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ORIGINAL ARTICLE

Analysis of the implementation of an AIDS mortality committee through municipal health indicators

Análise da implantação de um comitê de mortalidade por AIDS mediante indicadores de saúde municipais

Análisis de la implantación de un comité de mortalidad por SIDA a través de indicadores municipales de salud

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ABSTRACT

Background and objective: the acquired immunodeficiency syndrome (AIDS) has high rates of detection and death in the state of Rio Grande do Sul. In order to better understand such deaths, in December 2017, the Uruguaiana Municipal Department of Health implemented the AIDS Mortality Committee (CMaids). This study aimed to analyze the impact of an CMaids implementation in Uruguaiana through municipal health indicators. **Methods:** an ecological time-series study that used secondary data from the official platforms of the Ministry of Health from 2008 to 2020. **Results:** a reduction in the indicators number of deaths (from 28 in 2008 to 9 in 2020), mortality rate (from 22.0 in 2008 to 7.1 deaths/100,000 inhabitants in 2020), and fatality rate (from 46.74 in 2008 to 9.61 deaths/1,000 inhabitants in 2020) was observed. Moreover, trend lines were verified between 2017-2020 through the logarithmic regression model with join points. A relevant Annual Percent Change in mortality and fatality indicators was verified, with a reduction of 59.1% and 73.4%, respectively, in 2020, when comparing the observed and expected values. **Conclusion:** the findings enable us to conjecture that CMaids contributed to health indicator improvement, evidencing this as a relevant strategy to handle HIV/AIDS endemic at the local level.

Keywords: HIV. Aids. Mortality. Lethality. Health Indicators.

RESUMO

Justificativa e objetivo: a síndrome da imunodeficiência adquirida (aids) apresenta elevadas taxas de detecção e óbito no estado do Rio Grande do Sul. A fim de compreender melhor tais óbitos, em dezembro de 2017, a Secretaria Municipal de Saúde de Uruguaiana implementou o Comitê de Mortalidade por aids (CMaids). O objetivo deste estudo é analisar o impacto da implantação do CMaids de Uruguaiana por meio de indicadores de saúde municipais.

Métodos: estudo ecológico de série temporal, utilizando dados secundários das plataformas oficiais do Ministério da Saúde entre o período de 2008 a 2020. **Resultados:** observou-se redução dos indicadores número de óbitos (de 28 em 2008 para 9 em 2020), taxa de mortalidade (de 22,0 em 2008 para 7,1 óbitos/100.000 habitantes em 2020) e taxa de letalidade (de 46,74 em 2008 para 9,61 óbitos/1.000 habitantes em 2020). Ainda, verificaram-se linhas de tendência entre 2017-2020 por meio do modelo de regressão logarítmica com pontos de junção. Averiguou-se relevante mudança percentual anual nos indicadores de mortalidade e letalidade, com redução de 59,1% e 73,4%, respectivamente, em 2020, ao comparar-se o valor observado e o esperado. **Conclusão:** os achados permitem conjecturar que o CMaids contribuiu para melhorias dos indicadores de saúde, evidenciando essa como uma estratégia relevante para o enfrentamento do HIV/aids em nível local.

Descritores: HIV. Aids. Mortalidade. Letalidade. Indicadores de Saúde.

RESUMEN

Justificación y objetivo: el síndrome de inmunodeficiencia adquirida (sida) presenta altas tasas de detección y muerte en el estado de Rio Grande do Sul. Para entender mejor esas muertes, en diciembre de 2017, la Secretaría Municipal de Salud de Uruguaiana implementó el Comité de Mortalidad por SIDA (CMaids). El objetivo de este estudio es analizar el impacto de la implementación del CMaids de Uruguaiana a través de los indicadores de salud municipales. **Métodos:** estudio ecológico de series temporales, utilizando datos secundarios de las plataformas oficiales del Ministerio de Salud desde 2008 hasta 2020. **Resultados:** se observó la reducción de los indicadores de número de óbitos (de 28 en 2008 a 9 en 2020), tasa de mortalidad (de 22,0 en 2008 a 7,1 muertes/100.000 habitantes en 2020) y tasa de letalidad (de 46,74 en 2008 a 9,61 muertes/1.000 habitantes en 2020). Además, se verificaron líneas de tendencia entre 2017-2020 a través del modelo de regresión logarítmica con puntos de unión. Se verificó un cambio porcentual anual relevante en los indicadores de mortalidad y letalidad, con una reducción de 59,1% y 73,4%, respectivamente, en 2020, al comparar los valores observados y esperados. **Conclusión:** los resultados permiten conjeturar que el CMaids contribuye a mejorar los indicadores de salud, evidenciando que es una estrategia relevante para la lucha contra el VIH/SIDA a nivel local.

