



Burden of AIDS in a Brazilian State



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KEYWORDS

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Summary

Background: To estimate the burden of a disease implies the simultaneous quantification of the impact of early mortality and the health problems that affect the individual's quality of life, and this evaluation can be particularly important in a disease such as AIDS that has become a long-term disease. The purpose of this study was to determine the burden of disease due to AIDS in the Brazilian Southern State of Santa Catarina.

Methods: An ecological designed study was performed using death and AIDS notifications data for 2009. The disability adjusted life years (DALYs) were estimated by the sum of years of life lost (YLL) and the years lived with disability (YLD). The YLL was estimated as the difference between the life expectancy from birth and the age at death with the application of a discount rate of 3% per year. The YLD was estimated as the product of the Burden of Disease Study's weight for AIDS of 0.167 and its average duration of 108 months in Brazil for the incident cases. The YLL, YLD and DALY rates were calculated per 100,000 inhabitants by sex and age groups.

Results: There were 2034 notified cases and 689 deaths due to AIDS reported. There were 15,756.5 YLLs estimated, resulting in 257.5 YLLs/100,000 inhabitants, and 4554.1 YLDs were estimated, resulting in 74.4 YLDs/100,000 inhabitants. The DALY was estimated at 20,310.6, with a rate of 331.9 DALYs/100,000 inhabitants. The highest rates were observed in males in the age groups 30–44 and 45–59 years.

Conclusions: The burden of AIDS was high and was observed mainly in adults, with a predominance in males.

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Introduction

Since the introduction of anti-retroviral drugs, an improved survival rate has been observed in individuals living with HIV, transforming AIDS into a long-term disease. The decrease in mortality rates in countries such as Brazil could hypothetically be attributed to this factor. Due to this increased life expectancy, the quality of life for individuals living with HIV, in terms of life years gained, should be considered and measured, and this is possible with the use of indicators that incorporate the impact generated by the disease and mortality.

Estimation of the burden of disease implies the simultaneous quantification of the impact of early mortality and the health problems that affect the individual's quality of life. The proposed indicator to assess the burden of disease is known as disability-adjusted life years (DALY). One DALY corresponds to one year of healthy life that is lost or lived with incapacity [1]. In the case of AIDS, the inclusion of the loss of years of healthy life due to incapacity brings up the subject of non-fatal consequences of the disease, which are rarely measured, but could be used as indicators of health needs. It allows for the assessment of disease severity in an incapacitating condition, which enables the identification of epidemiological priorities and research.

In Brazil, the incidence and number of deaths due to AIDS are very high, with the Southern region being one of the regions with the highest incidences [2,3]. According to the Brazilian Ministry of Health, the country had a total of 656,701 cases of AIDS between 1980 and 2012 reported in the National Case Registry Database. The state of Santa Catarina showed 33,155 cases of the disease in the same period. The incidence of AIDS between 2000 and 2011 in Brazil ranged from 17.2 to 20.2/100,000 inhabitants, and the incidence in Santa Catarina ranged from 30.5 to 36.4/100,000 inhabitants. The incidence rate in 2009 was 22.2/100,000 inhabitants. Among Brazilian cities with over 50,000 inhabitants, the top three cities with the highest incidence rates were located in Santa Catarina [4]. The state accumulated a total of 8231 deaths from 1997 to 2009. The mortality rate was estimated to be 10.2/100,000 inhabitants in 2009 [5]. This information is useful in understanding the epidemiology of AIDS in the State and in Brazil, but this is an opportune moment to search for a more comprehensive indicator. The knowledge of a measure that includes potential life years lost due to premature death, by adding equivalent years of healthy life lost due to health problems or incapacity [1], presents epidemiological data that is still poorly explored but offers better assistance for strategic

management planning aimed at controlling the impact of the disease. The aim of the present study was to estimate the burden of AIDS for the Brazilian State of Santa Catarina in 2009.

Methods

Santa Catarina is one of the three Southern Brazilian states. In the year of 2009, it had a population of 6,118,743 inhabitants. It had the highest HDI (United Nations Human Development Index) in the South and ranked third among 26 Brazilian states. The per capita income is the fourth highest in the country. The state has the lowest illiteracy rate in the country and ranks first in the number of children between six and 14 years enrolled in school. In the year under study, the infant mortality rate was 11.04/1000 live births [6]. This study used data from official systems for health information that are of public domain, without the risk of compromising the Code of Ethics in Research involving human beings.

