Revista ARACÊ
ISSN: 2358-2472

TEMPORAL TREND OF HIV/AIDS INCIDENCE AND MORTALITY IN BRAZIL, FROM 2009 TO 2019

https://doi.org/10.56238/arev6n4-136

Submitted on: 11/10/2024 **Publication date:** 12/10/2024

Maurício Pratzel Ellwanger[1], Manuela Pozza Ellwanger[2], Fabiley de Wite Diogo[3], Liz Andréa Babireski Braz de Oliveira[4], Debora Reinert[5], Águida Vita de Souza Diogo[6], Antônio Carlos Mattar Munhoz[7] and Chaiana Esmeraldino Mendes Marcon[8].

ABSTRACT

Objectives: To analyze the temporal trend of HIV/AIDS incidence and mortality in Brazil from 2009 to 2019, identifying regional and demographic variations. Methods: An ecological time series study using data from the Notifiable Diseases Information System (SINAN) and the Mortality Information System (SIM) of the Ministry of Health. Incidence and mortality rates were calculated for the period from 2009 to 2019. The analysis of temporal trends was performed using linear regression for time series, with a statistical significance level of 95% ($p < 0.05$). Results: During the study period, 448,682 new cases of HIV and 132,499 AIDS-related deaths were recorded in Brazil. The South and Southeast regions had the highest incidence and mortality rates. The highest rates were observed in males and in the 30-39 age group. The main cause of death, according to the ICD-10, was related to infectious and parasitic diseases. There was a general trend toward a reduction in HIV/AIDS incidence and mortality during the study period. Conclusions: The study identified a trend of reduction in HIV/AIDS incidence and mortality in Brazil between 2009 and 2019, highlighting important regional and demographic variations. These results suggest the effectiveness of public policies, government interventions, and medical advances, such as antiretroviral therapy (ART), in reducing mortality and incidence of the disease.

Keywords: Acquired Immunodeficiency Syndrome. HIV infection. High Activity Antiretroviral Therapy Antiretroviral Therapy. Incidence. Mortality.

[1] University of Contestado – Santa Catarina
E-mail: ellwangermp@gmail.com
[2] University of Contestado – Santa Catarina
Email: manupozza@hotmail.com
[3] University of Contestado – Santa Catarina
Email: fabileydiogo@gmail.com
[4] University of Contestado – Santa Catarina
E-mail: lizbabireski@gmail.com
[5] University of Contestado – Santa Catarina
E-mail: dehreinert@hotmail.com
[6] University of Contestado – Santa Catarina
Email: aguidavita@gmail.com
[7] Dr.
University of Contestado – Santa Catarina
E-mail: munhoz.antonio.c.m@gmail.com
[8] Dr.
University of Southern Santa Catarina – Santa Catarina
Email: chaianamarcon@gmail.com

Revista ARACÊ
ISSN: 2358-2472

INTRODUCTION

Since it was introduced in 1981 in California, Acquired Immunodeficiency Syndrome (AIDS) has had an enormous impact on public health due to its unstable and lethal epidemic character. According to the World Health Organization (WHO), by the beginning of 2020, there were approximately 38 million people living with HIV (human immunodeficiency virus) in the world. In Brazil, the first case of AIDS was identified in the 1980s in the cities of São Paulo and Rio de Janeiro. Currently, about 920 thousand people live with HIV in the country. From 2007 to June 2020, Brazil registered 342,459 cases of HIV infection and approximately 39 thousand new cases have been registered annually in the last 5 years.(1–3)

AIDS is the consequence of HIV infection - retrovirus belonging to the Family *Retroviridae* with RNA genome and subfamily *Lentivirinae* - which is characterized by tropism by the immune system, with its most evident affectation in CD4 T lymphocytes. HIV can be found in the body fluids of infected people in the form of simple particles or infected immune cells and their Contamination occurs sexually, percutaneously, and perinatally. However, 80% of adults acquire the virus after exposure on the surfaces of the mucosa, so AIDS is, first and foremost, a sexually transmitted infection.(4–7)

HIV infection can course with numerous clinical manifestations and does not manifest itself in the same way in all people. In primary exposure to the virus, the seroconversion phase occurs, in which the immune system launches defense mechanisms to control the infection. This leads to clinical manifestations that can range from a flu-like condition to mononucleosis-simile, fever, photophobia, weight loss, cervical adenopathy, erythematous pharyngitis, myalgia, hepatosplenomegaly, diarrhea, nausea, vomiting, and headache. This typically occurs within 2 to 4 weeks after infection, thus marking the period of exacerbation. The duration of symptoms is approximately 1 to 2 weeks and they are self-limiting. After acquiring humoral immunity against HIV, which takes about 3 to 12 weeks, the body goes through a phase of viremic stabilization known as *set point*. In this phase there is a decrease in the viral load, as a result of the direct action of the immune system, entering into clinical latency characterized by being an asymptomatic period that can last up to 10 years.(5,8,9)

AIDS mortality in Brazil is a relevant problem for Public Health. From the 80s, the beginning of the AIDS epidemic, until the end of 2020, 360,323 deaths were reported with HIV/AIDS as the underlying cause, with a higher number of deaths among men. However,

Revista ARACÊ
ISSN: 2358-2472

in the last 10 years there has been a decrease in the mortality coefficient of the disease in the country, which may be associated with governmental and non-governmental actions such as: provision of antiretroviral treatment, prevention and treatment of opportunistic diseases, increase in the network of diagnostic services and strategies for adherence to the prevention and treatment of the disease.(10–13)