Palabras clave: VIH. Síndrome de Inmunodeficiencia Adquirida. Mortalidade. Letalidade. Indicadores de Salud.

INTRODUCTION

The first case of acquired immunodeficiency syndrome (AIDS) in Brazil dates back to 1983 in the state of São Paulo. At the time, the Ministry of Health (MoH) did not classify the disease as a public health problem, believing that the condition would not become an epidemic in the country.[1] Faced with the lack of effective policies at first, the human immunodeficiency virus (HIV) spread throughout the national territory and, in 2020, surpassed the mark of one million cases reported in the Reporting Diseases Information System (SINAN - *Sistema de Informação de Agravos de Notificação*).[2]

In this context, the South region accounts for 17.8% of national deaths from HIV/AIDS, surpassed only by the Southeast region (57.2%). Furthermore, Rio Grande do Sul (RS) was the state with the highest crude mortality rate from AIDS in 2020 (9.3/100,000 inhabitants), despite the 31.62% reduction in the indicator between 2010 and 2020.[3] In the context of RS, Uruguaiana, a city located in the west of the state, bordering Argentina, is listed as a priority in the fight against HIV/AIDS. The municipality ranked 6th in the national classification of the composite index in 2016, which is calculated taking into account the detection rates, mortality and first CD4 cell count of the last five years.[4] The years 2019 and 2020 were not considered in the ranking, as their composite index is below the hundredth municipality.[3,5] In 2020, the municipality had 26.8 new reported cases per 100,000 inhabitants and a crude mortality rate of 7.1 deaths per 100,000 inhabitants.[6] Comparing the state of RS, the first municipal indicator is higher than the state, while the second has a lower value (RS data of 21.8 cases/100,000 people and 9.3 deaths/100,000 people). An even greater difference is verified when these rates are compared with the national ones, with 14.1 new infections per 100,000 inhabitants and a mortality of 4.9 deaths per 100,000 inhabitants.[6]

Amidst the local epidemiological situation of HIV/AIDS, in December 2017, the Municipal Department of Health (MDH) of Uruguaiana, based on the positive experiences of the initiative developed in Porto Alegre, implemented the AIDS Mortality Committee (CMaids). This proposal, endorsed by the MoH, aims to develop inter-institutional, intersectoral and multidisciplinary articulation strategies for death prevention.[7] CMaids is composed of health professionals from different levels of care, in addition to professionals from the scientific society, representatives of the movement of people living with HIV/AIDS (PLHIV) and educational institutions.[8]

The referred strategy for coping with HIV/AIDS in the municipal context still lacks further details about its effect, which is possible based on health indicators' temporal analysis. The verification of trends and distribution of health indicators has been used as evidence to demonstrate the effect of policies, programs and actions in public health.[9] Therefore, this study aimed to analyze the impact of CMaids implementation in Uruguaiana through municipal health indicators.

METHODS

This is a quantitative study, with a time series, using secondary data from the official MoH and MDH platforms, between 2008 and 2020, referring to the indicators of Uruguaiana, RS and Brazil.

