Revista de Enfermagem e Atenção à Saúde
REAS

ORIGINAL ARTICLE
DOI: 10.18554/reas.v13i3.7047
e202450

TEMPORAL TREND AND SPATIAL DISTRIBUTION OF ACQUIRED SYPHILIS IN A MUNICIPALITY OF MATO GROSSO, 2010-2021

TENDÊNCIA TEMPORAL E DISTRIBUIÇÃO ESPACIAL DA SÍFILIS ADQUIRIDA EM UM MUNICÍPIO DE MATO GROSSO, 2010-2021

TENDENCIA TEMPORAL Y DISTRIBUCIÓN ESPACIAL DE LA SÍFILIS ADQUIRIDA EN UN MUNICIPIO DE MATO GROSSO, 2010-2021

Susi Astolfo[1], Amanda Cristina de Souza Andrade[2], Ruth Terezinha Kehrig[3]

How to cite this article: Temporal trend and spatial distribution of acquired syphilis in a municipality of Mato Grosso, 2010-2021. Rev Enferm Atenção Saúde [Internet]. 2024 [access:____]; 13(3): e202450. DOI: https://doi.org/10.18554/reas.v13i3.7047

ABSTRACT

Objective: to analyze the epidemiological scenario of acquired syphilis in Várzea Grande, Baixada Cuiabana and Mato Grosso. **Methods**: An ecological study that analyzed the detection rates of general acquired syphilis and disaggregated by sex and age group in Várzea Grande, in the Baixada Cuiabana health region and in the state of Mato Grosso in the period from 2010 to 2021. Thematic maps were constructed for three years (2010-2012, 2013-2015, 2016-2018, 2019-2021). **Results**: The rate of detection of acquired syphilis showed an upward trend in Várzea Grande, Baixada Cuiabana and in the state, mainly among young people, especially among males. **Conclusions**: The occurrence of acquired syphilis increased between 2010 and 2021 in the studied locations, more significantly in the last two trienniums.
Descriptors: Sexually Transmitted Diseases; Syphilis, Time Series Studies; Geographic Mapping.

[1] Graduated in Physical Education and Public Health, both from the Federal University of Mato Grosso. Specialist in Health Assessment from the National School of Public Health/FIOCRUZ and Federal Management of SUS, from the Institute of Education and Research of the Sírio Libanês Hospital/Ministry of Health, master in Public Health and PhD in Public Health at UFMT. Works at the State Superintendence of the Ministry of Health in Mato Grosso (Section of Institutional Support and Federative Articulation). Ministry of Health/Cuiabá/Mato Grosso/Brazil. https://orcid.org/0000-0003-2707-7924

[2] Professor at the Institute of Public Health and the Postgraduate Program in Public Health at UFMT. Researcher at the Urban Health Observatory of Belo Horizonte, School of Medicine - UFMG. PhD in Public Health from UFMG. Master in Epidemiology from the René Rachou Research Center - Fiocruz Minas. Bachelor's degree in Statistics from UFMG. Federal University of Mato Grosso, Institute of Public Health, Cuiabá, Mato Grosso, Brazil. https://orcid.org/0000-0002-3366-4423

[3] PhD in Public Health from USP, Master in Public Health from Universidad de Chile, Specialist in Public Administration from ESAG/UDESC (University for the Development of the State of Santa Catarina, Sanitarian, Degree in Public Health from the University of Chile and Graduated in Administration from FURB (Regional University of Blumenau. She is an associate professor, researcher and master's and doctoral advisor at the Institute of Public Health of UFMT - Campus Cuiabá/MT. She completed a postdoctoral internship in the Department of Preventive Medicine of the Faculty of Medicine USP. Federal University of Mato Grosso, Institute of Public Health, Cuiabá, Mato Grosso, Brazil. https://orcid.org/0000-0003-2931-1067

RESUMO

Objetivo: analisar o cenário epidemiológico da sífilis adquirida em Várzea Grande, Baixada Cuiabana e Mato Grosso. **Métodos:** Estudo ecológico que analisou as taxas de detecção de sífilis adquirida geral e desagregada por sexo e faixa etária em Várzea Grande, na região de saúde da Baixada Cuiabana e no estado de Mato Grosso no período de 2010 a 2021. A análise de tendência foi realizada pelo modelo *Jointpoint,* sendo calculadas a variação percentual anual e a média da variação percentual anual. Foram construídos mapas temáticos por triênios (2010-2012, 2013-2015, 2016-2018, 2019-2021). **Resultados**: A taxa de detecção da sífilis adquirida apresentou tendência de crescimento em Várzea Grande, na Baixada Cuiabana e no estado, principalmente entre os jovens, com destaque para o sexo masculino. **Conclusões**: A ocorrência de sífilis adquirida aumentou no período entre 2010 e 2021 nos locais estudados, mais expressivamente nos dois últimos triênios.

Descritores: Doenças Sexualmente Transmissíveis; Sífilis; Estudos de Séries Temporais; Mapeamento Geográfico.

RESUMEN

Objetivo: analizar el escenario epidemiológico de la sífilis adquirida en Várzea Grande, Baixada Cuiabana y Mato Grosso. **Métodos**: Estudio ecológico que analizó las tasas de detección de sífilis adquirida en general y desagregadas por sexo y grupo de edad en Várzea Grande, en la región sanitaria de Baixada Cuiabana y en el estado de Mato Grosso en el período de 2010 a 2021. Se realizó el análisis de tendencias. Utilizando el modelo Jointpoint se calculó la variación porcentual anual y la variación porcentual anual promedio. Los mapas temáticos se crearon durante tres años (2010-2012, 2013-2015, 2016-2018, 2019-2021). **Resultados**: La tasa de detección de sífilis adquirida mostró una tendencia creciente en Várzea Grande, Baixada Cuiabana y en el estado, principalmente entre los jóvenes, especialmente los varones. **Conclusión**: La ocurrencia de sífilis aumentó en el período comprendido entre 2010 y 2021 en nuestros lugares estudiados, pero significativamente en los últimos tres años.

Descriptores: Enfermedades de Transmisión Sexual**;** Sífilis**;** Estudios de Series Temporales**;** Mapeo Geográfico.

