic periods. In 2020, in Brazil, there was a 24% reduction in the detection rate of HIV/AIDS, 45% of HBV and 46% of HCV, in addition to a 33% increase in the detection rates of syphilis in pregnant women and 5% in congenital syphilis.

In 2021, there was a notable positive percentage change for acquired syphilis and syphilis in pregnant women, with increases of 64% and 34%, respectively. For the same year, viral hepatitis showed negative

percentage changes, with a 51% reduction in the detection rate of HBV and a 40% reduction for HCV. Regionally, the largest negative percentage changes were observed in the Southeast region for HIV/AIDS and HBV, and in the North region for HCV.

Table 1 - Detection rate per 100,000 people of notifiable STIs for the period Before the Pandemic (average 2015-2019) and During the Pandemic (2020 and 2021), with percentage variations in Brazil and its regions.

Pre-Pandemic			During the pandemic				Percentage Variation	
2015-2019			2020		2021		2020	2021
Cases		Detection Rate	Cases	Detection Rate	Cases	Detection Rate	Cases	Detection Rate
HIV/AIDS								
Brazil	39340	19,0	30562	14,4	35424	16,6	-24,1	-13,6
Center-West	2904	18,3	2448	14,8	2886	17,3	-19,2	-6,0
Northeast	9133	16,2	7250	12,6	8321	14,4	-23,0	-10,6
North	4503	25,1	3657	19,6	4892	25,9	-22,2	3,2
Southeast	15195	17,5	11749	13,2	13041	14,5	-26,0	-16,2
South	7605	25,8	5458	18,1	6284	20,7	-31,0	-20,0
Acquired Syphilis								
Brazil	121415	58,5	125143	59,1	171770	80,5	1,0	34,2
Center-West	8510	53,2	10068	61,0	12603	75,4	14,7	41,0
Northeast	17366	30,7	15939	27,8	27510	47,7	-2,5	53,7
North	6668	36,8	8402	45,0	13699	72,5	22,3	95,1
Southeast	60152	69,0	60837	68,3	80998	90,4	-1,0	27,8
South	28718	97,0	28656	94,9	36960	121,6	-2,1	18,9
Syphilis in Pregnant Women								
Brazil	49822	17,1	61441	22,5	75176	28,1	33,1	63,9
Center-West	3930	16,2	5303	23,0	5789	25,3	42,0	54,3
Northeast	10222	12,5	14081	18,3	16846	22	46,4	75,2
North	4759	15,1	6150	20,4	8050	26	34,2	71,1
Southeast	22951	20,1	30840	29,3	33654	33,3	45,8	63,2
South	7947	20,1	9461	25,2	10829	29,8	25,4	45,3
Congenital Syphilis								
Brazil	23820	8,2	23578	8,6	27070	10,1	4,9	23,2
Center-West	1346	5,5	1245	5,4	1298	5,7	-1,8	3,6
Northeast	6850	8,3	6779	8,8	8048	10,5	6,0	26,5
North	1978	6,3	1827	6,1	2283	7,4	-3,2	19,0
Southeast	10356	9,1	10611	10,1	11892	11,8	11,0	28,6
South	3283	8,3	3090	8,2	3545	9,8	-1,2	13,3
Hepatitis B								
Brazil	14333	12,0	7736	3,7	9745	4,6	-44,9	-50,7
Center-West	1193	25,8	610	3,7	1024	6,1	-48,6	-37,8
Northeast	1811	3,5	1200	2,1	1542	2,7	-32,3	-35,5
North	2205	6,4	1139	6,1	1440	7,6	-46,7	-52,5
Southeast	4527	6,1	2297	2,6	3031	3,4	-49,0	-52,9
South	4598	15,0	2490	8,2	2708	8,9	-43,9	-54,2
Hepatitis C								
Brazil	24759	11,9	12692	6,0	15068	7,1	-49,6	-40,3
Center-West	1008	6,4	607	3,7	894	5,4	-42,2	-15,6
Northeast	1957	3,5	1108	1,9	1415	2,5	-45,7	-28,6
North	1093	6,1	512	2,7	737	3,9	-55,7	-36,1
Southeast	13091	15,4	6521	7,3	7.71	8,8	-52,6	-42,9
South	7610	25,8	3944	13,1	4151	13,7	-49,2	-46,9

Source: Sousa RFV, et al., 2024, data extracted from the Department of Chronic Diseases and Sexually Transmitted Infections of the Ministry of Health, available and collected at the Department of Informatics of the Unified Health System (DATASUS).