Uruguaiana has an estimated population of 126,866 inhabitants. It is located in the Campanha Occidental micro-region, in the extreme west of Rio Grande do Sul, and has a Human Development Index (HDI) of 0.744, classified as high.[10] It is located in a free zone on the border with Argentina, connected to the city of Paso de Los Libres by the international bridge over the Uruguay River, hosting the largest dry port in Latin America. Because it belongs to a border region, it represents an important source of HIV transmission, due to the intense flow of people between the two countries. In the state of RS, the municipality is part of a group of fourteen cities that together account for 70% of reports of HIV/AIDS cases, being considered a priority for coping with the disease.[11]

The data used in the study were extracted from the electronic platform of the MoH's Department of Health Surveillance[6], and analyzed in context to the local situation. The information available comes from SINAN-AIDS and the Mortality Information System (SIM).[2]

Health indicators were analyzed in order to demonstrate potential influences of the CMaids training strategy in the municipal context on the HIV/AIDS situation, since these are instruments used to diagnose the community health scenario.[12,13] The indicators listed from 2008 to 2020 were the absolute frequency of AIDS deaths (number of AIDS deaths that occur annually) and the raw mortality coefficients (number of deaths from AIDS/resident population of the municipality) (x 100,000) and fatality from AIDS (number of deaths from AIDS/PLHIV) (x 1,000). Regarding fatality, this indicator is not presented in the aforementioned electronic addresses; however, information from SINAN-AIDS and SIM available on the MoH TABNET platform was used for its elaboration.[2]

In order to verify trends between the cited indicators, a logarithmic regression model with joining points was used using the Joinpoint Regression Program 4.9.0.0 software. This software allows checking any changes in the trend of indicators over time and the statistical significance of this change. Also, the procedure uses the best fit in a fragmented way for the log-linear model in the indicator's trend analysis. The parameters resulting from the analysis were the Annual Percent Change (APC), with its 95% Confidence Interval, and the p-value for each trend, for which values less than or equal to 0.05 were considered statistically significant. A maximum of three inflection points were analyzed. Thus, we sought to identify trends in the period before and after CMaids implementation in the municipality. Also, the trend curves of the logarithmic regression model that preceded the creation of CMaids were used to estimate the expected values for 2020, allowing the comparison of observed and expected values for the year mentioned as well as the calculation of the proportional percentage change that occurred. Analysis allowed for a projection of what would have happened to the historical series if the measures to combat HIV infection had been maintained as in the period prior to CMaids implementation.

This study was developed with public domain data, with no possibility of identifying the research subjects. This research was approved by the Research Ethics Committee of the *Universidade Federal do Pampa* (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration (CAAE) 12237319.0.0000.5323).

RESULTS

The number of AIDS deaths in the municipality of Uruguaiana between 2008 and 2020 showed fluctuations, reaching the highest value in 2010, with 44 deaths (Figure 1). On the other hand, 2020 registered 9 deaths, indicating the lowest value in the series and
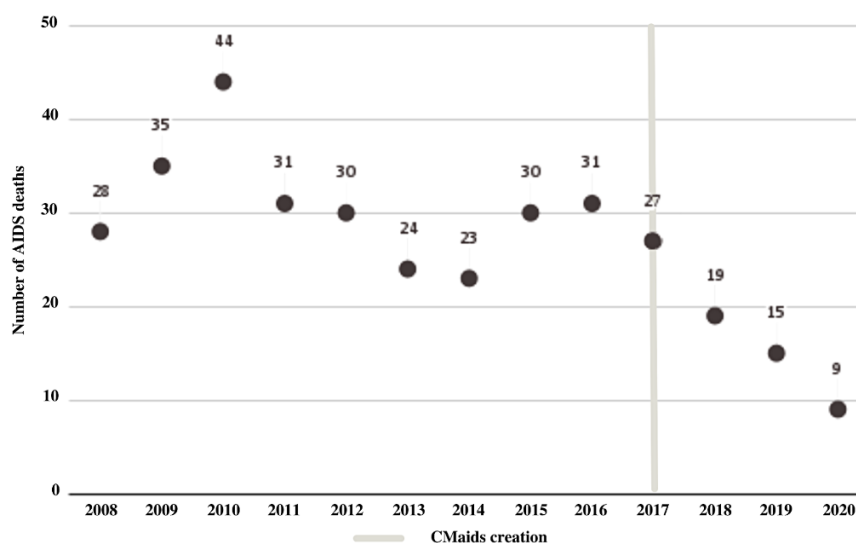
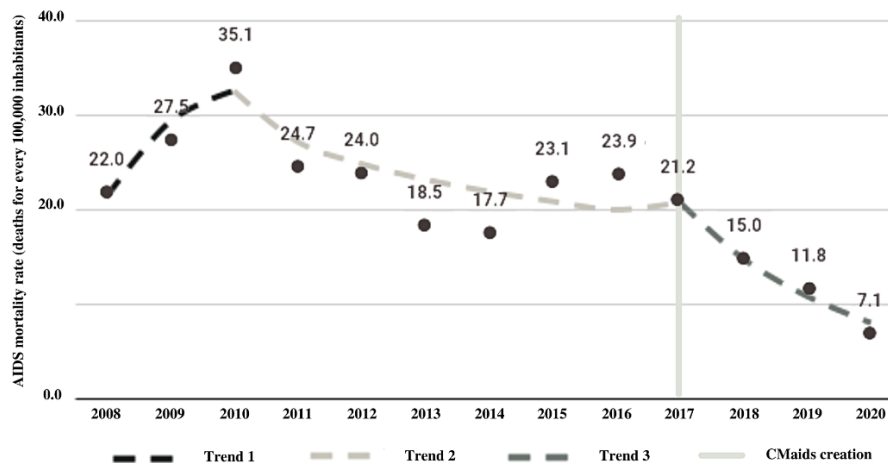**Figure 1.** Number of AIDS deaths in Uruguaiana between 2008 and 2020.
Source: Ministry of Health (BR). Indicators and Basic Data on HIV/AIDS in Brazilian Municipalities. 2021. Accessed on 3 Jul 2021.