INTRODUCTION

Syphilis is a chronic, curable infectious disease caused by the bacterium Treponema pallidum. It is transmitted sexually and vertically, and is characterized by three sequential clinical and symptomatic phases, separated by periods of asymptomatic latent infection.[1] This disease has become an epidemic and a serious public health problem, with an estimated 12 million new cases worldwide each year, according to 2016 estimates. [2]

To meet the demand for syphilis re-emergence in the country, health professionals must be trained to test, diagnose and treat, already in basic health units (UBS), a practice that has been reinforced in clinical protocols and therapeutic guidelines for sexually transmitted infections (STIs).[3] Increasing testing coverage implies prioritizing it in Primary Health Care and other gateway services to the Unified Health System (SUS), which will certainly increase the

number of people with a positive diagnosis and the desirable healthcare coverage, providing the necessary treatment and quality throughout the care continuum.[4]

Timely diagnosis and appropriate treatment of syphilis ensure a cure for the disease, which helps reduce transmission of the virus in different population groups. This impact depends in part on the quality of care and involves coordination between the different levels of care. As well as improving the performance of the continuum of care for HIV, congenital syphilis and hepatitis C in health regions (formed by border municipalities that share cultural, economic and social identities, communication networks and transport infrastructure. The purpose of these regions is to integrate the organization, planning and execution of health actions and services) was demonstrated in the QualiRede intervention[5], it is assumed that improving the lines of care for promoting sexual reproductive health, prevention, early diagnosis, treatment and linking to follow-up can contribute to achieving control/cure of acquired syphilis. Organizing care for STIs (sexually transmitted infections) is a challenge, since it requires differentiated technological arrangements because it is a complex object, shaping care that provides autonomy to the individual in the face of stigmas related to moral values faced in the dimensions of private life, mainly linked to sexuality.[6]

Several studies have been published showing the evolution of congenital syphilis and syphilis in pregnant women in the national, state and municipal scenarios. However, when it comes to acquired syphilis, publications are rare. Of the recent studies found on acquired syphilis to dialogue with this research, two analyzed cases of syphilis in Brazil[7, 8]; one analyzed syphilis in the state of Paraná, 9 another in the state of São Paulo, 10 and one in the municipality of Rio Verde in Mato Grosso do Sul. [11]

This study aimed to analyze the epidemiological scenario of acquired syphilis in Várzea Grande, Baixada Cuiabana and Mato Grosso.

METHODS

This is an ecological, time-series study of the detection rate of acquired syphilis in Várzea Grande, in the Baixada Cuiabana health region and in the state of Mato Grosso from 2010 to 2021. Mato Grosso has 16 health regions: Alto Tapajós, Araguaia Xingu, Baixada Cuiabana, Centro Norte, Garças Araguaia, Médio Araguaia, Médio Norte, Noroeste, Norte Araguaia Karajá, Norte, Oeste, Sudoeste, Sul, Teles Pires, Vale do Arinos and Vale do Peixoto.[12]

The state had an estimated population of 3,567,234 inhabitants in 2021, of which 1,028,372 were in Baixada Cuiabana and 290,383 in Várzea Grande. The Baixada Cuiabana health region is made up of 11 municipalities: Acorizal, Barão de Melgaço, Chapada dos Guimarães, Cuiabá, Jangada, Our Lady of Livramento, Nova Brasilândia, Planalto da Serra, Poconé, Santo Antônio do Leverger and Várzea Grande.

The study included all cases of acquired syphilis reported between 2010 and 2021 in Várzea Grande, Baixada Cuiabana and Mato Grosso, made available by the epidemiological surveillance coordination (COVEPI) of the State Department of Health (SES/MT). Population estimates were extracted from TABNET, available at the electronic address of the Department of Information Technology of the Unified Health System (DATASUS).

The data were organized in an Excel spreadsheet. The detection rate was calculated by the number of cases divided by the population and multiplied by 100,000 inhabitants. The detection rate of acquired syphilis was disaggregated by sex (female, male) and age group (10 to 19 years, 20 to 29 years and 40 years and over) in the study locations and divided by year, three-year periods (2010-2012, 2013-2015, 2016-2018, 2019-2021) and total period (2010-2021).

The trend analysis of the detection rate series was conducted using the Jointpoint model (inflection point), considering the detection rates of acquired syphilis as dependent variables (y) and as independent variables (x) in the years of the study period. The annual percentage change (APC - Annual Percent Change) and average annual percentage change (AAPC - Average Annual Percent Change) were calculated. The trend was classified as stationary (APC=0 and p-value>0.05), increasing (positive APC and p-value<0.05) or decreasing (negative APC and p-value<0.05). The software used was the Joinpoint Regression Program, version 4.9.0.0, available at (http://surveillance.cancer.gov/joinpoint/).

Thematic maps were constructed for the detection rates of acquired syphilis in Várzea Grande and the health region using QGIS software, version 3.10, with the SIRGAS 2000 projection and reference system. The cartographic base of the state map used was that of the IBGE website.

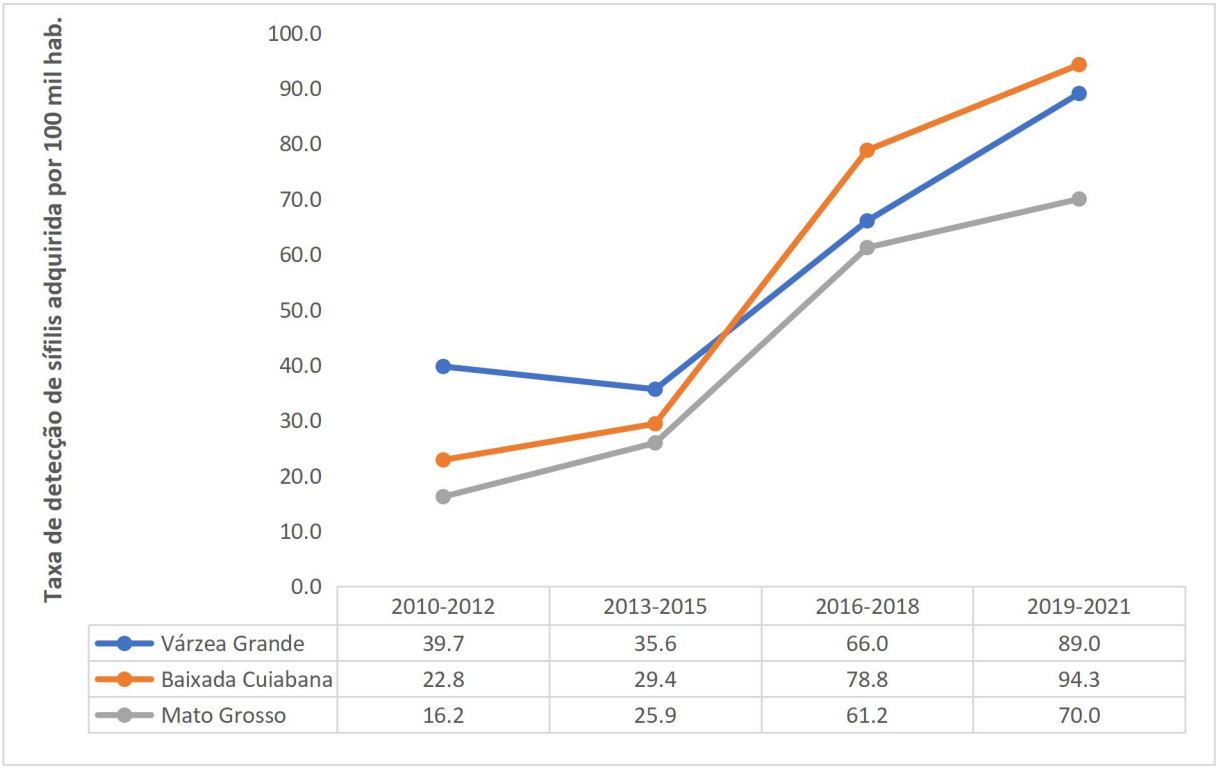
The study was approved by the Research Ethics Committee of the Federal University of Mato Grosso under opinion number 5,245.07, on February 16, 2022, in accordance with the Resolution of the National Health Council (CNS) No. 466, of December 12, 2012. Exclusively secondary data were used, therefore, there was no need