In the trend analysis, a decreasing trend in detection rates was observed in Brazil during the pre-pandemic period (2015-2019), which was accentuated during the pandemic for HIV/AIDS and HCV (**Table 2**). Specifically, the detection rate of HIV/AIDS decreased, on average, by -2.7% per year (95% CI, -4.0; -1.4) during the pre-pandemic period, and by -4.2% (95% CI, -6.9; -1.6) when including the pandemic years. In contrast, for acquired syphilis and syphilis in pregnant women, the detection rates exhibited an increasing trend during the pre-pandemic period, with particularly notable increases in the Northeast region. This trend continued during the pandemic, although with reduced intensity, suggesting an exacerbation of disparities in the trends of these STIs during the pandemic.

Table 2 – Temporal trend analysis of detection rates of notifiable STIs for the periods before (2015-2019) and during the pandemic (2015-2021).

Regions	2015-2019			2015-2021		
	APC	CI 95%	Trend	APC	CI 95%	Trend
HIV/AIDS						
Brazil	-2,6	-4,3 a -0,8	Decreasing	-4,1	-6,8 a -1,4	Decreasing
Center-West	1,4	-3,9 a 7,1	Stable	-1,4	-4,6 a 2,0	Stable
Northeast	-0,2	-1,4 a 1,9	Stable	-2,8	-6,3 a 1,0	Stable
North	0,9	-1,9 a 4,1	Stable	0,7	-5,3 a 4,3	Stable
Southeast	-4,7	-4,7 a -4,6	Decreasing	-5,5	-7,5 a -3,5	Decreasing
South	-5,5	-8,5 a -2,5	Decreasing	-6,4	-9,5 a -3,5	Decreasing
Acquired Syphilis						
Brazil	23,1	8,2 a 44,0	Increasing	11,3	0,4 a 23,1	Increasing
Center-West	34,0	18,7 a 55,9	Increasing	14,7	-1,2 a 33,2	Stable
Northeast	40,8	26,6 a 61,1	Increasing	17,1	-2,5 a 40,7	Stable
North	42,8	14,5 a 95,9	Increasing	22,6	5,5 a 42,4	Increasing
Southeast	16,6	4,4 a 32,5	Increasing	8,7	0,6 a 17,4	Increasing
South	20,7	5,8 a 41,5	Increasing	9,3	-1,4 a 20,8	Stable
Syphilis in Pregnant Women						
Brazil	20,8	10,5 a 34,4	Increasing	15,6	10,7 a 20,8	Increasing
Center-West	20,7	10,5 a 34,2	Increasing	14,9	9,5 a 20,6	Increasing
Northeast	29,4	17,5 a 45,4	Increasing	19,4	9,8 a 29,8	Increasing
North	17,6	10,8 a 26,0	Increasing	15,1	12,8 a 17,9	Increasing
Southeast	20,5	7,8 a 37,4	Increasing	15,9	11,3 a 20,8	Increasing
South	14,1	9,9 a 18,9	Increasing	11,3	8,3 a 14,4	Increasing
Congenital Syphilis						
Brazil	8,0	-0,24 a 17,5	Stable	5,6	1,8 a 9,6	Increasing
Center-West	6,4	1,6 a 11,6	Increasing	2,4	-1,9 a 6,8	Stable
Northeast	6,4	-2,8 a 17,4	Stable	5,3	-0,9 a 12,3	Stable
North	11,2	-3,3 a 29,3	Stable	5,2	-2,0 a 13,0	Stable
Southeast	9,8	0,3 a 20,8	Increasing	7,2	3,4 a 11,1	Increasing
South	5,1	-4,5 a 15,9	Stable	3,7	-1,5 a 9,2	Stable
Hepatitis B						
Brazil	-0,9	-2,6 a 0,65	Stable	-7,6	-13,8 a -1,4	Decreasing
Center-West	-4,2	-14,7 a 6,6	Stable	-7,2	-14,5 a -0,1	Decreasing
Northeast	11,6	5,4 a 18,2	Increasing	0,26	-11,0 a 12,9	Stable
North	3,2	1,2 a 5,3	Increasing	-6,7	-17,3 a 5,2	Stable
Southeast	-4,7	-6,0 a -3,4	Decreasing	-9,5	-16,8 a -2,5	Decreasing
South	-3,3	-6,3 a -0,2	Decreasing	-9,8	-16,9 a -1,9	Decreasing
Hepatitis C						
Brazil	-2,8	-5,1 a -0,4	Decreasing	-9,6	-17,1 a -1,3	Decreasing
Center-West	-3,3	-14,0 a 7,7	Stable	-5,6	-11,9 a -0,1	Decreasing
Northeast	7,9	0,5 a 16,8	Increasing	-3,3	-14,9 a 9,9	Stable
North	-0,1	-7,1 a 7,5	Stable	-8,2	-22,4 a 6,6	Stable
Southeast	-3,5	-7,1 a -0,1	Decreasing	-10,1	-17,6 a -1,9	Decreasing
South	-4,4	-6,3 a -2,5	Decreasing	-10,9	-18,0 a -3,2	Decreasing