The change in the pattern of AIDS mortality is also related to the advances in medicine that occurred in the mid-90s, in which there was the introduction of drugs capable of modifying the action of the virus in the body at different stages of the replicative cycle, making it possible to redefine the concept of deadly disease to chronic. By the year 2020, approximately 642 thousand people were on antiretroviral treatment, 48,406 more, compared to 2018. Even with the change in the panorama of the disease, AIDS continues to have a high lethality, being the fifth cause of death in adults.(14–16)

In view of the above, the temporal analysis of HIV/AIDS incidence and mortality in Brazil is of paramount importance to contribute to the deepening of knowledge of this disease, which is still so relevant to the country. Therefore, this study aimed to analyze the temporal trend of HIV/AIDS incidence and mortality in Brazil, from 2009 to 2019.

METHODS

An ecological time-series study of HIV/AIDS incidence and mortality rates in Brazil from 2009 to 2019 was conducted.

The study population was composed of all people who died in Brazil from the cited cause and new reported cases (selected according to "year of diagnosis" on the platform), in the period from 2009 to 2019, whose secondary data were aggregated in the Mortality Information System of the Ministry of Health (SIM-MS) and in the Information System of Diseases and Notifications (SINAN), Datasus. Cases whose variables of interest had unknown or unavailable data were excluded from the study.

The following were evaluated in the study: number of deaths and new cases due to HIV/AIDS in the period between 2009 and 2019; sex (female or male); age group (15 to 39 years; 40 to 49 years; 50 to 59 years; 60 years or older); regions of Brazil (North, Northeast, Midwest, Southeast and South); ICD10 category (B20, B21, B22, B23, B24).

The calculations of mortality and incidence rates were carried out by the ratio between the number of deaths or new cases registered and the resident population at risk

Revista ARACÊ
ISSN: 2358-2472

in the territory in the years 2009 to 2019, the result was multiplied by the constant 100 thousand following the following formula:

Incidence rate = ((number of new cases) (by year, sex, or region of residence) and year of diagnosis (2009-2019) /(population at risk residing in Brazil in the years 2009-2019)) x 100,000

Mortality rate = ((number of deaths) (by year, sex, or region of residence) and year of occurrence (2009-2019) /(population at risk residing in Brazil in the years 2009-2019)) x 100,000

The data were obtained from the DATASUS website, selected from TABNET and tabulated and organized in a database created and analyzed with the aid of Microsoft Excel® version 365 software.

The variables were described as mean and standard deviation and the evolutionary behavior of the mean annual variation of the values of the series (β) was tested by the linear regression method for time series. The analysis of the period was performed using the ANOVA test and with Pearson's correction coefficient and its significance. The level of statistical significance was 95%, with a p-value < 0.05.

As this is a study that uses secondary databases with population aggregates, and there was no research subject, there was no possibility of physical or moral damage. Thus, in accordance with CNS Resolution 466/12, the present study did not require submission to the Research Ethics Committee of the Universidade do Sul de Santa Catarina (CEP UNISUL).

The authors declare that there are no conflicts of interest between the research topic and their professional activities or those related to the funding of this research.

RESULT

Between 2009 and 2019, 448,682 new cases of HIV and 132,499 deaths were registered in Brazil, with a mortality rate of 50.9 deaths per 100 thousand inhabitants in the country. The highest absolute values for incidence and mortality were found in the Southeast region, while the highest rates were recorded in the South region. In both regions, downward trends were demonstrated, according to the mean annual variation by linear regression (Beta), for the incidence (β= -0.99 and -0.93, respectively) and mortality (β= -0.96 and -0.95, respectively) rates, both with statistical significance (p <0.05), evidencing a strong negative relationship between time and event. The Central-West

Revista ARACÊ
ISSN: 2358-2472

region also showed this same trend, but without statistical significance for the period. The other regions showed an upward trend, as shown in tables 1 and 2.

The analysis of HIV/AIDS incidence rates in Brazil, segmented by major Brazilian regions in the period from 2009 to 2019, reveals significant variations between regions. Table 1 presents these annual incidence rates, highlighting the annual percentage variation (VA%) for each region. There is a general trend of reduction in incidence rates in some regions, while others show an increase or stability over the period studied.

Table 1: HIV/AIDS incidence rate in Brazil, according to major Brazilian region, from 2009 to 2019.

Anus	Brazilian Region									
	North	VA%	Northeast	VA%	Southeast	VA%	On	VA%	Central-West	VA%
2009	20,92	-	14,15	-	23,22	-	32,84	-	18,55	-
2010	21,85	0,04	14,74	0,04	22,50	-0,03	32,40	-0,01	18,69	0,01
2011	21,46	-0,02	15,39	0,04	23,18	0,03	34,71	0,07	20,06	0,07
2012	21,87	0,02	16,16	0,05	22,00	-0,05	33,65	-0,03	21,05	0,05
2013	25,99	0,19	16,52	0,02	20,69	-0,06	32,25	-0,04	20,63	-0,02
2014	26,45	0,02	16,04	-0,03	19,88	-0,04	30,20	-0,06	19,40	-0,06
2015	25,00	-0,05	16,00	0,00	19,05	-0,04	29,23	-0,03	18,19	-0,06
2016	25,42	0,02	15,63	-0,02	18,17	-0,05	26,22	-0,10	17,50	-0,04
2017	23,52	-0,07	15,95	0,02	17,43	-0,04	24,69	-0,06	18,12	0,04
2018	25,48	0,08	16,37	0,03	16,46	-0,06	23,62	-0,04	17,81	-0,02
2019	26,37	0,04	15,90	-0,03	15,52	-0,06	23,17	-0,02	19,24	0,08
Average	24,03		15,71		19,83		29,36		19,02	
p	0,01		0,03		0,00		0,00		0,22	
Rs	0,76		0,65		-0,99		-0,93		-0,40	
R2	0,58		0,42		0,97		0,87		0,16	
B	0,76		0,65		-0,99		-0,93		-0,40	

