AIDS MORTALITY IN BRAZIL: AN ANALYSIS OF MULTIPLE CAUSES OF DEATH[*]

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1. Introduction

After 20 years of the STD-AIDS Program in Brazil - policy for antiretroviral that includes both disease prevention and health promotion activities, the face of the mortality by aids went though great transformations. Initially concentrated in the Southeast (84% of all deaths by aids in 1990), the spatial distribution of deaths by aids extended in all regions in the country. In 2007, 51% of deaths by aids were of residents of the Southeast, 22% in the South, 15% in the Northeast and around 12% equally distributed in the North and Centre-West regions.

Another aspect of the change is the increasing pattern of the epidemic in Brazil. During the 1980's, the tendency of the numbers of death was considered to increase exponentially, but in the mid of the 1990's, the curve presents an inflection, reaching its maximum in 1995 with 15516 deaths (50% from residents in the state of São Paulo). Later it stabilized around 11000 deaths per year (1998 to 2007). This increment of the number of deaths varied in the different regions of the country. While in São Paulo and Rio de Janeiro, in the Southeast region, the number of deaths rose until the mid 1990's and were followed by a drastic reduction, in the other states, mainly in the North and the Northeast, the numbers presented until 2007 a rising tendency (Figure A1).

The demographic characteristics also changed. In the beginning of the 1980's, AIDS were considered as a disease of a particular risk group, now it is noticed as a disease that overtakes a larger group of people. For instance, in the early stages of the epidemic, the great majority was of male death; in 2007, around 33% of all deaths by aids were female. On the other hand, the access to the highly

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active antiretroviral therapy (HAART) had a significant impact on the life expectancy. From a lethal disease, AIDS is now considered as a chronic disease which requires attention to the possible complications, mainly, dues to the antiretroviral therapies.

Considering the new epidemiologic profile of mortality by aids in Brazil, this paper has as objective the description of the progress of the disease in the country and its path leading to death using all the information stated on the death certificate. Other objective is to evaluate the quality of cause-of-death statistics recorded by physicians in death certificates when the underlying cause of death was aids.

2. Methods and data

Since 1999 the Ministry of Health in Brazil publishes all conditions mentioned on the death certificate besides socio-demographics characteristics of deceased and circumstances of death and its certification. The files were obtained from the Information System of Mortality accessible from the site www.datasus.gov.br. Underlying causes and other conditions mentioned were coded according to the Tenth Revision of International Classification of Diseases - ICD. For the selection of the underlying cause, the Ministry of Health utilizes the system "Underlying Cause Selector" – SCB – appropriated for the Brazilian epidemiological characteristics and similar to the ACME - Automated Classification of Medical Entities -, proposed by the National Center for Health Statistics – USA. The SCB algorithm to select the underlying cause from all conditions reported on the death certificate was initially based on decision tables from the Ninth revision of ICD. In 2008 the Ministry of Health revised the algorithm now based on decision tables from the Tenth revision of ICD and applied to mortality data from 2006.

As data for the years 2006 and 2007 were recently published, this paper focuses the analysis in the 2000 to 2005 period. 1999 was not considered in the analysis due to the relatively poor quality of data. The introduction of a new procedure to gather data in 1999 may be the reason of this lack of quality.

Underlying and other conditions are coded as variables: “Linha A”, “Linha B”, “Linha C”, “Linha D” and “Parte II”. These variables may comprehend more than one cause of death, separated by the symbol “*” (see Figure 1).

Figura 1 – Lay-out of the mortality data base

numerodo	dtobito	idade	sexo	Causabas	linhaa	linhab	linhac	linhad	linhaii
00000000	19012000	424	2	B208	*B208				
00000000	04012000	432	1	B208	*J969	*I509	*B24X		*A09X
00000000	06012000	444	1	B227	*J969	*J180			*B24X*C469
00000000	10012000	429	2	B208	*T792	*X939			
00000000	14012000	426	1	B206	*J960	*B59X	*B24X		
00000000	14012000	429	1	B24	*R98X				

Source: Ministry of Health, Information of Mortality System. 2000

In this article, we considered all deaths with underlying cause as aids (B20 to B24 – ICD10). The statistical analysis was performed using SPSS® and Tabwin packages.