Legend: APC: Annual Percent Changes. CI: Confidence Interval. *p-value < 0.05
Source: Sousa RFV, et al., 2024, data extracted from the Department of Chronic Diseases and Sexually Transmitted Infections of the Ministry of Health, available and collected at the Department of Informatics of the Unified Health System (DATASUS).

Table 3 shows the expected and observed detection rates for HIV/AIDS, acquired syphilis, congenital syphilis, syphilis in pregnant women, and hepatitis in the regions of Brazil for 2020 and 2021. In 2020, the observed rates for all investigated STIs were consistently lower than the expected rates across the entire country, suggesting that a considerable number of cases may have been underreported, delayed in diagnosis, or experienced reduced transmission, particularly for acquired syphilis, HBV, and HCV. In 2021, detection rates remained below the expected values, except for HIV/AIDS.

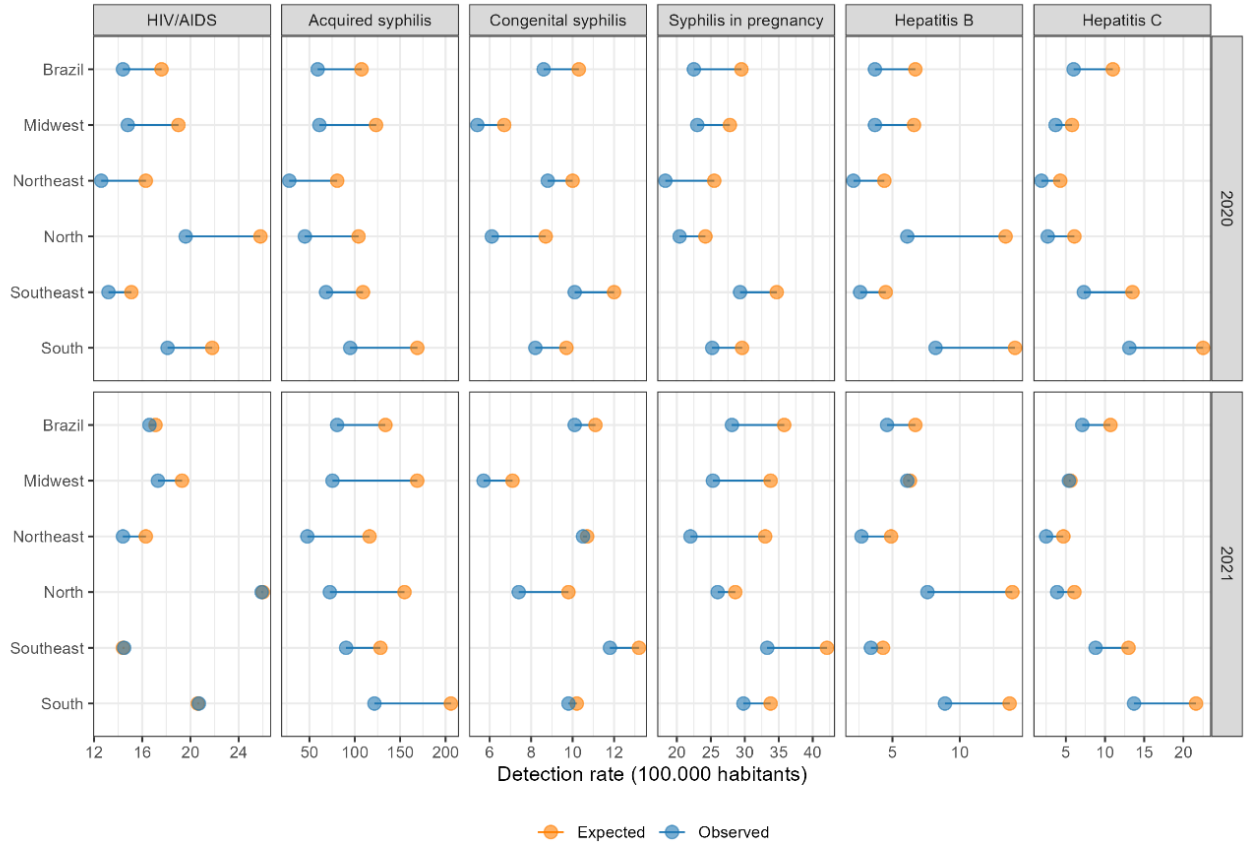
Table 3– Analysis of the expected detection rates of notifiable STIs for the periods of 2020 and 2021, compared to the observed rates, according to Brazilian regions and diseases.

