

Mortality trend due to HIV/AIDS among women in Porto Alegre/RS from 2007 to 2017

Tendência de mortalidade por HIV/AIDS entre mulheres em Porto Alegre/RS de 2007 a 2017

Tendencia de mortalidad por VIH/SIDA entre mujeres en Porto Alegre/RS de 2007 a 2017

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ABSTRACT

Background and Objectives: Porto Alegre is among the state capitals of Brazil with the highest magnitude of epidemiological indicators in relation to people living with HIV/AIDS, impacting the mortality indicators of this population. This study aimed to analyze the temporal trend of deaths from HIV/AIDS in women residents of the city of Porto Alegre, Rio Grande do Sul, Brazil, from 2007 to 2017, considering age groups, skin color and education. **Method:** this is an ecological time series study on the trend of HIV/AIDS mortality rates among women living with HIV residents in the city of Porto Alegre, RS. Unadjusted and standardized mortality rates were calculated according to age group, skin color and education. For trend analysis, Prais-Winsten generalized linear regression was used. **Results:** 1,603 deaths related to HIV/AIDS were identified in women living in the city during the study period. Mortality coefficients were higher in white, less educated women, with an increasing trend among those over 60 years of age (95%CI 0.044; 0.029) with a decline for those in the age group between 20 and 29 (95%CI - 0.566; - 0.120). **Conclusion:** changes in the epidemiological scenario of HIV/AIDS draw attention to the care of people over 60 years of age and with less education, requiring efforts from healthcare networks to prevent deaths.

Keywords: HIV. AIDS. Mortality. Women's Health.

RESUMO

Justificativa e Objetivos: Porto Alegre está entre as capitais estaduais do Brasil com maior magnitude de indicadores epidemiológicos em relação às pessoas vivendo com HIV/AIDS, impactando os indicadores de mortalidade dessa população. Este estudo teve como objetivo analisar a tendência temporal de mortes por HIV/AIDS em mulheres residentes na cidade de Porto Alegre, Rio Grande do Sul, Brasil, de 2007 a 2017, considerando grupos etários, cor da pele e educação. **Método:** trata-se de um estudo de série temporal ecológica sobre a tendência das taxas de mortalidade por HIV/AIDS entre mulheres vivendo com HIV residentes na cidade de Porto Alegre, RS. As taxas de

mortalidade não ajustadas e padronizadas foram calculadas de acordo com grupo etário, cor da pele e educação. Para análise de tendência, foi utilizada regressão linear generalizada de Prais-Winsten. **Resultados:** Foram identificadas 1.603 mortes relacionadas ao HIV/AIDS em mulheres residentes na cidade durante o período do estudo. Os coeficientes de mortalidade foram mais altos em mulheres brancas, menos escolarizadas, com uma tendência crescente entre aquelas com mais de 60 anos de idade (IC95% 0,044; 0,029) com declínio para aquelas na faixa etária entre 20 e 29 anos (IC95% -0,566; -0,120). **Conclusão:** Mudanças no cenário epidemiológico do HIV/AIDS chamam a atenção para o cuidado de pessoas com mais de 60 anos de idade e com menor escolaridade, exigindo esforços das redes de saúde para prevenir mortes.

Palavras-chave: HIV. AIDS. Mortalidade. Saúde da Mulher.

RESUMEN

Antecedentes y Objetivos: Porto Alegre está entre las capitales estatales de Brasil con la mayor magnitud de indicadores epidemiológicos en relación a las personas que viven con VIH/SIDA, impactando los indicadores de mortalidad de esta población. Este estudio tuvo como objetivo analizar la tendencia temporal de muertes por VIH/SIDA en mujeres residentes en la ciudad de Porto Alegre, Rio Grande do Sul, Brasil, de 2007 a 2017, considerando grupos de edad, color de piel y educación. **Método:** se trata de un estudio de serie temporal ecológica sobre la tendencia de las tasas de mortalidad por VIH/SIDA entre mujeres que viven con VIH residentes en la ciudad de Porto Alegre, RS. Se calcularon tasas de mortalidad no ajustadas y estandarizadas según grupo de edad, color de piel y educación. Para el análisis de tendencia, se utilizó la regresión lineal generalizada de Prais-Winsten. **Resultados:** Se identificaron 1.603 muertes relacionadas con el VIH/SIDA en mujeres residentes en la ciudad durante el período de estudio. Los coeficientes de mortalidad fueron más altos en mujeres blancas, menos educadas, con una tendencia creciente entre aquellas con más de 60 años de edad (IC95% 0,044; 0,029) con un declive para aquellas en el grupo de edad entre 20 y 29 años (IC95% -0,566; -0,120). **Conclusión:** Los cambios en el escenario epidemiológico del VIH/SIDA llaman la atención sobre el cuidado de las personas mayores de 60 años y con menor educación, requiriendo esfuerzos de las redes de salud para prevenir muertes.