Table 1 – Tabular list of codes ICD-10, B20 to B24, related to Human immunodeficiency virus [HIV] disease.

ICD-10	List
B20	Human immunodeficiency virus [HIV] disease resulting in infectious and parasitic diseases
B21	Human immunodeficiency virus [HIV] disease resulting in malignant neoplasms
B22	Human immunodeficiency virus [HIV] disease resulting in other specified diseases
B23	Human immunodeficiency virus [HIV] disease resulting in other conditions
B24	Unspecified human immunodeficiency virus [HIV] disease

3. Results

3.1. Evaluation of aids mortality data

In order to evaluate the quality of aids mortality data, we used two indexes: 1) death distribution by underlying cause of death; 2) average of the number of conditions mentioned on the death certificate.

- ***Death distribution by underlying cause of death***

If the death distribution by underlying cause of death clearly shows that the aids mortality in Brazil is highly associated with infectious and parasitic diseases (B20), it also shows the poor quality of fulfill death certificate when the underlying cause of death is "Unspecified human immunodeficiency virus [HIV] disease" (B24). In spite of this percentage for the country had reduced between 2000 and 2005, it shows the difference of data quality between the regions. Aids mortality data are more accurate on the South and Southeast regions followed by the Centre-West and North regions. The Northeast region presents the highest proportion of death with B24 as underlying cause of death, which indicates that data for this region is not adequate for an analysis of multiple cause of death.

Table 2 – Aids mortality by region and underlying cause of death. Brazil, 2000-2007

Region	2000					2007				
	B20	B21	B22	B23	B24	B20	B21	B22	B23	B24
North	68,6%	1,3%	12,3%	3,6%	14,2%	52,2%	1,0%	9,4%	1,6%	35,7%
North-East	61,4%	2,1%	13,7%	1,9%	20,9%	60,3%	2,4%	12,0%	2,2%	23,2%
South-East	67,1%	2,6%	13,7%	1,7%	14,9%	66,5%	2,1%	15,6%	1,1%	14,7%
South	70,0%	3,6%	12,6%	2,3%	11,6%	68,6%	3,2%	12,2%	0,9%	15,1%
Centre-West	64,4%	3,1%	14,4%	2,2%	15,7%	68,4%	2,8%	13,1%	1,7%	14,0%
Brazil	67,0%	2,7%	13,5%	1,9%	15,0%	65,3%	2,4%	13,8%	1,3%	17,3%

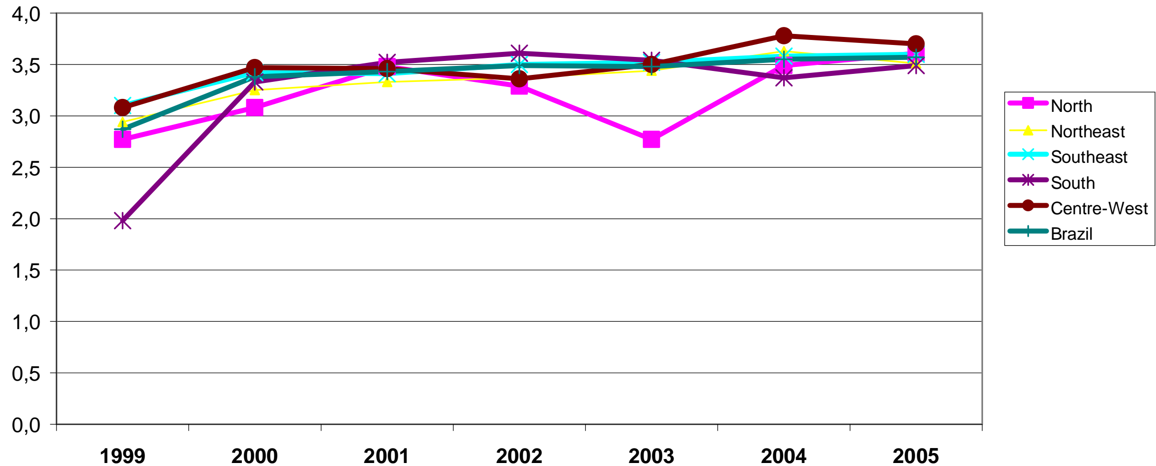
Source: Ministry of Health, Information of Mortality System. 2000-2007