to sign the Free and Informed Consent Form (TCLE).

RESULTS

The study analyzed 1919 cases of acquired syphilis in Várzea Grande, 6730 cases in Baixada Cuiabana and 17,712 in the state of Mato Grosso. The syphilis detection rate increased progressively in the three-year periods for the Baixada Cuiabana and Mato Grosso regions. The municipality of Várzea Grande showed a slight decrease from the first to the second three-year period, however, in the last two three-year periods there was a considerable increase, following the trend of the health region and the state (Figure 1). The acquired syphilis detection rate was higher in the last two three-year periods in the three locations: Várzea Grande (89.0), (66.0), Baixada Cuiabana (94.3) and (78.8) and Mato Grosso (70.0) and (61.2) respectively.

Figure 1- Syphilis detection rate per 100,000 inhabitants, Várzea Grande, Baixada Cuiabana and Mato Grosso, 2010-2012, 2013-2015, 2016-2018 and 2019-2021.



	2010-2012	2013-2015	2016-2018	2019-2021
Várzea Grande	39.7	35.6	66.0	89.0
Baixada Cuiabana	22.8	29.4	78.8	94.3
Mato Grosso	16.2	25.9	61.2	70.0

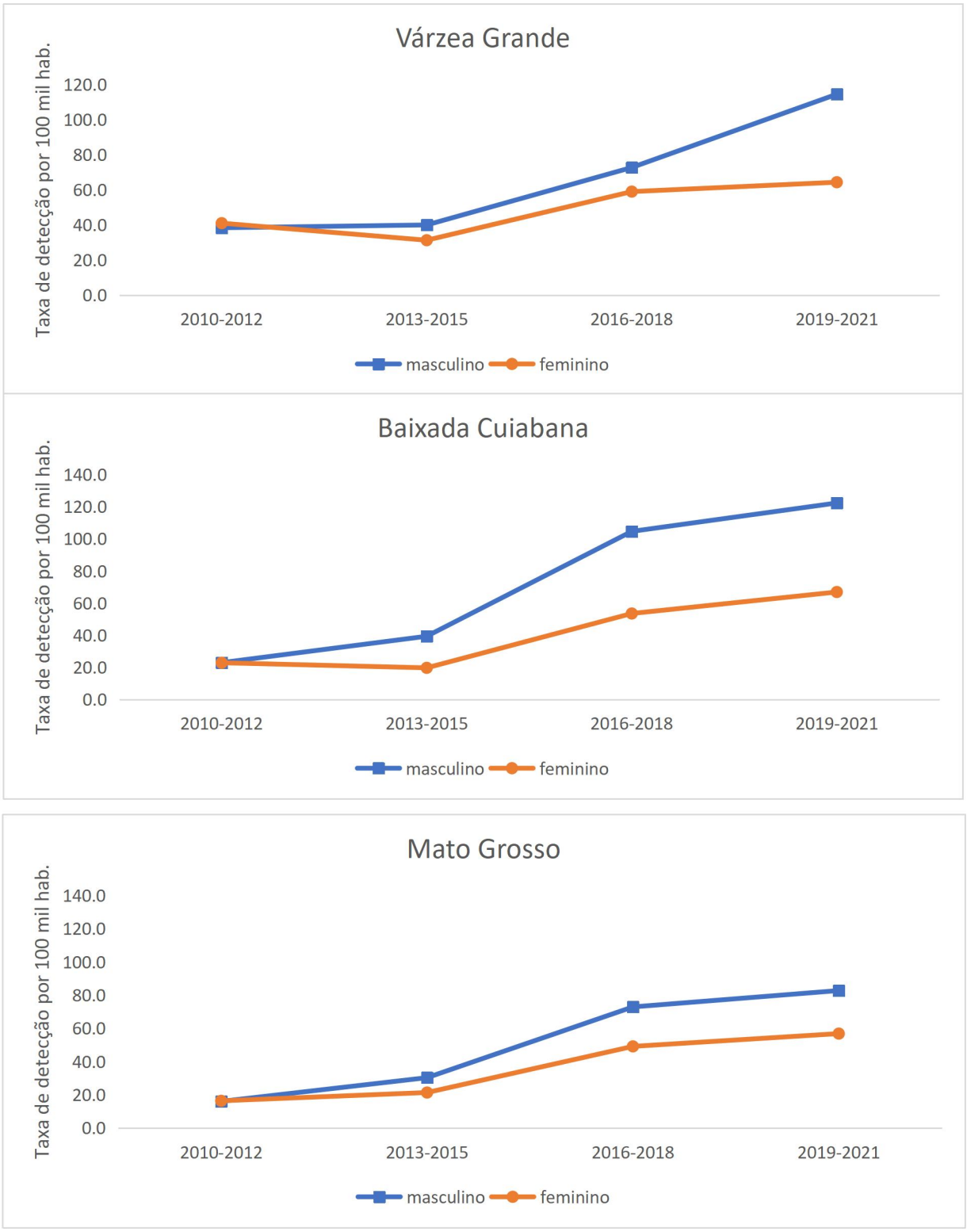
Source: Population:Preliminary estimates prepared by the Ministry of Health/SVS/DASNT/CGIAE)
Cases: (SINAN/COVEPI/SES/MT).

For all locations studied, the highest rates were found in the last three years (2019-2021) and for males in the three

years 2013-2015, 2016-2018 and 2019-2021 (Figure 2).