Source: TABNET (DATASUS), adapted by the author. Observations: VA% = annual percentage change; *p* = p-value; Rs = Pearson's Degree of Correlation; R^2 = coefficient of determination; β = Mean Annual Change by linear regression.

In addition to incidence rates, HIV/AIDS mortality rates also show important regional variations in Brazil during the period from 2009 to 2019. Table 2 details these mortality rates, showing the annual percentage variation (VA%) for each major Brazilian region. The data indicate a general trend of reduction in mortality, although some regions showed fluctuations or increases in rates during the period analyzed.

Revista ARACÊ
ISSN: 2358-2472

Table 2: HIV/AIDS mortality rate in Brazil, according to the large Brazilian region, from 2009 to 2019.

Anus	Region									
	North	VA%	Northeast	VA%	Southeast	VA%	On	VA%	Central-West	VA%
2009	5,25	-	3,93	-	7,27	-	9,50	-	5,07	-
2010	5,92	0,13	3,88	-0,01	7,20	-0,01	9,45	0,00	5,51	0,09
2011	5,75	-0,03	4,13	0,06	7,07	-0,02	9,34	-0,01	4,99	-0,09
2012	5,53	-0,04	4,33	0,05	6,79	-0,04	9,11	-0,03	5,35	0,07
2013	6,67	0,21	4,50	0,04	6,56	-0,03	9,18	0,01	4,90	-0,09
2014	6,75	0,01	4,39	-0,02	6,64	0,01	8,78	-0,04	4,90	0,00
2015	6,72	0,00	4,74	0,08	6,34	-0,04	8,69	-0,01	5,38	0,10
2016	7,19	0,07	4,73	0,00	6,15	-0,03	8,28	-0,05	5,22	-0,03
2017	6,91	-0,04	4,56	-0,04	5,44	-0,12	7,91	-0,05	5,09	-0,03
2018	6,75	-0,02	4,38	-0,04	5,23	-0,04	7,23	-0,09	4,81	-0,05
2019	6,51	-0,04	4,33	-0,01	4,78	-0,08	6,83	-0,06	4,58	-0,05
Average	6,36		4,36		6,32		8,57		5,07	
p	0,00		0,03		0,00		0,00		0,11	
Rs	0,78		0,67		-0,96		-0,95		-0,52	
R2	0,61		0,44		0,93		0,90		0,27	
B	0,78		0,67		-0,96		-0,95		-0,52	

Source: TABNET (DATASUS), adapted by the author. Observations: VA% = annual percentage change; p = p-value; Rs = Pearson's Degree of Correlation; R^2 = coefficient of determination; β = Mean Annual Change by linear regression.

When evaluating incidence and mortality by sex, it is possible to notice higher rates for males, with a downward trend for both sexes, especially in mortality for females (β= -0.86). Despite this, the incidence data are significant only for females (p-<0.05), while the mortality data for both, as shown in Table 3.

Table 3: HIV/AIDS incidence and mortality rate in Brazil, according to sex, from 2009 to 2019.

Anus	Incidence by sex					Mortality by sex			
	Male	VA%	Female	VA%		Male	VA%	Female	VA%
2009	26,12	-	16,62	-		8,31	-	4,27	-
2010	26,19	0,00	15,73	-0,05		8,25	-0,01	4,22	-0,01
2011	27,54	0,05	16,03	0,02		8,15	-0,01	4,20	-0,01
2012	27,42	0,00	15,48	-0,03		7,97	-0,02	4,19	0,00
2013	28,36	0,03	15,06	-0,03		8,36	0,05	4,19	0,00
2014	27,82	-0,02	13,98	-0,07		8,40	0,01	4,05	-0,03
2015	27,57	-0,01	12,82	-0,08		8,30	-0,01	4,14	0,02
2016	26,62	-0,03	11,95	-0,07		8,11	-0,02	4,10	-0,01
2017	26,28	-0,01	11,18	-0,06		7,59	-0,06	3,76	-0,08
2018	25,95	-0,01	10,82	-0,03		7,31	-0,04	3,47	-0,08
2019	25,41	-0,02	10,61	-0,02		6,88	-0,06	3,32	-0,04
Average	26,85		13,66			7,97		3,99	
p	0,30		0,00			0,01		0,00	
Rs	-0,34		-0,98			-0,75		-0,86	
R2	0,12		0,96			0,57		0,74	
B	-0,34		-0,98			-0,75		-0,86	

Source: TABNET (DATASUS), adapted by the author. Observations: VA% = annual percentage change; p = p-value; Rs = Pearson's Degree of Correlation; R^2 = coefficient of determination; β = Mean Annual Change by linear regression.