- ***Number of conditions mentioned on the death certificate***

The average of the number of conditions mentioned on the death certificate is also an index of quality because it reveals the circumstances of certification, when the physician has the possibility to describe more precisely the morbid process.

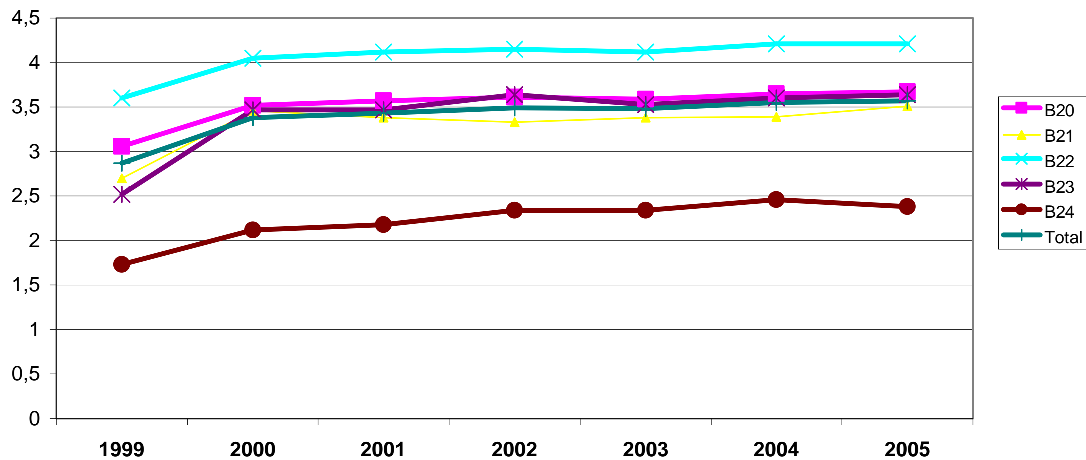
The average of the number of conditions mentioned varied from 2,9 to 3,6 between 1999 and 2005 (p-value <0,001), which means a significantly improvement in the certification of the morbid process by aids in Brazil. We notice differences by region but reducing during the period. (Figure 2).

Figure 2 – Average of the number of conditions mentioned on death certificates by regions. Brazil. 1999-2005



The averages of the number of conditions mentioned by underlying cause of death number are significantly different. The major differences are between the underlying causes B22 (Human immunodeficiency virus [HIV] disease resulting in other specified diseases) and B24 (Unspecified human immunodeficiency virus [HIV] disease). The first had, in average, 4,1 conditions mentioned, while the last had, in average, 2,4. The other underlying causes had, in average, 3,5 conditions mentioned on the death certificate between 2000 and 2005.

Figure 3 – Average of the number of conditions mentioned on death certificates by underlying cause of death. Brazil. 1999-2005



3.2. Conditions associated to the aids mortality in Brazil

The exploratory analysis of the conditions mentioned on the death certificate was realized excluding all the mentions coded between B20 and B24. The mentions were grouped as its similarity and position in the IDC-10 list.

The mentions coded as "Ill-defined and unknown causes of mortality" - highly frequently during all period, mainly, in the North and Northeast regions – also indicate the quality of the information of cause of death. We do not consider these mentions in the analysis of cause associated in the aids mortality.