Palabras clave: VIH. SIDA. Mortalidad. Salud de la Mujer.

INTRODUCTION

The increase in the number of Human Immunodeficiency Virus (HIV) infections is considerable in Brazil,¹ even though public actions and policies have expanded strategies aimed at reducing virus transmission, based on the implementation of universal access to antiretroviral therapy (ART) by the Brazilian Health System in 1996.² In recent years, there has been an increase in the number of Acquired Immune Deficiency Syndrome (AIDS) cases in women^{3,4} and, especially, in contexts of high HIV prevalence. Mortality due to AIDS, or its complications, has intensified, affecting especially women in greater social vulnerability.⁵ AIDS-related illnesses are the second leading cause of death among young women aged 15 to 24 years in African countries, and continue to be the leading causes of death among women of reproductive age (15-49 years) worldwide.⁶

In 2017, 49% of cases of death due to AIDS in Brazilian women fell within the age group of 25 to 39 years of age.³ The capital of the state of Rio Grande do Sul, Porto Alegre, stands out for a persistent growth in AIDS-related mortality rates among women living with HIV (WLWHIV), especially among those with greater social vulnerability.⁵ In the city of Porto Alegre, capital of the state of Rio Grande do Sul, characterized by the predominance of the female population in the age group from 20 to 29 years, there is a high incidence of HIV cases in relation to the

country, with a 4% increase in the absolute number of deaths of women of childbearing age in 2017 compared to the previous year.⁷ Diseases caused by HIV alone accounted for 17% of total deaths of women of childbearing age in the same period, compared to what was found in the city for 2016. This persistent growth in AIDS-related mortality rates among WLWHIV has been identified since 2007 and reflected in a mortality rate of 2.7% (95%CI 1.8 - 3.5)⁴ among WLWHIV residing in the capital of Rio Grande do Sul between 2000 and 2011.⁴ Increasing this increase, for 2018, a coefficient of 24.2 deaths/100 thousand inhabitants was recorded, exceeding the national AIDS mortality rate by five times.⁸

Most epidemiological studies that focus on the issue of WLWHIV mortality highlight HIV/AIDS as the main cause, however, they only present indicators of mortality in women of childbearing age or in pregnant and postpartum women, focusing on maternal mortality.⁹ The lack of epidemiological indicators that cover all WLWHIV represents one of the challenges in combating the epidemic, especially as it is not possible to capture health inequities and the impact of late diagnosis. Studies that encourage the production of accurate information on morbidity and mortality can favor evidence-based strategies focused on preventing deaths of people living with HIV (PLWHIV),¹⁰ contributing to mitigating barriers to monitoring and assessing local responses to the epi-

mic. Therefore, this study aimed to analyze deaths from HIV/AIDS in women living in the city of Porto Alegre, Rio Grande do Sul, Brazil, from 2007 to 2017, considering age groups, skin color and education.

METHODS

This is an ecological time series study on the trend in HIV/AIDS mortality rates among WLHIV living in the city of Porto Alegre, RS. The study population was made up of all women living in the city who died from HIV/AIDS between 2007 and 2017. We used death data from the Mortality Information System (SIM), provided by the Municipal Health Secretariat of the City Hall of Porto Alegre/RS (MHD/POA), which stores digital data from the Death Certificate (DC) including the cause of death.

To calculate mortality rates per 100 thousand inhabitants, all deaths of women whose causes were classified as related to HIV/AIDS (B20-24), according to the codes of the 10th Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), were included. The remaining death cases were excluded from the database. Deaths in children under fifteen years of age were excluded from the analyzes due to the low number of deaths (n=13). Unadjusted mortality rates were calculated according to age group, skin color and education. The standardization of HIV/AIDS mortality rates by age was carried out in all years of the studied period, using the direct method in which specific coefficients from the standard population were applied to the populations under study, estimating the number of deaths expected if the populations had the same coefficients as the standard population. The information on the resident population used in calculating mortality rates corresponds to data estimated by the Brazilian Institute of Geography and Statistics (IBGE - *Instituto Brasileiro de Geografia e Estatística*).