Revista ARACÊ
ISSN: 2358-2472

Considering the age group, there is a higher incidence rate (Table 4) for the 30 to 39 years and 40 to 49 years age groups, both with statistical significance (p-<0.05) and a downward trend for the period (β= -0.60 and -0.66, respectively). On the other hand, the extremes of age, <20 years and ≥60 years, have the lowest incidences, but with an increasing trend for age groups between 20 and 29 years and ≥60 years (β= 0.63 and 0.22, respectively) for the period. Mortality rates (Table 5) follow a similar pattern, but with an increasing trend only for the age group ≥60 years (β= 0.94).

Table 4: HIV/AIDS incidence rate in Brazil, by age group, from 2009 to 2019.

Anus	Age											
	<20	VA%	20 a 29	VA%	30 a 39	VA%	40 a 49	VA%	50 a 59	VA%	60 or more	VA%
2009	2,57	-	25,89	-	47,00	-	41,64	-	25,75	-	8,99	-
2010	2,50	-0,03	26,21	0,01	44,25	-0,06	40,72	-0,02	25,89	0,01	8,47	-0,1
2011	2,53	0,01	27,50	0,05	45,77	0,03	41,99	0,03	25,87	0,00	9,05	0,07
2012	2,58	0,02	28,42	0,03	43,59	-0,05	39,85	-0,05	25,60	-0,01	9,09	0
2013	2,65	0,03	29,82	0,05	42,47	-0,03	39,36	-0,01	26,04	0,02	9,82	0,08
2014	2,61	-0,02	29,44	-0,01	40,14	-0,05	37,02	-0,06	25,04	-0,04	9,39	-0
2015	2,49	-0,04	29,31	0,00	38,09	-0,05	34,48	-0,07	24,60	-0,02	9,20	-0
2016	2,33	-0,07	28,25	-0,04	35,49	-0,07	32,96	-0,04	23,21	-0,06	9,32	0,01
2017	2,22	-0,05	29,30	0,04	33,65	-0,05	30,50	-0,07	22,25	-0,04	9,11	-0
2018	1,99	-0,10	28,45	-0,03	33,01	-0,02	30,15	-0,01	21,64	-0,03	9,28	0,02
2019	1,96	-0,02	28,52	0,00	31,88	-0,03	29,23	-0,03	21,11	-0,02	8,83	-0
Average	2,40		28,28		39,58		36,17		24,27		9,14	
p	0,00		0,04		0,00		0,00		0,00		0,52	
Rs	-0,82		0,63		-0,98		-0,97		-0,92		0,22	
R2	0,67		0,39		0,97		0,95		0,85		0,05	
B	-0,82		0,63		-0,98		-0,97		-0,92		0,22	

Source: TABNET (DATASUS), adapted by the author. Observations: VA% = annual percentage change; *p* = p-value; Rs = Pearson's Degree of Correlation; R^2 = coefficient of determination; *β* = Mean Annual Change by linear regression.

The analysis of HIV/AIDS mortality rates in Brazil, segmented by age group in the period from 2009 to 2019, reveals important variations between different age groups. Table 5 presents these annual mortality rates, highlighting the percentage annual variation (VA%) for each age group. The data indicate a general trend of reduction in mortality rates in some age groups, while others show fluctuations over the analyzed period.

Table 5: HIV/AIDS mortality rate in Brazil, according to age group, from 2009 to 2019.

Anus	Age group											
	<20	VA%	20 a 29	VA%	30 a 39	VA%	40 a 49	VA%	50 a 59	VA%	60 or more	VA%
2009	0,35	-	4,68	-	13,28	-	15,21	-	9,93	-	4,04	-
2010	0,35	-0,13	4,41	-0,06	12,69	-0,04	14,97	-0,02	10,13	0,02	4,46	0,11
2011	0,30	0,10	4,31	-0,02	12,46	-0,02	14,76	-0,01	10,02	-0,01	4,40	-0,01
2012	0,33	0,02	4,33	0,00	11,33	-0,09	14,88	0,01	9,82	-0,02	4,62	0,05