a ratio almost 5 times lower. During this period, the average number of deaths was 27.9 deaths per year, with a standard deviation (SD) equal to 7.8. Moreover, there are fluctuations in the indicator until 2016, when a downward trend is evident until 2020.

The AIDS-related mortality indicator had a general average of 20.9 deaths/100,000 inhabitants, with SD=7.1 (Figure 2). The maximum and minimum mortality values are, respectively, 35.1 in 2010 and 7.1 in 2020. Three segments of trends were observed: 1 - upward; 2 - downward; and 3 – downward. The model was not statistically significant for the three trends, and the corresponding APC were 12.4, -5.5 and -22.3 for trends 1, 2 and 3, respectively (Table 1). A reduction of 59.1% in 2020 can be seen between the observed value (7.1 deaths/100,000 inhabitants) and the expected value (17.4 deaths/100,000 inhabitants), according to projec-

tions based on trend 2 of the graph shown in figure 2.

The fatality indicator had a general average of 34.8 and SD=15.0, with the highest record in 2010, with 64.61 deaths/1,000 inhabitants, and the lowest, in 2020, with 9.61 deaths/1,000 inhabitants (Figure 3). The AIDS fatality indicator also shows three trends (1 - downward; 2 - stationary; and 3 - downward). For both indicators, mortality and fatality, there was a sharp drop in trend 3, after CMaids implementation. As per Table 1, this model did not demonstrate statistical significance for the three trends, and the APCs were -10.2 from 2008 to 2014, 2.1 from 2014 to 2017, and -32.8 from 2017 to 2020. There was a reduction of 73.4% in 2020, comparing the observed value (9.61 deaths/1,000 inhabitants) and expected value (36.13 deaths/1,000 inhabitants), based on projections according to trend 2 of Figure 3's graph.

Figure 2. AIDS mortality rate (deaths/100,000 inhabitants) in Uruguaiana between 2008 and 2020. Analysis of trends observed for the indicator in the time series using a logarithmic regression model with join points.
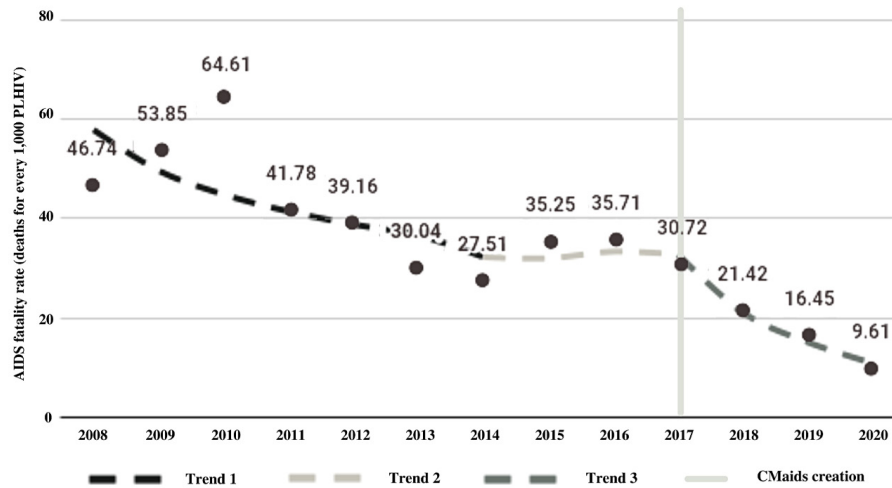
SOURCE: Ministry of Health (BR). Indicators and Basic Data on HIV/AIDS in Brazilian Municipalities. 2021. Accessed on 3 Jul 2021.