Regions	2020					2021				
	Expected rate (CI95%)			Observed Rate	Ratio	Expected rate (CI95%)			Observed Rate	Ratio
HIV/AIDS										
Brazil	17,6	16,9	19,0	14,4	0,82	17,1	16,3	17,9	16,6	0,97
Center-West	19,0	16,9	18,3	14,8	0,78	19,3	16,6	22,4	17,3	0,90
Northeast	16,3	15,6	16,2	12,6	0,77	16,3	15,4	17,2	14,4	0,88
North	25,8	22,2	25,1	19,6	0,76	26,0	21,4	31,6	25,9	1,00
Southeast	15,1	15,0	17,5	13,2	0,87	14,4	14,2	14,5	14,5	1,01
South	21,8	19,4	25,8	18,1	0,83	20,6	17,8	23,9	20,7	1,00
Acquired Syphilis										
Brazil	107,4	78,1	147,7	59,1	0,55	133,7	88,9	200,9	80,5	0,60
Center-West	123,4	73,7	206,4	61,0	0,49	168,7	87,3	326,0	75,4	0,45
Northeast	80,6	48,9	132,9	27,8	0,34	116,2	61,3	220,3	47,7	0,41
North	104,1	60,3	179,9	45,0	0,43	154,7	76,8	311,2	72,5	0,47
Southeast	109,0	83,8	142,0	68,3	0,63	128,2	91,5	179,6	90,4	0,71
South	168,8	121,4	234,8	94,9	0,56	205,8	135,0	313,9	121,6	0,59
Syphilis in Pregnant Women										
Brazil	29,5	23,9	36,4	22,5	0,76	35,8	27,4	46,9	28,1	0,78
Center-West	27,8	22,3	34,7	23,0	0,83	33,8	25,4	44,8	25,3	0,75
Northeast	25,5	17,1	37,9	18,3	0,72	33,0	19,8	55,0	22,0	0,67
North	24,2	21,0	28,0	20,4	0,84	28,6	23,8	34,4	26,0	0,91
Southeast	34,7	27,2	44,2	29,3	0,84	42,1	30,9	57,4	33,3	0,79
South	29,6	26,0	33,7	25,2	0,85	33,8	28,7	39,9	29,8	0,88
Congenital Syphilis										
Brazil	10,3	8,3	12,8	8,6	0,83	11,1	8,4	14,7	10,1	0,91
Center-West	6,7	5,5	8,2	5,4	0,81	7,1	5,5	9,2	5,7	0,80
Northeast	10,0	8,1	12,3	8,8	0,88	10,7	8,1	13,9	10,5	0,98
North	8,7	6,1	12,5	6,1	0,70	9,8	6,2	15,5	7,4	0,76
Southeast	12,0	9,8	14,7	10,1	0,84	13,2	10,1	17,2	11,8	0,89
South	9,7	7,3	12,8	8,2	0,85	10,2	7,1	14,6	9,8	0,96
Hepatitis B										
Brazil	6,7	6,2	7,3	3,7	0,55	6,7	6,0	7,4	4,6	0,69
Center-West	6,6	5,2	8,4	3,7	0,56	6,3	4,6	8,6	6,1	0,97
Northeast	4,4	3,6	5,3	2,1	0,48	4,9	3,8	6,2	2,7	0,55
North	13,4	11,9	15,2	6,1	0,46	13,9	11,8	16,3	7,6	0,55