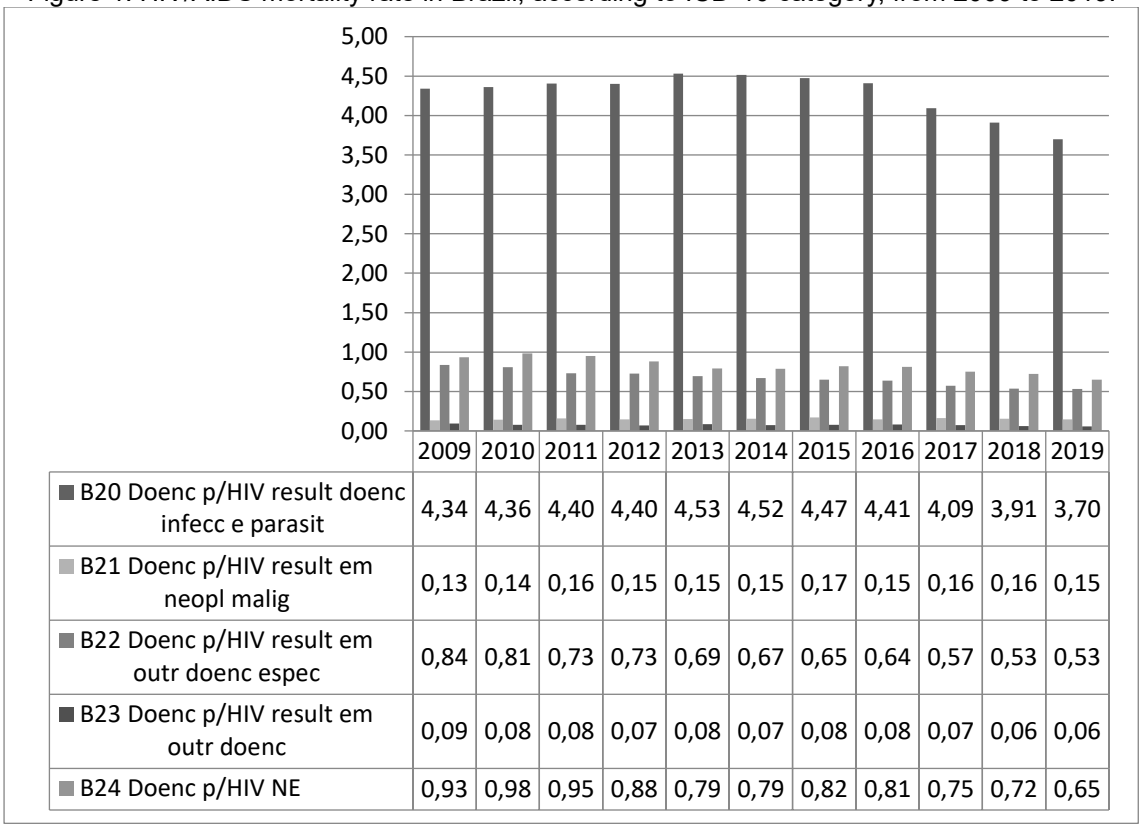
Revista ARACÊ
ISSN: 2358-2472

2013	0,34	-0,11	4,65	0,07	11,20	-0,01	14,79	-0,01	10,52	0,07	4,92	0,06
2014	0,30	0,10	4,45	-0,04	10,86	-0,03	14,33	-0,03	10,80	0,03	5,25	0,07
2015	0,33	-0,24	4,40	-0,01	10,76	-0,01	13,67	-0,05	11,03	0,02	5,41	0,03
2016	0,25	0,04	4,50	0,02	10,03	-0,07	13,35	-0,02	10,89	-0,01	5,57	0,03
2017	0,26	-0,23	4,28	-0,05	8,93	-0,11	11,93	-0,11	10,29	-0,05	5,42	-0,03
2018	0,20	-0,01	3,92	-0,08	8,40	-0,06	11,22	-0,06	9,64	-0,06	5,49	0,01
2019	0,20	-1,00	3,58	-0,09	7,67	-0,09	10,43	-0,07	9,17	-0,05	5,49	0,00
Average	0,29		4,32		10,69		13,59		10,20		5,01	
p	0,00		0,01		0,00		0,00		0,72		0,00	
Rs	-0,88		-0,71		-0,985		-0,93		-0,13		0,94	
R2	0,77		0,50		0,97		0,87		0,02		0,88	
B	-0,88		-0,71		-0,99		-0,93		-0,13		0,94	

Source: TABNET (DATASUS), adapted by the author. Observations: VA% = annual percentage change; *p* = p-value; Rs = Pearson's Degree of Correlation; R^2 = coefficient of determination; β = Mean Annual Change by linear regression.

When evaluating the mortality rates according to the ICD-10 category in HIV/AIDS patients, it is observed that the main causes of death are related to infectious and parasitic diseases, followed by HIV-related neoplasms, as shown in Figure 1.

Figure 1: HIV/AIDS mortality rate in Brazil, according to ICD-10 category, from 2009 to 2019.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
B20 Doenc p/HIV result doenc infecc e parasit	4,34	4,36	4,40	4,40	4,53	4,52	4,47	4,41	4,09	3,91	3,70
B21 Doenc p/HIV result em neopl malig	0,13	0,14	0,16	0,15	0,15	0,15	0,17	0,15	0,16	0,16	0,15
B22 Doenc p/HIV result em outr doenc espec	0,84	0,81	0,73	0,73	0,69	0,67	0,65	0,64	0,57	0,53	0,53
B23 Doenc p/HIV result em outr doenc	0,09	0,08	0,08	0,07	0,08	0,07	0,08	0,08	0,07	0,06	0,06
B24 Doenc p/HIV NE	0,93	0,98	0,95	0,88	0,79	0,79	0,82	0,81	0,75	0,72	0,65

Source: TABNET (DATASUS), adapted by the author.
Observations:

B20 – HIV disease resulting in infectious and parasitic diseases
B21 – HIV disease resulting in malignant neoplasms
B22 - HIV disease resulting in other specified diseases
B23 - HIV disease resulting in other diseases
B24 - HIV disease unspecified

Revista ARACÊ
ISSN: 2358-2472

DISCUSSION

HIV is an important public health problem in Brazil, as the country has one of the highest prevalences in Latin America.(17) It is estimated that currently about 802,482 people live with the virus in the country.(18) However, even with this expressive number, there is a downward trend in the incidence during the study period, which is predominant in the South and Southeast regions. Despite this, the same regions showed the highest incidence rates, in agreement with the 2021 HIV/AIDS Epidemiological Bulletin.(12) Such relationships were already found in other studies and in the period between 1990 and 2002 in the country.(19,20) The higher rates found in the aforementioned states may be related to the quality of health care, patient access to the system and, therefore, higher rates of diagnosis and notification of cases. As for the decrease in incidence, it is possibly related to efforts to promote, prevent and educate in health in the population.