In Várzea Grande, the detection rate of acquired syphilis in males went from 38.4 to 114.5 in the period, while that of females went from 41.0 to 64.4 from the first to the last three years. In the Baixada Cuiabana health region, the detection rate of acquired syphilis in males went from 22.9 (2010-2012) to 122.3 (2019-2021), while that of females went from 22.8 to 66.9 in the same period. In Mato Grosso, the rate went from 16.4 to 82.7 for males in the period studied and from 16.0 to 56.8 for females.

Figure 2– Detection rate of acquired syphilis per 100,000 inhabitants, according to sex, Várzea Grande, Baixada Cuiabana and Mato Grosso, 2010-2012, 2013-2015, 2016-2018 and 2019-2021.



Source: Population:Preliminary estimates prepared by the Ministry of Health/SVS/DASNT/CGIAE)

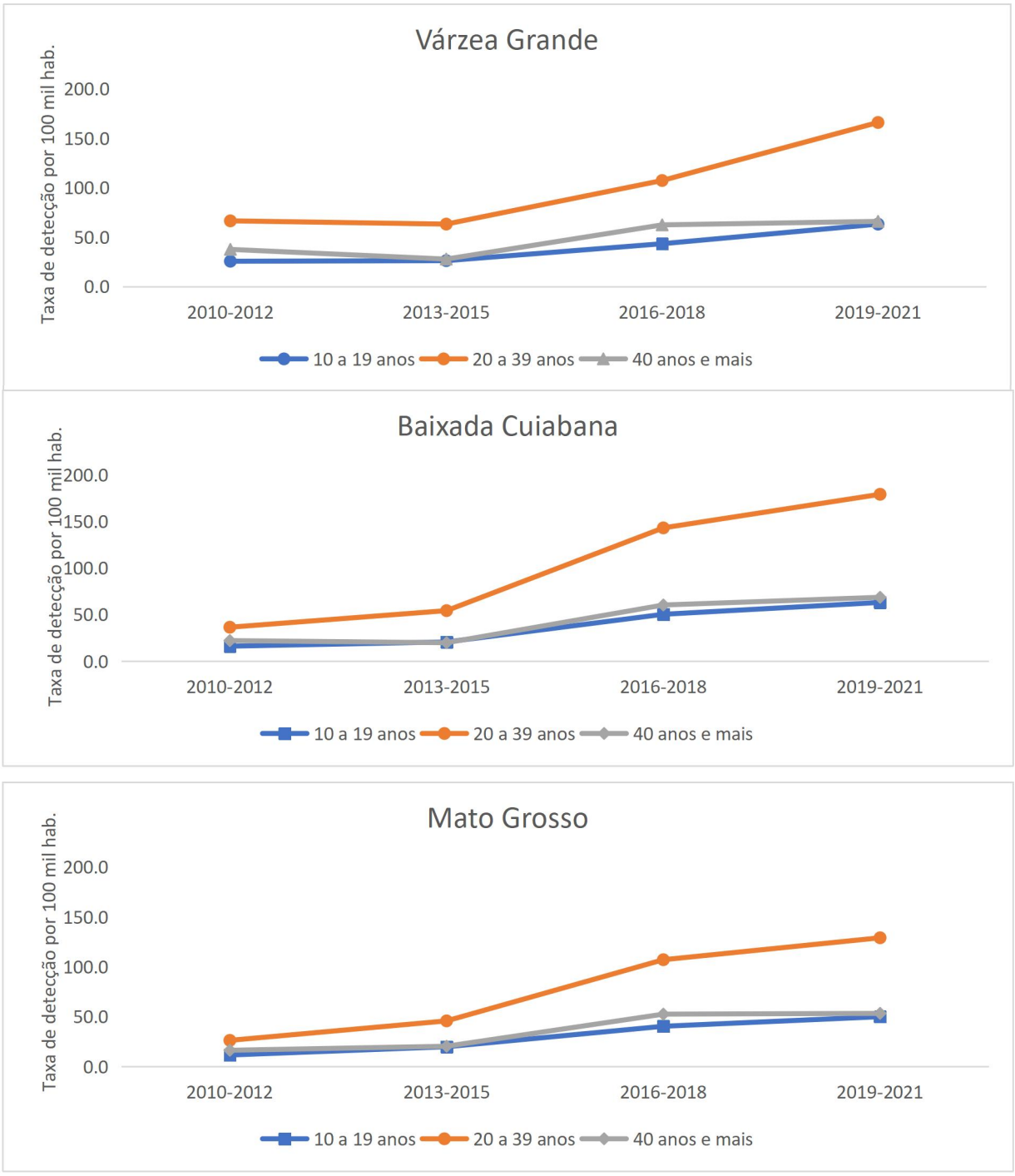
Cases: (SINAN/COVEPI/SES/MT).

Regarding age group, the highest syphilis detection rates in the studied locations were evident in young people between 20 and 39 years old. In Várzea Grande, the detection rate of acquired syphilis went from 66.5 in the first three-year period to 166.0 in the last three-year period in that same age group, while in the Baixada Cuiabana health region the rate went from 36.5 to 179.3 in the same periods and age group. In Mato Grosso, the rate went from 26.2 (2010-2012) to 129.1 (2019-2021) in the age group of 20 to 29 years old (Figure 3).

The 40-year age group had rates slightly above those found among young people aged 10 to 19 in Várzea Grande, in the second three-year period (27.8 and 26.2), respectively, and in the last three-year period (66.0 and 63.2). However, the last age group (40 years and over) remained higher in all periods compared to the first (10 to 19 years), being (37.6 and 25.7) in the first three-year period and (62.4 and 43.4) in the third three-year period, respectively.

In Baixada Cuiabana, the youngest age group (10 to 19 years) had a slightly higher rate of detection of acquired syphilis than that of the 40-plus age group in the second three-year period, while in the other three-year periods it was higher in the 40-plus age group. In Mato Grosso, the 40-plus age group was higher than the 10-19 age group in all three-year periods. In the three locations, the rates in the second three-year period had a small difference between these two age groups.

Figure 3 – Detection rate of acquired syphilis per 100,000 inhabitants, according to age group (in years), Várzea Grande, Baixada Cuiabana and Mato Grosso, 2010-2012, 2013-2015, 2016-2018 and 2019-2021.



Source: Population:Preliminary estimates prepared by the Ministry of Health/SVS/DASNT/CGIAE)
Cases: (SINAN/COVEPI/SES/MT).

In the three locations studied, two inflection points occurred, dividing the series into three periods, with some variation in their delimitation in relation to the second

period (between 2015 and 2019 for Várzea Grande, 2013 to 2018 for Baixada Cuiabana and 2014 to 2018 for Mato Grosso). In Várzea Grande and Mato Grosso, in the period from 2010 to 2021, the trend in the syphilis detection rate was increasing. In the three locations studied, two inflection points occurred, dividing the series into three periods. In Várzea Grande, the increasing trend was in the second period (2015-2019) while in the first period it was stable and in the last period it was decreasing (2019-2021). Baixada Cuiabana had an increasing trend in the second period (2013-2018) and stability in the first and last periods. In Mato Grosso, the second period showed an increasing trend, while the first and last were stable (Table 1).