Table 1. Comparative analysis of the trends observed in Uruguaiana, between 2008 and 2020, in each of the AIDS mortality and fatality indicators, applying a model of logarithmic regression with join points.

Indicator	Period	APC	Confidence Interval	P-value
AIDS death rate				
Trend 1	2008-2010	12.4	(–30.3 – 81.3)	0.556
Trend 2	2010-2017	-5.5	(–12.9 – 2.5)	0.133
Trend 3	2017-2020	-22.3	(–59.5 – 48.9)	0.364
AIDS fatality rate				
Trend 1	2008-2014	-10.2	(–21.1 – 2.2)	0.086
Trend 2	2014-2017	2.1	(–51.0 – 112.7)	0.944
Trend 3	2017-2020	-32.8	(–61.8 – 18.1)	0.130

APC = Annual Percent Change.
SOURCE: Ministry of Health (BR). Brazilian Health System Database – DATASUS. Accessed on 3 Jul 2021.

Figure 3. AIDS fatality rate (deaths/1,000 inhabitants) in Uruguaiana between 2008 and 2020. Analysis of trends observed for the indicator in the time series using a logarithmic regression model with join points

SOURCE: Ministry of Health (BR). Brazilian Health System Database - DATASUS. Accessed on 3 Jul 2021.

DISCUSSION

The findings of this research do not demonstrate, with statistical significance, that CMaids implementation in the municipality of Uruguaiana, from the end of 2017, influenced the reduction of indicators related to deaths from HIV/AIDS. However, it can be seen that the number of deaths from AIDS as well as the mortality and fatality indicators showed significant reductions, in addition to identifying downward trends in the post-CMaids period.

The number of deaths from AIDS and the coefficient of mortality from AIDS estimate the risk of death from this disease, and scale the magnitude of the disease as a public health cocnern.[12,14] The mortality data observed throughout the time series from 2008 to 2020 demonstrate that the city has significant values, reflecting the disease's epidemiological context. This corroborates the need for strategic actions to face HIV/AIDS by the municipality, which in 2015 signed the Paris Declaration, committing itself to advances in local epidemic's knowledge and response acceleration to the infection.[11]

The context of the investigated municipality still has the particularity of being located in a border region characterized by high HIV transmission due to the intense mobility of people, the high demand for sex workers and drug trafficking and use.[15,16] The displacement of individuals hinders the follow-up of care, and care for transient populations is carried out in times of emergency, making reception in primary care limited.[17] Therefore, HIV infection is facilitated both for residents and for those who just transit through the region, and treatment for individuals without a fixed address is made difficult, maintaining the transmission cycle.[16,18]

It should be mentioned that AIDS mortality in Brazil tends to stabilize, which is evidenced by standardized death rates practically unchanged since 2007.[4] However, this scenario at the national level masks a complex and heterogeneous epidemiological situation, due to regional and local contexts presenting specificities.[19] A study developed by Anderson *et al.* emphasizes, as one of its conclusions, that the definition of goals and assessment of indicators for the HIV/AIDS epidemic control must be carried out at the local level, in order to define more effective public policies.[20,21]