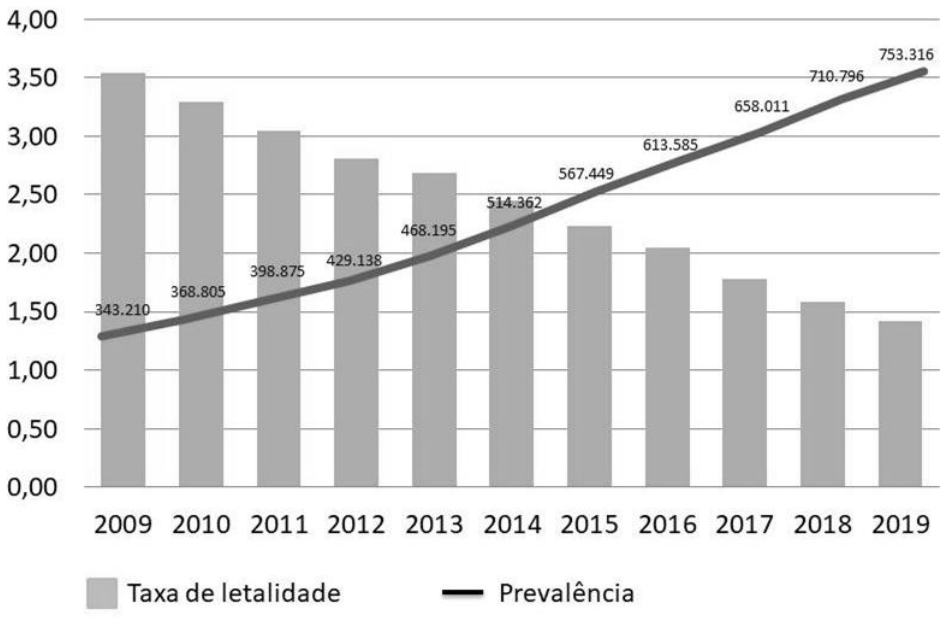
The mortality rate follows the same slopes as the incidence: higher rates and a more significant downward trend for the South and Southeast regions. Other studies have already shown this, with the states of Rio Grande do Sul, Rio de Janeiro, São Paulo and Santa Catarina having the highest mortality rates in Brazil and the states of São Paulo and Santa Catarina standing out for the decrease in rates.(11–13) In the period of this study, there is, therefore, a reduction in HIV/AIDS mortality in the country. Research suggests that this reduction may be associated with encouraging the implementation of public policies in the area, such as: improving the quality of public services, reducing vertical transmission of HIV, increasing diagnostic coverage and treatment, reducing stigma and increasing actions for prevention of the population.(21) In agreement with the above, in the same period, a significant increase in the number of people living with HIV using Antiretroviral Therapy (ART) is described - from 214,726 in 2009 to 633,699 in 2019.(18) To reinforce this suggestion, Cunha's study, which evaluates the temporal trend of HIV/AIDS mortality from 1990 to 2002, shows the beginning of the decline in the HIV mortality rate in Brazil from 1997 onwards, a period that coincides with the universal introduction of ART.(19) It is therefore possible to note the importance and effectiveness of ART and public measures related to health care to increase the survival of patients with HIV/AIDS.

As a consequence of the reduction in mortality and the greater number of people treated, there is a tendency for HIV to change from a highly lethal disease to a chronic condition, which is demonstrated by the increase in prevalence, therefore survival, and reduction in the lethality of the disease.(22)

Revista ARACÊ
ISSN: 2358-2472

Figure 2 illustrates the case fatality rate and prevalence of HIV/AIDS in Brazil from 2009 to 2019. This figure provides a comprehensive view of the evolution of the disease in the country, highlighting both the lethality rate and the absolute number of people living with HIV, based on data from the AIDS indicator and clinical monitoring system. Prevalence considers people linked to the system, that is, those who have at least one dispensation, CD4 or viral load registered.

Figure 2: Case fatality rate and prevalence of HIV/AIDS in Brazil, from 2009 to 2019.



Source: TABNET (DATASUS)/ Clinical indicators AIDS, adapted by the author.
Note: Prevalence is represented by the absolute number of people living with HIV linked (those who have at least one dispensation, CD4, or viral load in the AIDS indicator and clinical monitoring system).

When evaluating the gender variable, it is possible to note that both incidence and mortality are higher for males, a relationship already found by other authors. It is known that men tend to have more advanced stages of the disease, have later diagnoses and start treatment later, which could justify such findings.(13,18,22–25)

The incidence of HIV was predominant in the age group of 30 to 39 years, corroborating other studies in the country,(13,17,19,25) however, the highest mortality rate is between 40 and 49 years old. Among all age groups, the only one with an upward trend in mortality was for the elderly, which has already been demonstrated in other studies in Brazil. For Cunha, this may be related to the advance in the use of ART with a consequent

Revista ARACÊ
ISSN: 2358-2472

increase in life expectancy and advances in diagnosis in the elderly.(13,26) Rossi found a higher chance of death for individuals over 50 years of age, and associates it with the difficulty of early diagnosis and higher incidence of comorbidities in this age group.(22) The difficulty in diagnosis may be related to the stigma of the disease in the elderly, the difficulty of professionals in addressing sexuality among the elderly, and the confounding factor associated with the symptoms of pre-existing comorbidities and the onset of HIV manifestation. In addition, since it is a sexually transmitted infection, it is usually not among the first hypotheses in medical reasoning in elderly patients, which could delay diagnosis, start of treatment and increase mortality in this age group.