Southeast	4,5	4,1	4,8	2,6	0,58	4,3	3,9	4,7	3,4	0,79
South	14,1	12,0	16,6	8,2	0,58	13,7	11,1	16,8	8,9	0,65
Hepatitis C										
Brazil	11,0	10,1	11,9	6,0	0,55	10,7	9,6	11,9	7,1	0,66
Center-West	5,8	4,4	7,6	3,7	0,64	5,6	3,9	8,0	5,4	0,96
Northeast	4,3	3,6	5,3	1,9	0,44	4,7	3,6	6,0	2,5	0,53
North	6,1	5,2	7,2	2,7	0,44	6,1	5,0	7,5	3,9	0,64
Southeast	13,5	12,0	15,2	7,3	0,54	13,0	11,2	15,2	8,8	0,68
South	22,5	20,4	24,9	13,1	0,58	21,6	19,0	24,5	13,7	0,63

Legend: CI: Confidence Interval
Source: Sousa RFV, et al., 2024, data extracted from the Department of Chronic Diseases and Sexually Transmitted Infections of the Ministry of Health, available and collected at the Department of Informatics of the Unified Health System (DATASUS).

Figure 2 shows the expected (blue dots) and observed (orange dots) detection rates for notifiable STIs for the pandemic years (2020 and 2021) for Brazil and its regions. The observed detection rates for all STIs (HIV/AIDS, syphilis, and hepatitis) were consistently lower than expected in all regions during 2020 and 2021. However, in 2021, for HIV/AIDS, the observed detection rates were similar to the expected rates. Regarding regional disparities, the largest differences between expected and observed detection rates were recorded for the North region, especially for HIV/AIDS, and in 2020.

Figure 2 - Evolution of expected detection rates of notifiable STIs, compared to detection rates observed in Brazil and geographic regions, according to the years of pandemic and diseases



Note: The layout was developed using CorelDRAW Graphics Suite 2024 software.
Source: Sousa RFV, et al., 2024, data extracted from the Department of Chronic Diseases and Sexually Transmitted Infections of the Ministry of Health, available and collected at the Department of Informatics of the Unified Health System (DATASUS).