In the analysis stratified by sex, the trend from 2010 to 2021 in the syphilis detection rate was increasing for both sexes in Baixa da Cuiabana and Mato Grosso and for males in Várzea Grande. Várzea Grande had two inflection points for both sexes. Females showed stability in the period analyzed, while males in the second period (2016-2019) showed an increase and stability in the first and last. In Baixada Cuiabana, an inflection point occurred dividing the series into two periods for males, with a significant increase in the first and a small decrease in the second period. Females showed two inflection points dividing the series into three periods, with a significant increase in the second period while the other two periods showed decreases, being significant in the last period. In Mato Grosso, in relation to males, the same occurred in the Baixada Cuiabana rates: an inflection point dividing the series into two periods for males, with a significant increase in the first and a decrease in the second period. Females showed an increase in the first two periods (the second significant) and a decrease in the last.

Regarding age groups, Várzea Grande did not present an inflection point in the 10 to 19 age category, with a significant increase throughout the period; in the second age group (20 to 39 years) it presented two inflection points dividing the series into three periods, with an increase in the first two periods (the first small and the second significant) and a decrease in the last; and in the last category (> 40 years) it presented an inflection point dividing the series into two periods, with a decrease in the first and last periods and an increase in the second, neither significant. Baixada Cuiabana presented an inflection point dividing the series into two periods, with a significant increase in the first and a decrease in the second period in the first two categories, while the third category presented two inflection points dividing the series into three periods, all significant with an increase

in the second and decreases in the first and third periods. Mato Grosso follows Baixada Cuiabana in the first two categories; in the third category there were two inflection points dividing the series into three periods, with an increase in the first two, the second being significant and a decrease in the last period.

Table 1– Average annual percentage change (AAPC) and annual percentage change (APC) of acquired syphilis detection rates according to sex and age group, Várzea Grande, Baixada Cuiabana and Mato Grosso, 2010-2021.

Indicators	Period	Tendencies		Total Period	
		APC	95% CI	AAPC	95%CI
Várzea Grande	2010-2015	-3.6	-15.5;18.6	5.0*	0.3;10.0
	2015-2019	36.8*	21.5;54.0		
	2019-2021	-23.4*	-37.0;-5.7		
Gender					
Masculine	2010-2016	3.2	-4.3;11.4	8.9*	0.9;17.5
	2016-2019	50.2*	10.2;104.7		
	2019-2021	-21.1	-40.9;5.2		
Feminine	2010-2015	-9.7	-26.9;11.5	1,2	-16.6;22.2
	2015-2018	48.9	-36.5;249.4		
	2019-2021	-16.8	-40.0;15.5		
Age range (years)					
10-19	2010-2021	12.0*	5.4;18.9	12.0*	5.4;18.9
20-39	2010-2016	1.1	-6.0;8.7	6.6	-1.3;15.1
	2016-2019	47.9*	8.5;101.7		
	2019-2021	-23.5	-43.8;4.2		
>40	2010-2015	-13.1	-56.1;67.4	1,2	-12.9;17.5
	2015-2018	64.6	28.9;70.4		
	2018-2021	-19.8	-23.8;3.8		
Baixada Cuiabana	2010-2013	-14.3	-56.1;67.4	11.0	-3.4;27.7
	2013-2018	48.2*	28.9;70.4		
	2019-2021	-11.0	-23.8;3.8		
Gender					
Masculine	2010-2018	39.2*	25.3;54.5	23.8*	15.0;33.4
	2018-2021	-9.3	-23.7;7.7		
Feminine	2010-2015	-4.4	-11.7;3.4	8.2*	2.0;14.8
	2015-2018	68.7*	29.7;119.3		
	2019-2021	-14.6*	-22.2;-6.3		
Age range (years)					
10-19	2010-2019	28.8*	17.0;41.7	17.5*	1.6;35.9
	2019-2021	-22.1	-67.1;84.7		
20-39	2010-2018	39.1*	27.8;51.4	24.7*	17.2;32.7