Regarding HIV/AIDS mortality according to the ICD-10 category (including categories B20 to B24), it is noted that the main cause of mortality results from infectious or parasitic diseases, similar to the cohort carried out in northeastern Brazil and in an Amazonian study.(27,28) In that study, as well as others carried out in the country, the main infection associated with HIV/AIDS mortality was tuberculosis.(27,29) It is worth mentioning that HIV-positive individuals have immunological fragility, due to the dysregulation of the immune system with depletion of CD4+ lymphocytes, which favors the emergence of opportunistic infections, the main ones being: tuberculosis, cryptococcal meningitis, pneumocystosis, toxoplasmosis and rhinitis by Cytomegalovirus.(14,30) This condition is probably associated with the leading cause of death found in studies.

The present study has advantages mainly to guide public policies contributing to the management and planning of prevention actions and care for people living with HIV/AIDS, since it provides relevant information on population groups. Despite this, it finds limitations related to the accessed databases that may be incomplete or inconsistent. In addition, it is not possible to extrapolate the present findings to specific individuals or groups.

CONCLUSION

The present study demonstrates a temporal trend of reduction in HIV/AIDS incidence and mortality in Brazil in the period from 2009 to 2019. Among the Brazilian states, those with the highest incidence and mortality rates were the South and Southeast, which also showed the greatest downward trends. It was possible to notice a predominance of the disease in males and aged 30 to 39 years, while mortality was predominantly observed in males and in the age group of 40 to 49 years. The leading cause of death in HIV/AIDS was the result of infectious and parasitic diseases.

Revista ARACÊ
ISSN: 2358-2472

With the present study, it is possible to note that the disease is still very important for Brazilian public health, despite the drop in lethality. This finding is possibly related to the popularization and efficacy of ART, which makes HIV/AIDS a chronic disease, increasing its prevalence and reducing mortality.

Finally, even with an optimistic scenario for the future of controlling the incidence, treatment and mortality of HIV/AIDS, there is still a need for public programs for population education, prevention and encouragement of early detection and treatment of the disease in the country.

Revista ARACÊ
ISSN: 2358-2472

REFERENCES

1. UNAIDS, & WHO. (2007). AIDS epidemic update. Available from: http://data.unaids.org/pub/EPISlides/2007/2007_epiupdate_en.pdf

2. Ministério da Saúde. (2021). Dados da AIDS no Brasil. Available from: http://www.aids.gov.br/

3. UNAIDS. (2021). Estatísticas Globais sobre HIV. Available from: https://unaids.org.br/estatisticas/#:~:text=ESTATÍSTICAS%20GLOBAIS%20SOBRE%20HIV%202020&text=38%20milhões%20%5B31%2C6%20milhões,até%20o%20fim%20de%202019

4. Santos, F. F. dos, Pereira, F. B., Silva, C. L. O. da, Lazzarotto, A. R., & Petersen, R. D. de S. (2013). Características imunológicas e virológicas e as variáveis flexibilidade (FLEX) e força de resistência abdominal (FRA) de crianças e adolescentes portadores de HIV/AIDS em uso de TARV. Revista Brasileira de Medicina do Esporte, 19(1), 40–43. https://doi.org/10.1590/s1517-86922013000100008

5. Soares, R., Armindo, R. D., & Rocha, G. (2014). A imunodeficiência e o sistema imunitário. O comportamento em portadores de HIV. Arquivos de Medicina, 28(4), 113–121.

6. Gomes, C. D. Q. (2015). Vírus da Imunodeficiência Humana: O desenvolvimento de uma vacina. Universidade Fernando Pessoa.

7. Salomão, R. (2017). Infectologia: Bases clínicas e tratamento (Vol. 1). GEN - Grupo Editora Nacional.

8. Myhre, J., & Sifiris, D. (2021). Very Well Health - Symptoms of HIV. Available from: https://www.verywellhealth.com/hiv-aids-symptoms-4014373?print

9. Dias, J. O., Gabryelle, S., Sousa, C. de, Rômulo, D., & Furtado, L. (2019). Principais sintomas e alterações imunológicas decorrentes da infecção pelo vírus HIV: Uma revisão bibliográfica. Revista Brasileira de Medicina, 1, 1–11.

10. Marins, J. R. P., Jamal, L. F., Chen, S. Y., Barros, M. B., Hudes, E. S., Barbosa, A. A., et al. (2003). Dramatic improvement in survival among adult Brazilian AIDS patients. AIDS, 17(11), 1675–1682. https://doi.org/10.1097/00002030-200307250-00012

11. Reis, A. C., Santos, E. M. dos, & Cruz, M. M. da. (2007). Mortality for AIDS in Brazil: An exploratory study of its temporal evolution. Epidemiologia e Serviços de Saúde, 16(3), 195–205.