DISCUSSION

In this study, a significant decrease in the detection rates of notifiable STIs in Brazil was observed during the COVID-19 pandemic period. The detection rates for all STIs (HIV/AIDS, syphilis, and hepatitis) were consistently lower than expected across all regions in 2020 and 2021. This reduction in notifications may not reflect a true decline in the incidence of these infections but could suggest potential diagnostic losses or underreporting due to the reallocation of health resources to pandemic management.

The World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020 (WHO, 2020). During the first wave of the pandemic, many countries reported disruptions in the provision of services and care for STIs due to COVID-19, leading to an unprecedented negative impact on these services worldwide (SARKAR S, et al., 2021). The global health crisis caused significant disruptions in healthcare services, including STIs testing and treatment, which may have led to many cases going undiagnosed (FERNÀNDEZ-LÓPEZ L, et al., 2023). Additionally, fear of coronavirus infection and social distancing measures may have kept people away from health services, contributing to the reduction in notifications.

The STIs notification rates observed in this study align with various epidemiological surveys conducted worldwide. A time series analysis to estimate the magnitude of the decline in confirmed STIs cases reported in Catalonia (Spain) during the COVID-19 pandemic, by comparing observed values with expected ones, demonstrated that the number of reported STIs cases was 51% lower than expected, reaching an average of 56% during the lockdown. Additionally, this assessment also indicates that fewer STIs were reported among women, individuals living in more disadvantaged areas, those without previous STIs episodes in the past three years, and those who were HIV-negative (SENTÍS A, et al., 2021).

Similarly, a study conducted in China revealed that the more restrictive lockdown measures imposed by COVID-19 had a significant impact on the number of STIs cases and deaths, as well as on the case fatality rates associated with these infections. Prior to the pandemic, an alarming trend of increasing monthly STIs cases was observed, consistent with global patterns. However, during the pandemic, difficulties accessing medical care, reluctance to seek treatment, and possible underreporting were identified as causes for the reduction in reported cases in the country (WU X, et al., 2023).

This pattern of underreporting was also evidenced in a national survey conducted in the United States, which demonstrated a drastic reduction in STIs case reports during the period from March to April 2020 compared to 2019. With the implementation of widespread COVID-19 mitigation measures, many health clinics limited in-person visits to symptomatic cases or closed entirely, resulting in a considerable decrease in STIs screening and diagnosis (PAGAOA M, et al., 2021).

Adding to this situation, a study conducted in the Eastern Cape province of South Africa reveals a significant reduction in STIs services and suggests that the emergency period may have increased the burden of untreated infections in the region (MAITHUFI R, et al., 2021). Adding to this scenario, a study conducted in Europe shows that nearly all testing services experienced interruptions in STIs diagnosis, with 64% of these centers reporting severe disruptions in the provision of tests due to strict mobility restrictions during this period (SIMÕES D, et al., 2020).

Similarly, a study analyzing STIs screening data from the French national health database revealed a 37% reduction in the total number of STIs screenings in April 2020 during the first wave of COVID-19, compared to March 2020, with a particular decrease of 32% in syphilis testing (LIU M, et al., 2023). On the other hand, an observational study conducted in Japan found that STIs incidence rates did not decrease in 2020 and increased significantly from April to June 2021. Similarly, an assessment conducted in Taiwan indicated that the overall number of STIs cases during the pandemic period (2020-2021) was higher than in the pre-pandemic period (2018-2019). However, notifications for AIDS, HIV infection, and syphilis were reduced during the public health emergency (GHAZNAVI C, et al., 2022; KANDA N, et al., 2023).