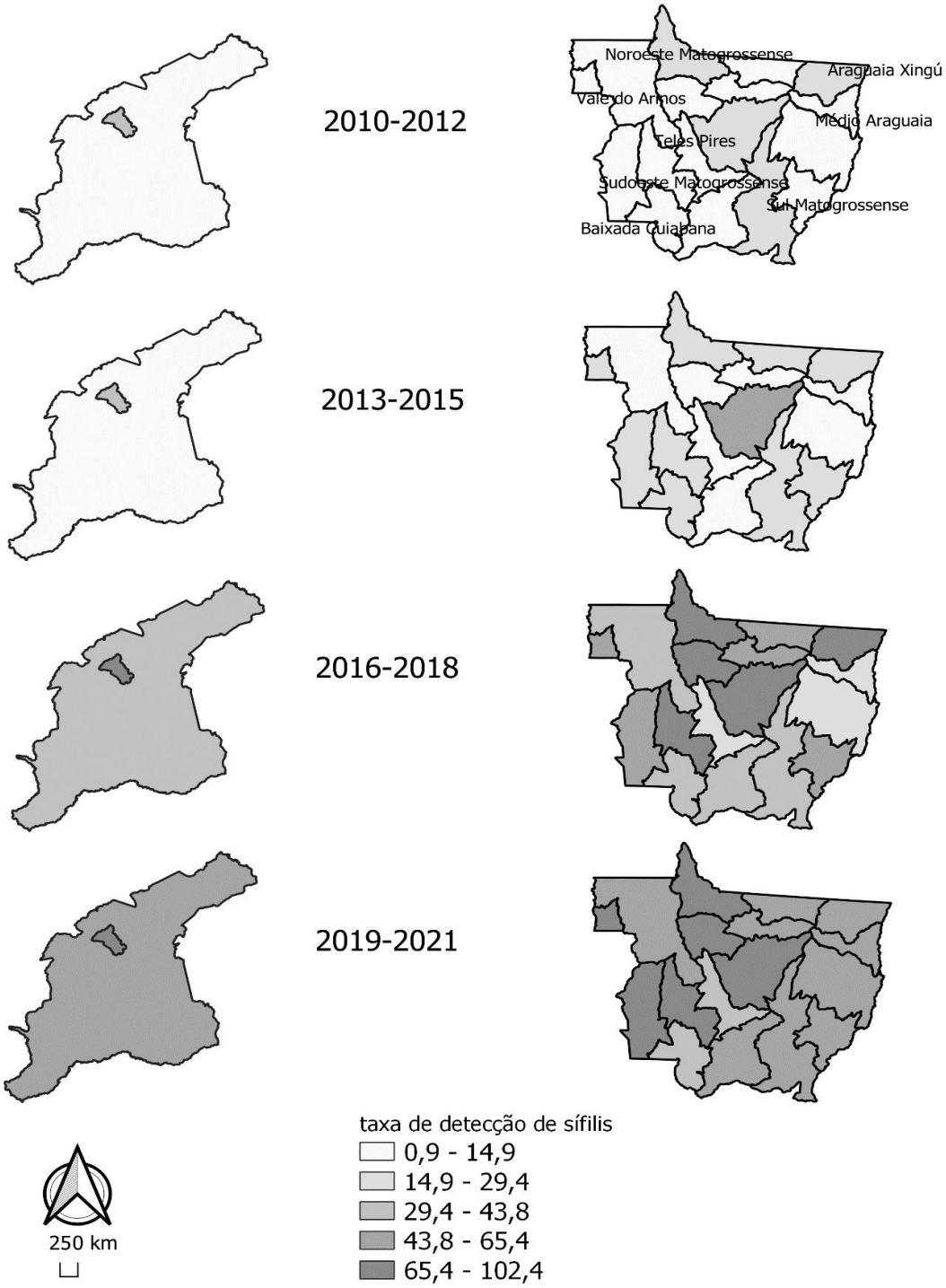
	2018-2021	-6.8	-20.0;8.7		
>40	2010-2014	-11.7*	-20.9;1.5	7.7*	3.1;12.6
	2014-2018	59.1*	41.5;79.0		
	2018-2021	-16.5*	-23.0;9.6		
Mato Grosso	2010-2014	12.2	-5.2;48.4	14.4*	5.4;24.1
	2014-2018	39.3*	23.5;57.1		
	2019-2021	-9.7	-20.1;2.0		
Gender					
Masculine	2010-2018	34.4*	27.4;41.8	21.3*	16.3;26.5
	2018-2021	-7.8	-18.2;3.8		
Feminine	2010-2014	3.2	-17.3;28.8	11.0*	1.6;21.3
	2014-2018	40.8*	11.7;77.5		
	2019-2021	-10.8	-25.1;6.1		
Age range (years)					
10-19	2010-2018	27.7*	22.1;33.6	18.8*	14.6;23.2
	2018-2021	-2.0	-11.9;9.1		
20-39	2010-2018	34.0*	27.3;41.2	21.7*	16.9;26.8
	2018-2021	-5.9	-16.2;5.7		
>40	2010-2014	2.0	-22.0;33.4	9.9	-0.9;22.0
	2014-2018	43.9*	10.4;87.4		
	2018-2021	-15.1	-30.2;3.3		

Source: Population:Preliminary estimates prepared by the Ministry of Health/SVS/DASNT/CGIAE).Cases: (SINAN/COVEPI/SES/MT).* $p<0.05$

Figure 4 shows the spatial evolution of the detection rates of acquired syphilis by three-year periods in the study sites, characterized by the increase in the number of health regions with higher notification of the analyzed rate throughout the studied period, mainly in the last two three-year periods. Várzea Grande has higher detection rates of acquired syphilis than Baixada Cuiabana in all three-year periods.

The Teles Pires health region stands out from the others in the second three-year period, presenting higher rates than the others (between 43.8 and 65.4). In the penultimate three-year period (2016-2018), five health regions stood out with the highest syphilis detection rates (65.4 – 102.4): Alto Tapajós, Vale do Arinos, Teles Pires, Centro Norte and Baixo Araguaia. Of these, the first four also presented higher rates in the last three-year period, together with the Southwest region.

Figure 4– Spatial distribution of the syphilis detection rate per 100,000 inhabitants by three-year periods, Mato Grosso, 2010-2021.



Source: Population: Preliminary estimates prepared by the Ministry of Health/SVS/DASNT/CGIAE). Cases: SINAN/COVEPI/SES/MT.Cartographic data: Brazilian Institute of Geography and Statistics (IBGE).

DISCUSSION

The occurrence of acquired syphilis and the number of reporting municipalities increased between 2010 and 2021 in Várzea Grande, Baixada Cuiabana, and the state of Mato Grosso. This trend follows the growth in the rate observed in the country, which highlights the epidemic of the disease since 2010, as observed in the MS syphilis epidemiological bulletin, which reported an increase in the incidence from 2 cases (/100,000 inhabitants) in 2010 to 9.3 cases (/100,000 inhabitants) in 2021. 13 Although it does not justify it, the increase in reporting is a positive point for the services, since it may be one of the hypotheses for the increase in the number of cases.

Between 2011 and 2017, there was an 86.3% increase in the number of municipalities reporting acquired syphilis. 10 Another study considered data on the detection rate of acquired syphilis cases in the country, which was continuously increasing between 2010 and 2018.[8] The research that analyzed cases of acquired syphilis in the same period as the present study in Rio Verde, Mato Grosso do Sul, observed an increasing trend from 2012 onwards due to the greater number of cases or the expansion of rapid testing, facilitating the diagnosis of the infection. [11]

In 2010, the Ministry of Health included syphilis in the list of diseases subject to compulsory notification[14], considering the increase in cases from that same year onwards, with a positive evolution in the detection rate over the years since then. This fact highlights the epidemic of the disease in the country, which peaked in 2019 (51.5 cases per 100,000 inhabitants)[15], a trend reinforced by this study in Mato Grosso.

The positive increase over the first 10 years of the study's historical series, both in the state and in Várzea Grande, can be attributed to factors such as the expansion of testing, especially rapid tests, the reduction in condom use by the population, resistance by health professionals to administering penicillin in PHC, in addition to the global shortage of penicillin, especially between 2014 and 2016, and the improvement of notification by the surveillance system.[16]

In several countries, penicillin treatment was being hampered by shortages of the drug: 41% of countries that participated in a survey between 2015-2016 and reported shortages or stockouts, a figure that rose to 5% in 2019.[17]

It is worth noting that, in Brazil, the definition of syphilis cases only includes active cases of the disease, excluding cases of serological scarring and false-positive results, which makes it difficult to compare

notification data with other countries, since the definition of cases is different.[10,18] Another issue that should be highlighted refers to the non-discrimination in the notification forms of the Notifiable Diseases Information System (SINAN) of the primary, secondary, recent latent and other phases - these phases correspond to the acute phase of the disease.[10]