During the period, five groups of conditions appear as the most frequent: insufficiency respiratory, pneumonia, septicemia, tuberculosis and toxoplasmosis. The first three were frequently declared as immediate causes (in the two first line of the death certificate), and the other two mainly as associated. These two groups of causes, with Candidiasis, Mycosis and pneumocystosis, are causes associated to the aids mortality in the period pre-antiretroviral therapy. The frequency in which this group of cause was mentioned varied between regions and year.

Nevertheless, we call attention for the frequency of tuberculosis in the South in 2005, when 20.7% of the certificates present this condition.

Liver diseases and hepatitis are more likely associated to aids in the period pos-HAART and more frequently mentioned in the South and Southeast regions between ages of 30 and 50 years.

Diseases not frequently associated to aids as cardiovascular diseases and diabetes have their frequency increased in 2005 in respect to 1999. These diseases are associated to the fact that the morbid process is becoming more chronic in the period pos-HAART.

Table 3a – Proportion of death certificate with the condition mentioned by region. Brazil, 1999.

Conditions associated to Aids	Region					Brazil
	North	Northeast	Southeast	South	C-West	
Insufficiency respiratory	20,4%	32,6%	33,8%	21,9%	38,3%	31,4%
Pneumonia	10,6%	9,6%	23,5%	14,1%	25,5%	20,3%
Septicemia	6,5%	12,4%	20,2%	12,9%	15,9%	17,6%
ill-defined and unspecified causes of mortality	9,4%	13,3%	18,6%	12,0%	17,8%	16,6%
Tuberculosis	10,6%	11,0%	16,0%	7,9%	11,2%	13,7%
Toxoplasmosis	4,9%	7,3%	11,7%	6,1%	8,2%	9,9%
Symptoms and signs involving the circulatory and respiratory systems	11,0%	13,1%	7,1%	5,0%	8,8%	7,5%
Candidiasis and Mycosis	3,3%	4,2%	6,4%	5,3%	9,5%	6,1%
Pneumocystosis	2,9%	2,8%	6,9%	3,3%	8,6%	5,8%
Other diseases of the respiratory system	4,5%	18,8%	10,0%	6,3%	5,7%	9,8%
Other diseases of the digestive system	2,9%	6,0%	4,0%	2,4%	4,8%	3,9%
Liver diseases	2,4%	1,9%	4,2%	2,9%	2,6%	3,6%
Hepatitis	0,8%	0,4%	1,9%	1,4%	0,7%	1,6%

Source: Ministry of Health, Information of Mortality System. 2000-2005

Table 3b – Proportion of death certificate with the condition mentioned by region. Brazil, 2005.

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Conditions associated to Aids	Region					Brazil
	North	Northeast	Southeast	South	C-West	
Insufficiency respiratory	32,0%	39,0%	31,6%	32,1%	31,2%	32,7%
Pneumonia	23,3%	27,0%	30,3%	25,9%	28,1%	28,4%
Septicemia	14,7%	12,8%	32,9%	26,6%	29,9%	27,7%
ill-defined and unspecified causes of mortality	35,6%	23,0%	26,6%	22,0%	31,7%	25,9%
Tuberculosis	10,5%	15,0%	13,8%	20,7%	7,9%	15,0%
Toxoplasmosis	7,4%	8,3%	11,5%	8,5%	10,2%	10,1%

Symptoms and signs involving the circulatory and respiratory systems	19,2%	16,1%	6,4%	8,1%	10,3%	8,9%
Candidiasis and Mycosis	4,0%	5,0%	7,7%	8,7%	5,9%	7,3%
Pneumocystosis	4,1%	5,0%	7,0%	7,5%	12,4%	7,0%
Other diseases of the respiratory system	9,1%	23,7%	11,6%	11,7%	7,6%	12,8%
Liver diseases	1,4%	1,1%	5,3%	6,3%	3,8%	4,7%
Hepatitis	3,1%	1,5%	3,2%	2,2%	2,4%	2,7%