Considering this situation, several hypotheses exist regarding the potential factors associated with underreporting and the increase in STIs during the COVID-19 pandemic. The implementation of stringent quarantine and lockdown measures was global, with cities, states, and countries enforcing school closures, banning public gatherings, reducing public transportation, and repurposing facilities that provided screening services to control the spread of COVID-19 (DE BAETSELIER I, et al., 2021). In many countries, including Brazil, it was observed that the pandemic led hospitals and clinics to cancel non-urgent visits, convert in-person consultations to remote (telemedicine) sessions, repurpose HIV/AIDS and Infectious Diseases reference hospitals for COVID-19 inpatient services, and reduce routine laboratory tests and social services for people living with HIV/AIDS and other STIs (GATECHOMPOL S, et al., 2021).

Another study identified that more than half (57%) of the specialists working with STIs were reassigned to work related to COVID-19. This shift has intrinsically impacted public services dedicated to the care of these infections (JOHNSON KA, et al., 2021). As a large portion of human resources and health funding were redirected to COVID-19, state and local public health programs were unable to sustain pre-COVID-19 levels of cases while simultaneously managing the prevention and control of other infectious diseases. This directly impacted the diagnosis and testing, potentially interfering with the routine screening of asymptomatic individuals for STIs and possibly resulting in a decrease or delay in diagnosis and treatment, as all efforts in the healthcare sector were focused on the pandemic (BARBEE LA, et al., 2020).

Our results also indicate a considerable increase in the notification rates for most of the STIs assessed in 2021 compared to 2020. This increase suggests a need for a "correction" in the trend analysis for these diseases, with undiagnosed cases from 2020 being detected in the following year. According to the Centers for Disease Control and Prevention (CDC), after periods of restrictions or isolation, it is possible that more people will seek screening or care. On the other hand, individuals with STIs may transmit the infection to others for longer periods due to reduced access to healthcare. Additionally, social distancing measures may have altered individuals' sexual behaviors, potentially leading to an increase in the number of new partners or sexual networks (CDC, 2023).

The epidemiological context of STIs explored in the various studies mentioned highlights the complexity of the effects of the COVID-19 pandemic on these infections and indicates the need for regional and contextualized approaches to understand and mitigate these impacts. It is essential to recognize the need for healthcare systems to adapt their strategies to ensure that STIs screening, diagnosis, and treatment remain effective, even during health crises. This study is an ecological trend analysis that utilizes secondary data, and thus has some limitations that must be considered when interpreting the results.

One of the main limitations is ecological bias, also known as the ecological fallacy, where associations observed at the population level may not reflect relationships at the individual level. Additionally, the use of secondary data can introduce issues related to quality, underreporting, and information flow inherent to health information systems, particularly during the pandemic. Nevertheless, studies of this design are essential for understanding how the pandemic has impacted the detection of these infections in Brazil, allowing for a more effective and targeted response within the SUS (Unified Health System).

In the Brazilian context, this decline in notification rates may have long-term consequences. The lack of timely diagnosis and treatment of STIs can result in severe health complications, increase the transmission of these infections, and undermine the effectiveness of control and prevention strategies within national healthcare systems. Given these factors, it is essential to systematically continue adopting measures that reinforce health surveillance and the management of STIs in Brazil. Additionally, healthcare managers and public health professionals should prepare for potential increases in STIs-related morbidity in the coming years because of the reduced availability of care during the pandemic.

CONCLUSION

The results of this study indicate that the COVID-19 pandemic had a significant impact on the detection and reporting of STIs in Brazil, with notable regional variations. The analysis of temporal trends revealed a decrease in the detection rates of HIV/AIDS and Hepatitis B and C during the pandemic, accentuating the downward trends already observed in the pre-pandemic period. In contrast, the detection rates of acquired syphilis and syphilis in pregnant women increased, highlighting a different dynamic in monitoring these conditions during the pandemic period. The discrepancy between the expected and observed STIs rates in 2020 and 2021 suggests underreporting, especially in the first year of the pandemic, possibly due to disruptions in sexual health services. However, the increase in observed syphilis rates in 2021 may reflect a delayed resumption of reporting or a worsening of public health conditions. These findings underscore the importance of continuous surveillance and intervention strategies to mitigate the impact of regional inequalities and ensure more effective control of STIs.

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