An epidemiological study of ecological design, which involved records of individuals notified as confirmed AIDS cases or who had died of AIDS and were residents of Santa Catarina in 2009, was carried out. The 2009 dataset was the most recent year with consolidated data made available by the Ministry of Health of Brazil when the data were collected (2012). The Brazilian Government finalizes its statistics, especially on mortality, with a lag of about three years. Brazil is a country with continental dimensions with 5565 municipalities where data from both mortality and morbidity are primarily generated. Information regarding the population, estimated by sex and age group, from the same year was used. This information was not indexed by age, so nine age groups were created: <1 year, 1–4 years, 5–14 years, 15–29 years, 30–44 years, 45–59 years, 60–69 years, 70–79 years and 80 years and over [7].

The data for mortality were collected from the Mortality Information System database for 2009, available at www.datasus.gov.br (accessed on 10/03/2012). The morbidity data were collected from the National System for notifiable diseases available at www.datasus.gov.br (accessed on 10/03/2012). To compensate for underreporting of notification data, the total number of notifications was increased by 50% of the incident cases [7].

YLD calculation

The number of years lived with disability (YLD) was estimated by the product of weight and its duration

on the incident cases. A weight of 0.167 for AIDS was used, as recommended by the World Health Organization [8]. The mean duration of disease used was 108 months [9].

YLL calculation

The number of years of life lost (YLL) was estimated by the difference between the age at death and the life expectancy. In this study, the same parameters were used as in the Global Burden of Disease Study [10]: a life expectancy of 80 years for men and 82.5 years for women. These values are standardized to enable international comparisons of the results.

A discount rate of 3% for each year of future life lost was applied [7]. Future years suffered the effects of the discount rate, where each year of healthy life lost was considered as 97% of the year before and so on.

DALY calculation

The DALY was calculated by the sum of the YLL and the YLD.

Data analysis

All of the data were collected in Microsoft Office Excel 2007 and exported to SPSS 16.0 for analysis. The rates for the YLL, YLD and DALY per 100,000 inhabitants were calculated based on the resident population in the State for the year of study.

Results

A total of 689 deaths and 2034 AIDS notifications were analyzed for the year 2009.

The number of YLLs was estimated at 15,756.65, resulting in a rate of 257.51 YLLs/100,000 inhabitants; 65.7% (10,358.30 YLLs) occurred in men, at a rate of 340.70 YLLs/100,000 males. In women, 5398.20 YLLs (34.3%) were estimated, at a rate of 175.30 YLLs/100,000 females (Fig. 1).

The highest YLL rates were observed in the 30–44 years age group (644.60 YLLs/100,000 inhabitants), the 45–59 years age group (383.10 YLLs/100,000 inhabitants) and the 60–69 years age group (151.00 YLLs/100,000 inhabitants) (Fig. 2).

The total number of YLDs was estimated at 4554.05, resulting in a rate of 74.43 YLDs/100,000 inhabitants; 58.7% (2673.20 YLDs) were in men, generating a rate of 87.94 YLDs/100,000 males. In women, 1880.85 YLDs (41.3%) were estimated, resulting in a rate of 61.08/100,000 females

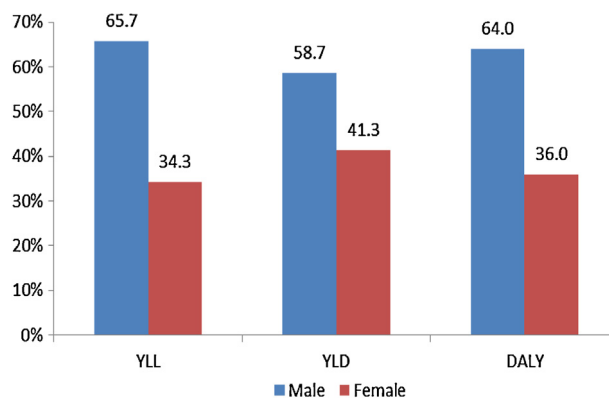


Figure 1 Percentage distribution of YLL, YLD and DALY for AIDS according to sex. Santa Catarina, Brazil, 2009.

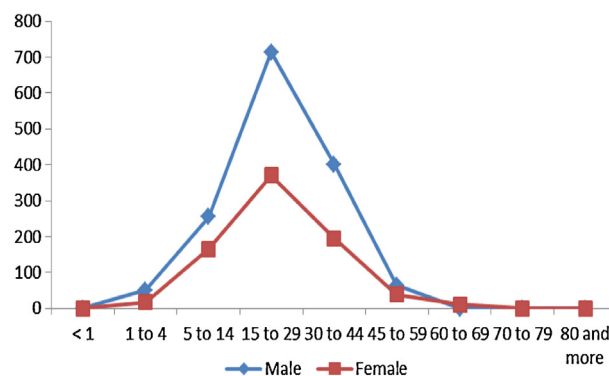


Figure 2 Rates for YLL/100,000 inhabitants for AIDS according to age group and sex. Santa Catarina, Brazil, 2009.