Data were analyzed according to sociodemographic variables, such as age group in years (15-19, 20-29, 30-39, 40-49, 50-59 and 60 years and older), skin color (white, black/brown, yellow) and education (no education/incomplete elementary school, complete elementary school/incomplete high school, complete high school/incomplete higher education and complete higher education), according to the IBGE Census classification for 2010. For trend analysis, Prais-Winsten generalized linear regression was used, in which the independent variables (X) were the years in which deaths occurred and mortality rates were considered dependent variables (Y). Trends were classified according to the direction of their regression coefficients and statistical significance values as: - increasing (p-value <0.05 and positive coefficient); - negative (p-value <0.05 and negative coefficient); - or stable (p-value >0.05). For the analyses, SPSS 20.0 and Stata 12 were used.

This study is part of a larger study entitled "Space-time indicators and risk factors associated with mortality in women living with HIV", which was conducted in accordance with the required ethical standards, according

to Resolutions 466/2012, 510/2016 and 580/2018 from the Ministry of Health, approved by the Research Ethics Committees (REC) of the *Universidade do Vale do Rio dos Sinos* (Unisinos) [REC/Unisinos: Opinion 3.233.242, approved on March 29, 2019; Certificate of Presentation for Ethical Consideration (CAAE - *Certificado de Apresentação para Apreciação Ética*) 06210919.7.0000.5344] and the Porto Alegre Municipal Health Department (REC/SMSPA: Opinion 3.281.948, approved on April 24, 2019; CAAE 06210919.7.3001.5338).

RESULTS

Among the 61,644 deaths of women living in the city of Porto Alegre, in the period between 2007 and 2017, there were 1,603 related to HIV/AIDS, with a predominance of deaths among those in the age group of 30 to 39 years (29.7%), of brown skin color (53.6%) and with complete elementary school and incomplete high school (25.3%) (Table 1).

Table 1. Sociodemographic characteristics of women living with HIV living in Porto Alegre who died from HIV/AIDS between 2007 and 2017 (n=1,603, MHD/POA).

	N	%
Age	15	0.9
15-19 years	217	13.5
20-29 years	476	29.7
30-39 years	453	28.3
40-49 years	269	16.8
50-59 years	158	9.9
60 years and older		
Skin color	859	53.6
White	495	30.9
Black/brown	215	13.4
Yellow		
Education*	9	0.6
No education/incomplete elementary school	405	25.3
Complete elementary school/incomplete high school	499	31.1
Complete high school/incomplete higher education	183	11.4
Graduated		

*According to IBGE classification, 2010.

A slight decrease in mortality rates due to HIV/AIDS in women living in Porto Alegre was observed between the first and last period; however, a rate of 10.41 deaths per 100 thousand women was recorded in 2010 among those aged 30 to 39 years old. However, at the end of the period, the highest coefficient found was among women aged 40-49 years, with 7.32 deaths per 100 thousand women (Table 2).

Despite the increase in overall AIDS mortality rates in WLHIV until 2010 (6.6 deaths/1.000 inhabitants), a continued decline was observed at the end of the period analyzed. However, the downward trend in coefficients (95%CI: -0.307; 0.019) did not present statistical significance.

Table 2. Mortality coefficients due to HIV/AIDS in women aged 15 or over, standardized and specific, by year of occurrence and age group, in Porto Alegre, Rio Grande do Sul, Brazil, 2007 to 2017 (MHD/POA).

Year	Total ^a	Specific by age group					
		15-19	20-29	30-39	40-49	50-59	60 +
2007	5.48	0.00	3.80	7.97	8.44	2.56	0.17
2008	5.34	0.00	4.68	8.62	6.69	2.85	0.17
2009	5.92	0.35	4.24	9.92	6.21	4.27	0.23
2010	6.06	0.53	3.80	10.41	6.53	3.56	0.36
2011	5.55	0.18	4.82	8.46	5.09	3.28	0.42
2012	5.44	0.18	3.22	8.62	7.32	3.99	0.19
2013	4.73	0.53	1.90	6.18	6.69	3.85	0.27
2014	4.14	0.35	0.88	4.39	6.21	4.84	0.27
2015	3.80	0.18	1.32	4.23	5.89	2.99	0.31
2016	3.90	0.00	1.61	3.58	5.73	2.99	0.50
2017	4.52	0.35	1.46	5.04	7.32	3.13	0.42

^a Direct standardization, Brazilian population CENSUS 2010 per 100,000 women.