In the studied locations, an increase in the rates of acquired syphilis was observed in the last two three-year periods (2016-2018 and 2019-2021), in both sexes, being more significant in males, as in a study that recorded 58.5% of cases in men between 2010 and 2018.[9] Other studies[7,19] indicate higher rates of syphilis in men, which these authors relate to behavioral aspects of greater exposure to infection, such as drug and alcohol use, non-use of condoms and relationships between men who have sex with men.[20] The results of that study showed that the sex ratio increased from 2010 (0.2) to 2017 (0.7), which reflects the increase in the number of male cases of syphilis. Even so, women's access to health services and subsequent syphilis testing is still higher, which indicates that this sex ratio may still be underreported. [20]

Regarding socioeconomic factors, this research found that most of this information is poorly recorded in the UBS studied, implying the analysis of socioeconomic factors and their relationship with the maintenance of treatment and adherence to prevention measures. Some socioeconomic factors interfere with the maintenance of treatment, such as ethnicity, level of education, especially among women, low income and young people for both genders.[5]

Another author points out that among the risk situations for syphilis infection are sociodemographic factors (low education, low income and marital status), which configure a direct relationship with poverty. Failure to adhere to safe sex practices, use of illicit and psychoactive drugs, among others, are pointed out as some risk behaviors. Women are even more vulnerable to the disease when they have their first sexual intercourse and during pregnancy; and a high number of sexual partners at a young age. [21]

This study pointed out higher prevalence of syphilis in the following sociodemographic characteristics: lack of Internet access at home; onset of sexual activity before the age of 14; exposure category men who have sex with men; sexual practices with more than five partners; receipt of gifts, drugs or other incentives in exchange for sex; and previous history of symptoms of sexually transmitted infections. It also presented higher prevalence among blacks (1.7%) and mixed

races (1.1%), as well as in people with lower levels of education (between 1.2% and 2.9%). [22]

Regarding age group, adults aged 20 to 39 were the most affected by syphilis in the studied locations, especially in the last three years (2019-2021). Young people are more susceptible to the disease, a fact that corroborates studies carried out in 2020 in the state of Paraná 9 and in São Paulo, 10 as well as in the municipality of Macaé in Rio de Janeiro in 2018.[23]

Globally, in 2022, the number of new cases of syphilis in adults aged 15–49 years increased from 7.1 million in 2020 to 8.0 million. Between 2020 and 2022, syphilis cases among adults aged 15–49 years increased by 30% in the Americas, which currently face the highest global incidence, with 3.37 million cases (or 6.5 cases per 1000 people), representing 42% of all new cases.[24]

The lack of knowledge of the vulnerabilities associated with exposure to risk corroborates the increase in STIs among young people, and young women are also more exposed to unwanted pregnancies.[25] The social determinants of the health-disease process are directly related to situations of vulnerability, therefore, identifying social risk helps workers in planning and executing their actions. [26]

One of the main strategies for preventing the transmission of syphilis is the use of condoms. However, a study on behavior, attitudes and practices showed a low percentage of young people who used condoms during their last sexual intercourse (36.9%) and only 30.7% used condoms in all sexual relations with regular partners, and 49.6% with casual partners.[27] The factors that justify not using condoms, according to another study, are: not having one during sexual intercourse, decreased pleasure and trust in the partner.[28]

In order to prevent the transmission of the disease in different population groups, it is necessary to know the epidemiological profile of syphilis, as well as to develop prevention strategies that include timely diagnosis and adequate treatment of the disease, both for the patient and the partner, as well as the correct use of condoms, in order to ensure the cure of Syphilis.[5]

The limitations of this study are inherent to the use of secondary data, given that the information was from cases reported in SINAN, which may indicate underreporting, especially during the COVID-19 pandemic, as confirmed by another study.[8] Nevertheless, the findings of this study are essential for identifying priority municipalities for controlling the disease through action planning.

Despite the limitations mentioned, the results obtained can support strategies for the prevention and control of acquired syphilis in the state of Mato Grosso. The implementation of comprehensive prevention programs combined with care and access to treatment are important actions to prevent new infections. Monitoring the actions provided, from the promotion of sexual and reproductive health to the outcome of the care involved, as well as the coordination of lines of care, are essential to addressing this problem.

Acknowledgement

We would like to thank Laine de Andrade e Silva for her contribution to the review.

REFERENCES

1- Rivitti EA. Sífilis Adquirida. In: Walter Belda Júnior. Doenças Sexualmente Transmissíveis. São Paulo: Atheneu; 1999. p. 9-21.
2- World Health Organization. Guidelines for the treatment of *Treponema pallidum* (syphilis). Geneva: World Health Organization [internet]. 2016 [acesso em 27 mai 2023]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK384904/.
3- Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Doenças de Condições Crônicas e Infecções Sexualmente Transmissíveis. Protocolo Clínico e Diretrizes Terapêuticas para Atenção Integral às Pessoas com Infecções Sexualmente Transmissíveis (IST). Brasília (DF); 2019.
4- Silva FL, Freire MES, Astolfo S, Kehrig RT. Trajetória da articulação do "projeto QualiRede" com a resposta para a sífilis no município de Cuiabá – Mato Grosso, 2019. RBits [internet]. 2020 [acesso em 15 abr 2023]; 10 (4). Disponível em: https://doi.org/10.18816/r-bits.v10i4.23902.
5- Nemes MIB, Castanheira ERL, Alves AM, Adania CSS, Loch AP, Monroe AP, et al. A intervenção QualiRede: melhoria do desempenho do contínuo do cuidado em HIV, sífilis congênita e hepatite C em regiões de saúde. Rev bras epidemiol [internet]. 2019 [acesso em 16 fev 2020]; 22 (supl.1): E190010. Disponível em: https://doi.org/10.1590/1980-549720190010.supl.1.
6. Nemes MIB, Castanheira ERL, Loch AA, Santos MA, Alves AM, Melchior R. et al. Avaliação de serviços de saúde: a experiência do Qualiaids. In: Akerman M, Furtado JP, organizadores. Práticas de avaliação em saúde no Brasil – diálogos. Porto Alegre: Rede Unida; 2015. p. 93-145.
7- Carneiro BF, Silva BAS, Júnior CJF, Aguiar EG, Oliveira FCS, et al. Perfil epidemiológico dos casos de sífilis adquirida no Brasil, no período de 2017 a 2021. REAS [internet]. 2023 [acesso em 20 mai 2023]; 43. Disponível em: https://doi.org/10.25248/reac.e11823.2023.
8- Menezes IL, Targino MLM, Júnior ECF, Verli FD, Marinho SA. Sífilis Adquirida no Brasil: Análise retrospectiva de uma década (2010 a 2020). Research Society and Development [internet]. 2021 [acesso em 05 abr 2023]; 10 (6): e17610611180. Disponível em: https://doi.org/10.33448/rsd-v10i6.11180.
9. Gonçalves MR, Gonçalves MR, Ito FY, Hirota MM, Hayashida MR, Mizoguti NN, et al. Perfil epidemiológico dos portadores de sífilis entre 2010 e 2018 no Estado do Paraná, Brasil. Rev. Saúde Públ [internet]. 2020 [acesso em 07 mai 2023]; 3 (2). Disponível em: https://doi.org/10.32811/25954482-2020v3n2p61.
10. Luppi CG, Tayra A, Domingues CSB, Gomes SEC, Pinto VM, Silva MA, et al.