(Fig. 1). The highest YLD rates were observed within the 30–44 years age group (167.22 YLDs/100,000 inhabitants), the 45–59 years age group (118.36 YLDs/100,000 inhabitants) and the 15–29 years age group (48.22 YLDs/100,000 inhabitants) (Fig. 3).

The burden of AIDS was estimated at 20,310.65 DALYs, generating a rate of 331.94 DALYs/100,000

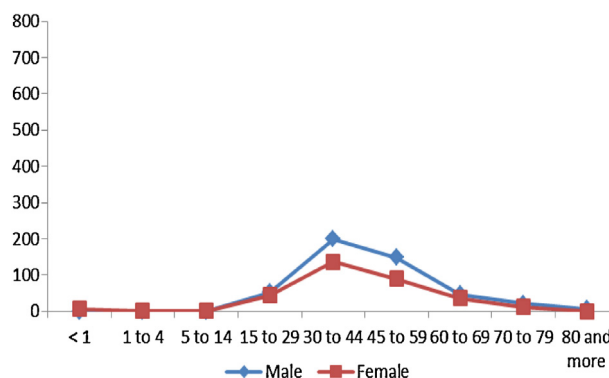


Figure 3 Rates for YLD/100,000 inhabitants for AIDS according to age group and sex. Santa Catarina, Brazil, 2009.

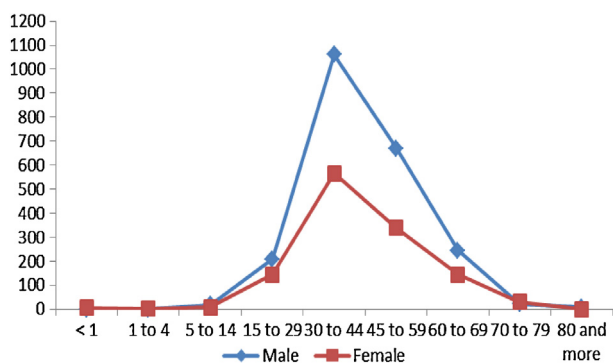


Figure 4 Rates for DALY/100,000 inhabitants for AIDS according to age group and sex. Santa Catarina, Brazil, 2009.

inhabitants, of which 64.0% (12,998.82 DALYs) were estimated for males, at a rate of 428.79 DALYs/100,000 men. In females, 7311.83 DALYs (36.0%) were estimated, generating a rate of 236.34 DALYs/100,000 women (Fig. 1). The highest DALY rates were observed in the 30–44 years age group (811.91 DALYs/100,000 inhabitants), the 45–59 years age group (501.51 DALYs/100,000 inhabitants) and the 60–69 years age group (192.61 DALYs/100,000 inhabitants) (Fig. 4).

Discussion

The Brazilian Ministry of Health pinpointed Santa Catarina as one of the top five states in terms of the rate of HIV detection between 2000 and 2009 [2]. AIDS is one of the principal causes of death in Santa Catarina in men and in women. The numbers follow the national trends of stabilizing since 1996, with its peak in 2009 [11]. In 1996, the Brazilian government instituted the universal law establishing the right to receive free medication for AIDS treatment. This measure, associated with other preventive actions of the National STD and AIDS, resulted in a decline in mortality from AIDS in the country [12]. We believe that this could influence the burden of disease due to HIV/AIDS in recent years in Santa Catarina.

In this study, a total of 20,310.6 DALYs was estimated, generating a rate of 331.9 DALYs/100,000 inhabitants, of which 64% occurred in males, at a rate of 428.79 DALYs/100,000 men and 36% occurred in females, at a rate of 236.34 DALYs/100,000 women. These results are similar to those found in other studies [7,13,14]. Though the burden of disease due to HIV/AIDS is seldom explored individually in the literature, in the studies, the Global Burden of Disease AIDS is always emphasized.

A Brazilian study [7] highlighted that in the South, HIV represents an important isolated cause of burden of disease, representing 1.8% of the total DALYs in both sexes, with 2.2% in males and 1.3% in females. In the United States of America, HIV was cited as one of the 20 most common causes of DALY, and it was the 4th cause in men and the 18th cause in women, with a total burden of 4.3% and 1.3%, respectively [14].