Regarding stratification by age group, the trend analysis in WLWHIV mortality coefficients indicated a decline in the age groups between 20 and 29 (95%CI - 0.566; -0.120). Deaths from HIV/AIDS in women aged 30 to 39 also showed a decrease, however, this was just enough to indicate a stable trend. It is noteworthy that the trend of mortality from HIV/AIDS in women aged 60 and older was increasing (Table 3).

The trend analysis of HIV/AIDS mortality rates in women in Porto Alegre, RS, pointed to differences in skin color during the period. For white and black/brown women, the trend of coefficients was decreasing, whereas for self-declared yellow women it remained stable between 2007 and 2017 (Table 3).

Despite a slight increase in the rates of deaths from

HIV/AIDS among women with no education or with incomplete elementary school and a decrease among those with complete elementary school and incomplete high school, both trends did not reach statistical significance. Only the death rates in WLWHIV who had incomplete elementary school or higher education showed a decreasing trend and were specifically decreasing (Table 3).

In relation to skin color, HIV/AIDS mortality rates were higher among white women throughout the period investigated. Higher coefficients were also observed among educated women, especially among those with complete elementary school and incomplete high school and those with complete high school and incomplete higher education (Figure 1).

Table 3. Trend in death rates from HIV/AIDS in women living with HIV by sociodemographic characteristics in Porto Alegre, Rio Grande do Sul, Brazil, 2007 to 2017 (MHD/POA).

	Coefficient	95%CI		p-value
Age range				
15 to 19 years	0.013	- 0.035	0.062	0.553
20 to 29 years	- 0.343	- 0.566	-0.120	0.007
30 to 39 years	- 0.459	- 0.917	0.002	0.049
40 to 49 years	- 0.083	- 0.250	0.084	0.292
50 to 59 years	- 0.027	- 0.141	0.194	0.728
60 years and older	0.023	0.003	0.044	0.029
Skin color				
White	- 0.702	- 1.06	- 0.338	0.004
Black/Brown	- 0.371	- 0.640	- 0.101	0.013
Yellow	0.006	- 0.002	0.013	0.136
Education				
No education/incomplete elementary school	0.002	- 0.004	0.008	0.561
Complete elementary school/incomplete high school	- 0.028	- 0.021	0.077	0.232
Complete high school/incomplete higher education	- 0.040	- 0.061	- 0.018	0.002
Higher education	- 0.009	- 0.024	0.006	0.211
Total	-0.144	-0.307	0.019	0.077