Sífilis no estado de São Paulo, Brasil, 2011–2017. Rev Bras Epidemiol [internet]. 2020 [acesso em 10 jun 2023]; 23: e200103. Disponível em: https://doi.org/10.1590/1980-549720200103.
11- Antero L, Teles RA, Santos YF. Tendência temporal de incidência de sífilis adquirida na cidade de Rio Verde de Mato Grosso, Mato Grosso do Sul. Revista Concilium [internet]. 2022 [acesso em 17 abr 2023]; 22 (5). Disponível em: https://doi.org/10.53660/CLM-448-548.
12- Mato Grosso. Resolução CIB MT nº 65, de 03 de abril de 2012: Dispõe sobre a instituição de 16 (dezesseis) Regiões de Saúde no estado de Mato Grosso. Cuiabá: Conselho Estadual de Saúde (CES), 2012.
13- Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Vigilância, Prevenção e Controle das Infecções Sexualmente Transmissíveis, do HIV/ Aids e das Hepatites Virais. Boletim Epidemiológico Sífilis. Brasília (DF); 2022.
14- Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Departamento de DST, Aids e Hepatites Virais. Sífilis: estratégias para diagnóstico no Brasil. Brasília (DF); 2010. (Série TELELAB). 2010.
15- Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Vigilância, Prevenção e Controle das Infecções Sexualmente Transmissíveis, do HIV/ Aids e das Hepatites Virais. Boletim Epidemiológico Sífilis. Brasília (DF); 2020.
16- Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Doenças de Condições Crônicas e Infecções Sexualmente Transmissíveis. Protocolo Clínico e Diretrizes Terapêuticas para Atenção Integral às Pessoas com Infecções Sexualmente Transmissíveis (IST). Brasília (DF); 2019.
17- World Health Organization. Notícia sobre escassez global de penicilina. Geneva: World Health Organization [internet]. [Acesso em 10 set 2023]. Available from: https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/stis/treatment/shortages-of-penicillin.
18- Lynn WA, Lightman S. Syphilis and HIV: a dangerous combination. Lancet Infect Dis. [internet]. 2004 [acesso em 18 jun 2023]; 4(7): 456-66. Available from: https://doi.org/10.1016/S1473-3099(04)01061-8.
19- Santos IV, Holzman APF, Barbosa DA, Grandi JL, Soares JAS, Santos J. Diferenças sociais e comportamentais entre homens e mulheres diagnosticados com sífilis em um centro de testagem e aconselhamento. Temas em Saúde [internet]. 2021 [acesso em 19 jun 2023]; 21 (5). Disponível em: https://doi.org/10.29327/213319.21.5-2
20- Pereira RMS, Selvati FS, Teixeira LGF, Loureiro LH, Castro RBC, Silva LR. Sífilis em homens: representação social sobre a infecção. Bra. J Hea ver. [internet]. 2020 [acesso em 23 jul 2023]; 3 (1). Disponível em: https://doi.org/10.34119/bjhrv3n1-035.
21- Macedo VC de, Lira PIC de, Frias PG de, Romanguera LMD, Caires S de, et al. Risk factors for syphilis in women: case-control study. Rev Saúde Pública. [internet]. 2017 [acesso em 03 abr 2023]; 51:78. Available from: https://doi.org/10.11606/S1518-8787.2017051007066.
22- Freitas FLS, Bermúdez XPD, Hamann EM, Motta LR, Paganella MP, et al. Sífilis em jovens conscritos brasileiros, 2016: aspectos sociodemográficos, comportamentais e clínicos. Cad. Saúde Pública [internet]. 2021 [acesso em 20 mai 2023]; 37(8): e00263720. Disponível em: https://doi.org/10.1590/0102-311X00263720.
23- Souza BSO, Rodrigues RM, Gomes RML. Análise epidemiológica de casos notificados de sífilis. Rev Soc Bras Clin Med. [internet]. 2018 [acesso em 06 mai 2023]; 16 (2): 94-8. Disponível em: https://www.sbcm.org.br/ojs3/index.php/rsbcm/article/view/339/307.
24- World Health Organization. Implementing the global health sector strategies on HIV, viral hepatitis and sexually transmitted infections, 2022–2030:

report on progress and gaps 2024. World Health Organization [internet]. 2024 [Acesso em 10 out 2024]. Available from: https://www.who.int/publications/i/item/9789240094925.
25- Costa TDS, Capeletti CP, Mello ML, Vieira PR, Brum MD, Krabbe EC et al. Escola,
sexualidade, práticas sexuais e vulnerabilidades para as infecções sexualmente transmissíveis
(IST). Revista Interdisciplinar de Ensino, Pesquisa e Extensão [internet]. 2017 [acesso em 25 set 2023; 4(1). Disponível em: https://revistaeletronica.unicruz.edu.br/index.php/revint/article/view/169/102.
26- Castro CR da S. Determinantes sociais de saúde e o processo de avalição social pré-transplante renal / Social determinants of health and the social assessment process renal pre-transplantation. Braz. J. Develop. [internet]. 2020 [acesso em 16 mai 2023]; 6(5):29065-73. Disponível em: https://doi.org/10.34117/bjdv6n5-380.
27- Fontes MB, Crivelaro RC, Scartezini AM, Lima DD, Garcia AA, Fujioka RT. Fatores determinantes de conhecimentos, atitudes e práticas em DST/Aids e hepatites virais, entre jovens de 18 a 29 anos, no Brasil. Ciênc saúde colet. [internet]. 2017 [acesso em 20 abr 2023]; 22 (4). Disponível em: https://doi.org/10.1590/1413-81232017224.12852015.
28- Santos CP, Barboza ECS, Freitas, NO, Almeida, JC, Dias AC, Araújo EC. Adesão ao uso do preservativo masculino por adolescentes escolares. Brazilian Journal of Health Research. [internet]. 2017 [acesso em 08 jun 2023]; 18 (2). Disponível em: https://periodicos.ufes.br/rbps/article/view/15085.

RECEIVED: 09/2023
APPROVED: 12/12/24
PUBLISHED: 11/2024