Considering the above, one of the municipal programmatic actions is the implementation of committees for the investigation of deaths from HIV/AIDS, in order to reduce the occurrence of deaths from AIDS that are considered preventable, which has been carried out by the MDH in Uruguaiana.[7] This action aims to assess particularities of deaths from HIV/AIDS, making it possible to outline strategies for surveillance and assistance to PLHIV, in order to achieve a more satisfactory performance by the municipality in reducing deaths, with the integration of the sectors provided by CMaids, through the multidisciplinary discussion of the cases, enabling a better understanding of the weaknesses of comprehensive care actions for individuals with HIV.[22]

The scientific literature still lacks information on the benefit of the strategy of creating committees to investigate deaths from HIV/AIDS at the municipal level. Based on this, a temporal analysis of health indicators related to the disease under study was developed, and such a methodology is conducive to comparing cuts in different times and, consequently, the impact of CMaids.[9] Through the developed analyses, the AIDS mortality and fatality indicators point to the existence of distinct trends across the entire time series. Mortality data showed upward trends between 2008 and 2010, stabilization between 2010 and 2017, and a downward between 2017 and 2020. For fatality, there was a downward trend (2008-2014), stabilization (2014-2017) and sharp reduction (2017-2020).

Some strategies to combat HIV at the federal level, such as making available the rapid HIV test and "test and treat", which began in 2013 in Uruguaiana as well as local

health education and awareness campaigns about HIV, which have been contributing to the reduction of these indicators, may have influenced trends 1 and 2 observed in both indicators.[23,24] However, the aforementioned initiatives have shown increasing signs of exhaustion, especially in a context of inequality in the response to HIV.[25] This fact can be seen in trend 2, where APC for mortality is only -5.5, and, for fatality, 2.1, which shows braking movements of the reduction of the referred coefficients.

On the other hand, from 2017, the year CMaids was implemented, trend 3 changed drastically. The reductions verified in the number of deaths and in the mortality and fatality coefficients, from 2017, may reflect CMaids implementation and the execution of its activities over time. Some of the findings that corroborate this are: i) lower number of AIDS deaths occurred between 2018 and 2020, with successive reductions; ii) verification of trends with reduction of mortality and fatality indicators for the post-CMaids period (2017-2020), in which the most expressive negative values of APC are found; iii) reduction of 59.1% and 73.4% in 2020 between the observed and expected value, according to projections based on trend 2, for mortality and fatality, respectively.

Some of the limitations of this research include the use of secondary data available in the MoH and MDH databases. Although the official government platforms have high reliability in relation to the information made available, it is inherent to the information systems used and to health surveillance activities that there are some weaknesses, such as underreporting of records of cases and deaths due to HIV/AIDS. Another limitation worth mentioning is the period of time analyzed. Although the total time series is composed of 13 years, the gap after CMaids implementation is small, corresponding to 2017-2020 only. Therefore, this may have limited the power of the comparisons made. Finally, it is important to point out that a direct cause and effect relationship cannot be established between the activities carried out by CMaids and the best levels observed in the analyzed indicators. Several actions have been developed by the MDH to face HIV/AIDS. However, it is understood that CMaids was one of the factors that contributed to improvement the indicators, since the activities carried out by this collegiate promote a broad and longitudinal look at PLHIV care.

The findings of this study made it possible to analyze the potential contribution of CMaids implementation in a border municipality in its health indicators. The results referring to the number of deaths from AIDS and the expressive values APC in the mortality and fatality coefficients in the period 2017-2020 are evidence that allow conjecturing the influence of CMaids in coping with the problem in question. It should be noted that the aforementioned strategy was not applied in isolation, since other measures that make up combined prevention are developed in the local context. Future studies should explore the contribution of CMaids through the analysis of other health indicators, in addition to those already explored here, and for longer periods as well as the characterization and investigation of AIDS death records. Finally, the creation of CMaids has been shown to be a relevant strategy for coping with HIV/AIDS at the local level, being one more element to be considered by health managers in municipalities with high rates of the aforementioned condition.

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Lucas Pitrez Mocellin, **Beatriz Herbst Sanday**, **Maria Eduarda Grutzmacher** and **Pedro Henrique Drehmer de Vargas** contributed to article planning and design, review and final approval;

All authors participated in the writing or critical review of the manuscript's intellectual content and approved the final version to be published. All authors declare responsibility for the elements of this work, including the guarantee of accuracy and completeness. All authors approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.