12. Ministério da Saúde. (2021). Boletim Epidemiológico HIV/Aids. Secretaria de Vigilância em Saúde.

Revista ARACÊ
ISSN: 2358-2472

13. da Cunha, A. P., da Cruz, M. M., & Pedroso, M. (2022). Analysis of the trend of mortality from HIV/AIDS according to sociodemographic characteristics in Brazil, 2000 to 2018. Ciência e Saúde Coletiva, 27(3), 895–908. https://doi.org/10.1590/1413-81232022273.00432021

14. Brasil, M. da SS de V em S. (2018). Protocolo Clínico e Diretrizes Terapêuticas para Manejo da Infecção pelo HIV em Adultos. Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância, Prevenção e Controle das Infecções Sexualmente Transmissíveis, do HIV/Aids e das Hepatites Virais. 410 p.

15. Shiels, M. S., & Engels, E. A. (2017). Evolving epidemiology of HIV-associated malignancies. Current Opinion in HIV & AIDS. https://doi.org/10.1097/COH.0000000000000327

16. Ministério da Saúde. (2018). Manual técnico para o diagnóstico da infecção pelo HIV em adultos e crianças. Secretaria de Vigilância em Saúde.

17. Dartora, W. J., Propp, Ânflor É., & Ribeiro Pavão da Silveira, L. (2017). Prevalência do HIV no Brasil 2005-2015: dados do Sistema Único de Saúde. Revista Cuidarte, 8(3), 1919. https://doi.org/10.15649/cuidarte.v8i3.462

18. Ministério da Saúde. (2022). Indicadores Clínicos AIDS no Brasil. Available from: http://indicadoresclinicos.aids.gov.br/

19. Dourado, I., Maria, M. A., Barreira, D., & de Brito, A. M. (2006). Tendências da epidemia de Aids no Brasil após a terapia anti-retroviral. Revista de Saúde Pública, 40(SUPPL.), 9–17. https://doi.org/10.1590/S0034-89102006000700003

20. Sousa, A. I. A. de, & Pinto, V. L. (2016). Análise espacial e temporal dos casos de aids no Brasil em 1996-2011: Áreas de risco aumentado ao longo do tempo. Epidemiologia e Serviços de Saúde, 25(3), 467–476. https://doi.org/10.5123/S1679-49742016000300003

21. Villarinho, M. V., Padilha, M. I., Berardinelli, L. M. M., Borenstein, M. S., Meirelles, B. H. S., & Andrade, S. R. de. (2013). Políticas públicas de saúde face à epidemia da AIDS e a assistência às pessoas com a doença. Revista Brasileira de Enfermagem, 66(2), 271–277.

22. De Rossi, S. M. G., Pereira Maluf, E. C., Carvalho, D. S., Ribeiro, C. E. L., & Battaglin, C. R. P. (2012). Impacto da terapia antirretroviral conforme diferentes consensos de tratamento da Aids no Brasil. Revista Panamericana de Salud Pública, 32(2), 117–123. https://doi.org/10.1590/S1020-49892012000800005

23. Jiang, H., Yin, J., Fan, Y., Liu, J., Zhang, Z., Liu, L., et al. (2015). Gender difference in advanced HIV disease and late presentation according to European consensus definitions. Scientific Reports, 5, 14543. Available from: http://dx.doi.org/10.1038/srep14543

Revista ARACÊ
ISSN: 2358-2472

24. Weber, A., Tombini, L. H. T., Dalla Rosa, G. F., De Souza, T., Silva, D. T. R., & Pitilin, É. D. B. (2020). Análise da tendência temporal da infecção pelo HIV/aids na região oeste catarinense: Estudo retrospectivo 1984-2015. Revista Epidemiologia e Controle de Infecção, 10(1), 1–8. https://doi.org/10.17058/jeic.v1i1.13089

25. de Melo, M. C., de Almeida, V. C., & Donalísio, M. R. (2021). Trend incidence of HIV-aids according to different diagnostic criteria in Campinas-SP, Brazil from 1980 to 2016. Ciência e Saúde Coletiva, 26(1), 297–307. https://doi.org/10.1590/1413-81232020261.08652019

26. Chambers, L. A., Wilson, M. G., Rueda, S., Gogolishvili, D., Shi, M. Q., Rourke, S. B., et al. (2014). Evidence informing the intersection of HIV, aging and health: A scoping review. AIDS and Behavior, 18(4), 661–675. https://doi.org/10.1007/s10461-013-0627-5

27. Alves, D. N., Bresani-Salvi, C. C., Batista, J. d'Arc L., de Alencar Ximenes, R. A., de Barros Miranda-Filho, D., de Melo, H. R. L., et al. (2017). Uso do Coding Causes of Death in HIV na classificação de óbitos no Nordeste do Brasil. Revista de Saúde Pública, 51, 1–9. https://doi.org/10.11606/S1518-8787.2017051000124

28. Magno, E. da S., Saraiva, M. das G. G., Menezes, C. H. de A. B. de. (2019). Causas de óbito relacionadas ao HIV/AIDS em Instituição de referência, Amazonas, 2016. Brazilian Journal of Health Review, 2(2), 787–799. Available from: http://brjd.com.br/index.php/BJHR/article/view/1216/1081

29. da Silva Magno, E., Saraceni, V., de Souza, A. B., da Silva Magno, R., das Graças Gomes Saraiva, M., & Bührer-Sékula, S. (2017). Factors associated with TB/HIV coinfection: Evidence from notification data in the State of Amazonas, Brazil, 2001-2012. Cadernos de Saúde Pública, 33(5), 1–11. https://doi.org/10.1590/0102-311X00019315

30. Santiago, G. M. F. (2020). Mortalidade por infecções oportunistas em pacientes HIV positivo. Universidade Federal da Fronteira Sul.