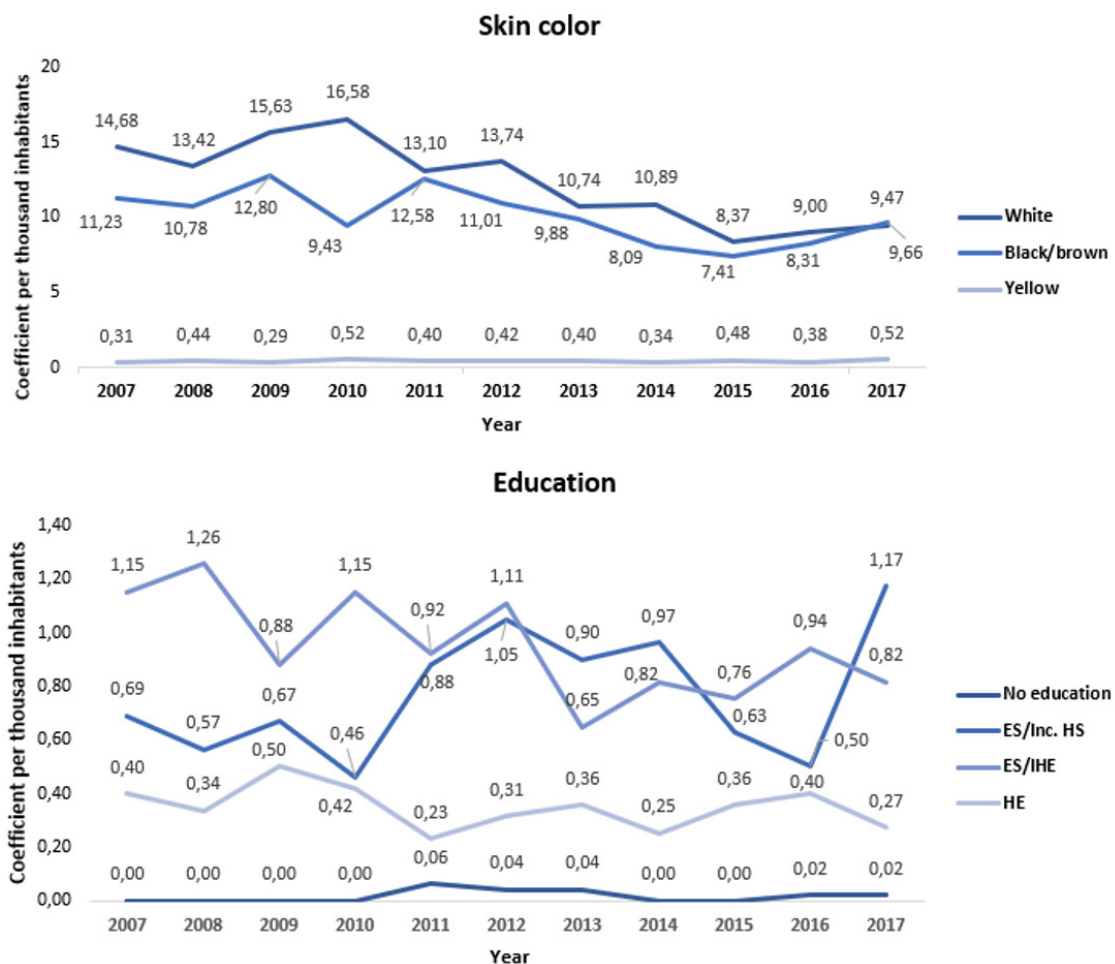


Figure 1. Trend in mortality due to HIV/AIDS, according to skin color and education, in women aged 15 or over, by year of occurrence and age group, in Porto Alegre, Rio Grande do Sul, Brazil, 2007 to 2017 (MHD/POA)

DISCUSSION

ART implementation universally by the Brazilian Health System, from 1996, brought benefits in reducing mortality associated with AIDS.¹¹ However, the situation in relation to WLWHIV deaths in the city of Porto Alegre reveals persistent inequalities.⁵ For the capital of Rio Grande do Sul, our findings revealed the predominance of deaths in young women, with a coefficient above the national one, exceeding the estimates raised in the epidemiological bulletin in 2018,³ revealing a rate of 4.4/100,000 inhabitants for women aged 30–34 years. Mortality from AIDS in young women follows the high prevalence of the disease in this population, being the main cause of death among those of childbearing age or in pregnant and postpartum women living with HIV/AIDS.^{9,12,13} Although the precocity of deaths draws attention and has been identified in previous studies,^{4,14} our findings point to a tendency for mortality rates to decline in WLWHIV at childbearing age, especially between 20 and 39 years old, which may be due, in part, to the strategies and initiatives implemented by Porto Alegre’s health services from 2010 onwards.¹⁵

The municipality’s management reports between 2010 and 2014 describe that the implementation of strategic actions and the expansion and qualification of health services resulted in a 17% reduction in overall mortality rates due to HIV/AIDS.¹⁵ However, difficulties related to the management of HIV/AIDS care matrix for Primary Health Care (PHC) and healthcare strategies in longitudinal care at this level of care may be related to mortality rates, considering that, in more peripheral areas, where social vulnerabilities are greater, the number of health professionals is smaller compared to central regions, favoring “care gaps”.^{15,16}

In the same sense, a study on the therapeutic itineraries of cases that resulted in deaths, monitored by the Municipal AIDS Mortality Committee, in the city of Porto Alegre, highlighted weaknesses in access and assistance provided by health services,¹⁰ which may be related to difficulties in identifying and retaining individuals for treating the disease, increasing risk factors. Among the weaknesses identified in assistance, the following stood out: late diagnosis of HIV infection; non-adherence to ART; the loss of opportunity in diagnosis; inadequate

clinical management during hospital stay; failure to carry out diagnostic tests.¹⁰ Failures in access to health services highlighted weaknesses in HIV diagnosis, reception/consultation in specialized services and PHC, among others.¹⁰ Therefore, it is important to expand such analyzes to verify how such inequities are reflected in health care for women, since, even though they use health services more,¹⁷ they continue to have high mortality rates due to HIV/AIDS.