Source: Ministry of Health, Information of Mortality System. 2000-2005

4. Conclusion

The different epidemiological profiles in mortality by AIDS in Brazil also comprehend the association with different causes of death. First, it was seen as closely associated to dermatological disease. More recently, as other studies have shown for the state of São Paulo, that it is closely associated to the cardiovascular disease, hepatitis and diabetics (Pereira et al, 2007). Even though, in the more poor regions of the country the quality of the information does not permit an accurate evaluation of its epidemiological background, it is often associated with tuberculosis and diseases related with the respiratory system.

.As conclusion, this paper emphasizes that although the information about the multiple causes are not accurate and in some cases ill-defined it is a valuable source of information and can be more explored to determine the changes in this vast scenery of this disease contributing then to the Brazilian Program for assistance and prevention of STD-Aids.

5. Acknowledgment

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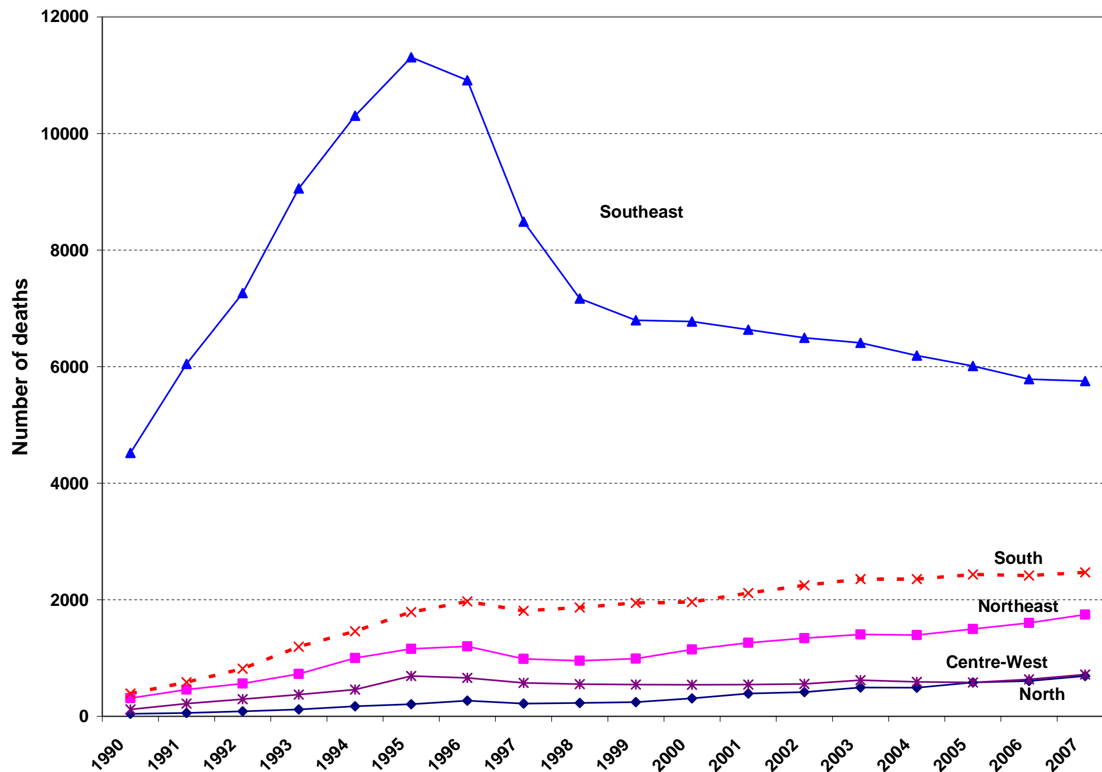
Annexe

Figure A1 – Numbers of deaths by AIDS in Brazil. 1990-2007



Source: Ministry of Health, Information of Mortality System. 1990-2007.