This study highlighted a larger proportion of DALYs in men, but it can be confirmed that AIDS is in a frank process of feminization, independent of the age group. In 1986, the incidence ratio in Brazil was 15.1 men for each woman. From 1997 to 2009, a rate decrease was observed in men, from 73.6 to 54.2 cases/100,000 inhabitants, and there was an increase noted in women, from 23.0 to 35.5 cases/100,000 inhabitants [2]. In Santa Catarina, the sex ratio fell from 4.8 in 1987 to 1.7 in 2009 [4]. One hypothesis proposed for explaining this process was the heterosexualization of the epidemic [2]. The disability component presented a reverse sex distribution ratio in the Far West of the State (data not presented), highlighting that women with AIDS are living longer than the men in that region, which is consistent with a Brazilian study on the Southern region of the country [7].

In the present study, the highest DALY rates and their components were found in the 30–44 years age group, followed by 45–59 years and 60–69 years groups in both sexes. The presence of AIDS prevails in young adults, which undoubtedly has economical and psychosocial impacts. The Brazilian Ministry of Health reported that the rate of AIDS detection in Brazil was highest in the 30–34 and 35–39 years age brackets between 1997 and 2009, with the 60 years and over age group having an increase in the rate from 4.0–8.4 cases per 100,000 inhabitants [4]. Murray (2012) highlighted that the DALY distribution by age group in studies on the Global Burden of Disease presented similarly; the DALY for those in the reproductive age group increased from 27% to 35% between 1990 and 2010, and the 50 years and over age group also demonstrated an increase.

A study performed in the Andalusia region of Spain revealed lower DALYs in older individuals living with HIV [15]. Other authors argued that the results demonstrated a significant difference for the DALYs in terms of age groups, highlighting the debate regarding the need to include an age log component when calculating the DALYs for different diseases. To include this information, it would be necessary to alter the results for the burden of disease due to AIDS because it is more common in younger age groups.

Approximately 75% of the total DALY estimated was composed of the mortality component (YLL), with the remaining 25% made up by the morbidity component (YLD). The YLD was considerably lower because once the syndrome is established, survival is relatively low, resulting in a lower proportion of YLD compared with to YLL. In 1990, diseases related to HIV infection presented in 30th place in the ranking of causes of death, but in a projection performed by Murray and Lopes, these diseases will be the 9th cause of death by 2020. The total number of deaths related to HIV from 2006 to 2030 was predicted at 117 million [16]. Mathers and Loncar [17] suggested a more optimistic scenario. They suggested that with hard work aimed at prevention, a decline in the incidence rate of 3% in the long-term could lead to 89 million deaths, avoiding 28 million deaths. The authors highlighted that for this scenario, there should be guaranteed access to antiretroviral medication and strict case monitoring.

A recently published study involving 187 countries showed that the burden of disease due to HIV/AIDS has greatly increased over the last 10 years. In 1990, it was considered the 33rd cause of the Global Burden of Disease, and it moved up to 5th position in 2010 [18]. This demonstrated that burden of disease attributed to HIV/AIDS is increasing, which endorses its priority in the context of public policy.

Recently, HIV/AIDS has been a priority in various scenarios of health and action planning worldwide. In Brazil, health programming and annual performance goals via the Health Pact are encouraged, with one priority being strengthening the response capacity to diseases, with an emphasis on AIDS [18]. To manage AIDS, a change is necessary, in terms of its indicators and in the way in which it is considered. The importance of the present study concentrates on the estimation of a health indicator based on the concept of burden of disease, which is relatively new in Brazil and in Santa Catarina. The data presented in this study, although descriptive, represent new information that is unavailable in the National Health System and that is significant, due to its size, for comparisons with other locations investigated, including internationally. Within the limitations of this study, it is proposed that it be integrated into official secondary data sources. Despite the number of notified cases, the possibility of underreporting should be considered. Underreporting of cases treated in the private sector could influence the official health information data systems. The use of the Mortality Information System to identify deaths was extremely reliable, covering virtually 100% of Santa Catarina's death

notifications [2]. We emphasize that although this study is focused in a Brazilian state, it reveals results that had not been explored in the region, and it was performed by a method that has been stimulated in epidemiological research due to the effect of comparisons on many levels, between communities and globally, in cross sectional and cohort studies. The burden of disease is a summary of the population health and has been systematically developed by the Institute for Health Metrics and Evaluation (IHME) of the University of Washington [13]. The findings of this study might assist in the evaluation of health information on more than the local level.

Conclusions

In light of the findings of this study, it can be concluded that in 2009, the burden of AIDS in the State of Santa Catarina was high and was concentrated mainly in the adult age groups and in men. Considering the potential economic, psychosocial and quality of life impacts on individuals living with the disease, planning measures aimed at disease control and prioritizing follow-up, with a focus on these populations, is suggested.

Conflict of interest

Funding: No funding sources.

Competing interests: None declared.

Ethical approval: Not required.

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