Added to these challenges, stigma associated with diagnosis can generate experiences of social suffering, impacting the possibilities of access to treatment.¹⁸ Furthermore, sociocultural beliefs associated with sex and the prevention of sexually transmitted infections and HIV/AIDS in old age, as well as decreased frequency of gynecological medical care routines and consultations by women in this age group, may justify the late diagnosis and increased mortality in women over 60 years of age identified in our study, following the coefficient found in Ceará.¹⁹ It is considered that older adults with AIDS fall ill and die faster than young people, especially due to difficulties related to taboos that permeate older adults' sexuality and favor late diagnosis of the disease, in addition to the combination of other health problems, such as drug use and exposure to tuberculosis, which accelerate the progression of immunological decline and increase the risk of death.¹⁹ Another relevant issue is that, while women of childbearing age maintain a routine of medical and gynecological monitoring, women in more advanced age groups end up invisible in health systems, since their sexuality is denied and, sometimes, their role as wife does not identify them as potentially vulnerable, which can keep them away from exams and preventive behaviors such as not using condoms.²⁰ In a study on the sexual behavior of PLWHIV over 50 years of age in Santa Catarina,²¹ it was found that 50% of older adults reported not using condoms regularly, regardless of the partner's seropositivity.

Especially, as observed in the present study, women with less education had higher mortality rates, corroborating a national study that indicates higher survival in more educated WLWHIV.²² Despite not identifying statistically significant trends, it should be noted that low education is associated with worse living conditions, housing, food, transportation, access to health services and social discrimination, which directly impact the population's health.²³

Higher levels of education can result in greater knowledge about ways to prevent HIV, as well as access to better employment and income conditions, enhancing access to health services and care.²⁴ Stigma and prejudice can promote barriers, affecting increased mortality in both more vulnerable populations and those with better social conditions. In this regard, sometimes higher levels of education favor access to private health systems and, as they are not considered "key populations" or are identified as having "risky sexual behaviors" or "drug users",²⁰ access to early diagnosis and treatment of HIV/AIDS are made difficult, reducing the survival rate of PLHIV.²⁵

It is noteworthy that white women are the most affected by deaths, following the trend of decreasing

mortality rates for this category. For black/brown women, a decrease in coefficients was observed, but smaller in relation to white women, indicating important inequities in the health care scenario.¹⁰ Studies carried out in Brazil, between 2000 and 2007,²⁵ and in Florida (USA), between 2000 and 2009,²⁶ point out that black and brown people were the most likely to have recorded mortality related to HIV/AIDS, compared to white individuals. It must be considered that vulnerabilities associated with race/color, especially among black and brown people, increase barriers in access to health services and may favor lower risk perception and lower adherence to ART.²⁷ Hence, it is possible to think that investments are still necessary to reduce inequities and strengthen care and attention networks for WLWHIV in order to reduce mortality. Especially in Porto Alegre, RS, vulnerabilities related to poverty, race and social class affect women who live in more precarious regions and with a strong presence of violence and drug trafficking.²⁸

Even though the economic factor was not assessed in the present study, financial barriers can impact health care and increase mortality levels.²⁹ Another limitation is underreporting in death records, causing distortions in estimates, but the improvement of records and official statistics has been constant, benefiting the increasing use of this information by health services. Other information on health characteristics and vulnerabilities, as well as socioeconomic specificities and public policies aimed at WLWHIV, can bring new perspectives for research and care in the preventability of deaths.

Investments that favor equal access to education and economic stability and security, especially for women,³⁰ must be promoted with a view to enhancing their autonomy and reducing health inequities. On the other hand, it is believed that investments in qualification of health care networks' work, such as to encourage continued education through actions that strengthen basic care as an element that organizes care and train teams and community health workers to work with PLWHIV, can also impact mortality indicators among women.

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AUTHORS' CONTRIBUTIONS

Maiton Bernardelli contributed to study conception, planning, data statistical analysis and interpretation and article writing. **Douglas Nunes Stahnke** contributed to study statistical analyzes and critical review and final review. **Tonantzin Ribeiro Gonçalves** guided study planning and contributed to study analysis and critical review and final review. **Marcos Pascoal Pattussi** co-supervised the study and contributed to study analysis and critical review and final review.

All authors approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.