



Age and sex trends for suicide in Brazil between 2000 and 2016

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Abstract

Purpose To evaluate changes in standardized suicide rates in Brazil between 2000 and 2016, stratified by sex and age.

Methods Descriptive analyses of data from the Brazilian Mortality Information System were performed.

Results 156,292 suicides were registered in the period, with a standardized rate of 4.82/100,000. The risk for males was 3.81 times higher than for females, without meaningful regional variations. This ratio was 8.2 at the 80+ group. An increase from 2000 to 2016 was demonstrated in nearly all subgroups over the 17, especially men aged 20–39 and women aged 40–59.

Conclusions Suicide rates continue to rise in Brazil, especially among young men and middle-aged women. Older men remain exposed to the highest absolute risk.

Introduction

Approximately, 800,000 people die by suicide each year [1]. One of the most affected demographic groups is the elderly population, which demonstrates the highest rates in several countries [2]. Elderly suicide in China, for example, represents 38.2% of all suicides, while elderly people consist of only 8.9% of the general population [3]. This higher risk of suicide might be due to retirement, death of family members and friends, physical deterioration, mobility dysfunction, and terminal illnesses, among other aspects of aging [4, 5]. In Brazil, the elderly also present higher rates of suicide [6].

Minayo [7] has analyzed suicide rates between 1980 and 2006, presenting evidence of higher self-inflicted deaths among the male elderly people during this period. Between 2000 and 2012, suicide rates have increased 16.2% in Brazil [6]. The same study pointed out that, analyzing all ages and regions of the country, men ended their lives three times more frequently than women, albeit women also showed significant increase over time [6].

This points to the need to stratify suicide rates by sex and age to obtain a better understanding of suicidal behavior

trends. Retrospective cohorts of the Australian [8] and white American [9] population revealed a progressive elevation of suicide rates throughout life for males, whereas females had their most elevated rates between 35 and 54 years and 45–54 years, respectively. In São Paulo [10], there has been a striking increase in suicide rates of males aged 24–44 between 1996 and 2009, surpassing elderly men as the group in greatest absolute risk. In women, the highest rates occur in the 45–64 group. In Italy [11], a 12% elevation of suicide rates in the male population aged between 25 and 64 was registered during the economic crisis. This elevation has not been found in the elderly, children, teenagers or women, suggesting that biopsychosocial aspects have a different impact on suicidal behavior among distinctive sex and age groups.

Brazil, however, lacks national studies with simultaneous stratification of sex and age, which hinders the allocation of investments in prevention strategies. Therefore, the present study aims to verify the age- and sex-stratified estimates of suicide in Brazil, as well as its variation over the period from 2000 to 2016, utilizing the national mortality information system's data.

Methods

We conducted a descriptive analysis of data on mortality by suicide in Brazil, stratified by sex and age. Data on mortality by suicide were obtained from the Information System on Mortality (SIM) database, Health Ministry/

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Department of Analysis and Data Tabulation of the Unique Health System (DATASUS), following ICD-10 codes X60–X84 [12]. DATASUS is a Brazilian platform for information on health statistics and contains mortality data fed by the Notification of Injury Information System (SINAN). Thus, its indicators refer to the set of official suicide records, not covering deaths that occurred in locations without medical assistance. Resident population estimates by sex and age were obtained from the Brazilian Institute of Geography and Statistics (IBGE). For the calculation of age- and sex-standardized suicide rates—that is, the cumulative incidence proportion for the period—the number of deaths in the analyzed year or period was considered as numerator and the estimated population of the respective year was considered as denominator.

Suicide rates were calculated for the cluster of cases from 2000 to 2016 according to sex and age and presented by 100,000 inhabitants. Population was aggregated into five age groups of interest: 5–14; 15–19; 20–39; 40–59 and 60 or more years. Such aggregation aims at discriminating different phases of the life cycle, whose motivation for suicide could differ (children, adolescent, young adults, middle-aged and elderly).

Overall estimates were age and sex-standardized and sex-specific estimates were age standardized. The stratified cumulative incidence proportion was also calculated for each Brazilian region. Sensitivity analyses were conducted, excluding region by region from the analysis, without significant alteration on the epidemiological curve in the study.

Results

In the 17-year period, 156,292 suicides were registered in Brazil. The overall age- and sex-standardized estimate per 100,000 was 4.81 for the whole period, increasing from 3.82 in 2000 to 5.4 in 2016 (Fig. 1). Male and female age standardized rates were 6.12 and 1.6 in 2000 and increased to 8.65 and 2.24 in 2016, respectively. The ratio was 3.81 times higher in men compared to women in the period. The risk ratio for sex was lower between 40 and 59 years (3.72) than 20–49 and 60+ years (4.24 and 5.44, respectively), due to an increase in female suicide in this age group and rises after the sixth decade, peaking at 8.2 in the population older than 80 years.

Despite variations in the total suicide estimates, much above the national average in South and Center-West, risk ratio for sex was similar in the five regions, varying from 3.6 to 4.13. Rates increased consistently in both sexes for the period, especially in men between 20 and 39 years and women between 40 and 59 years.

Discussion

Standardized suicide rates are higher in men, whose risk rises throughout life, peaking at older ages. For women, it is stable from 20 years of age onwards, with a peak between 40 and 59 years. Rates increased in almost all groups over 17, especially in men aged 20–39 and women aged 40–59 years.

Men face higher risk of suicide than women in most nations [13]. Out of 171 countries assessed by the World Health Organization [14] in 2012, 165 showed risk ratio for sex higher than 1, being the world average of 3.2. In Brazil, previous studies had already reported a ratio of 3.71 [6] and in the present study it was 3.82. Furthermore, recent data [14] showed that these rates are particularly higher in older men.

Although the WHO reports a proportional elevation of suicide at older ages in both sexes, some studies showed this phenomenon exclusively in men, while women kept stable or declining rates throughout life. In Australia [8], men aged 85 years or more showed rates 6–10 times higher than women in the same age, and 2–3 times higher than men in middle age. Similarly, our study verified that men aged older than 80 years presented rates 2.67 times higher than the male average, and the risk ratio for sex is 8.2/1 in this age range. Retirement and affective rigidity may worsen the feeling of uselessness in men facing the loss of the role of provider [15–17]. Marriage plays a more powerful protective role in men, to whom the death of the partner is a more salient stressor [13].

About 75% of the countries in the world register the highest suicide female rates among the elderly, although the majority of Latin American countries showed highest rates for women between 15 and 29 years [14]. Previous studies showed that Brazil was different from both these groups, presenting the highest risk in the middle age, similarly to Australia and countries of Occidental Europe or Anglo-Saxon America.

Australian [8] and white North American [9] historical series showed highest female suicide rates between 35 and 54 and 40–60 years, respectively. Brazilian's largest city also verified an increase of suicide rate in women aged 45–64 years between 1996 and 2009, surpassing elderly women's rate [10]. Such findings raise the issue of possible association with an increase in depression in this population. A large meta-analysis [18] verified a twofold risk for the development of clinically significant depressive symptoms in perimenopause as compared to premenopausal women.

Suicide is the leading cause of death between 20 and 49 years in men in the United Kingdom and Wales [19]. We verified that the highest increase in suicide estimates in

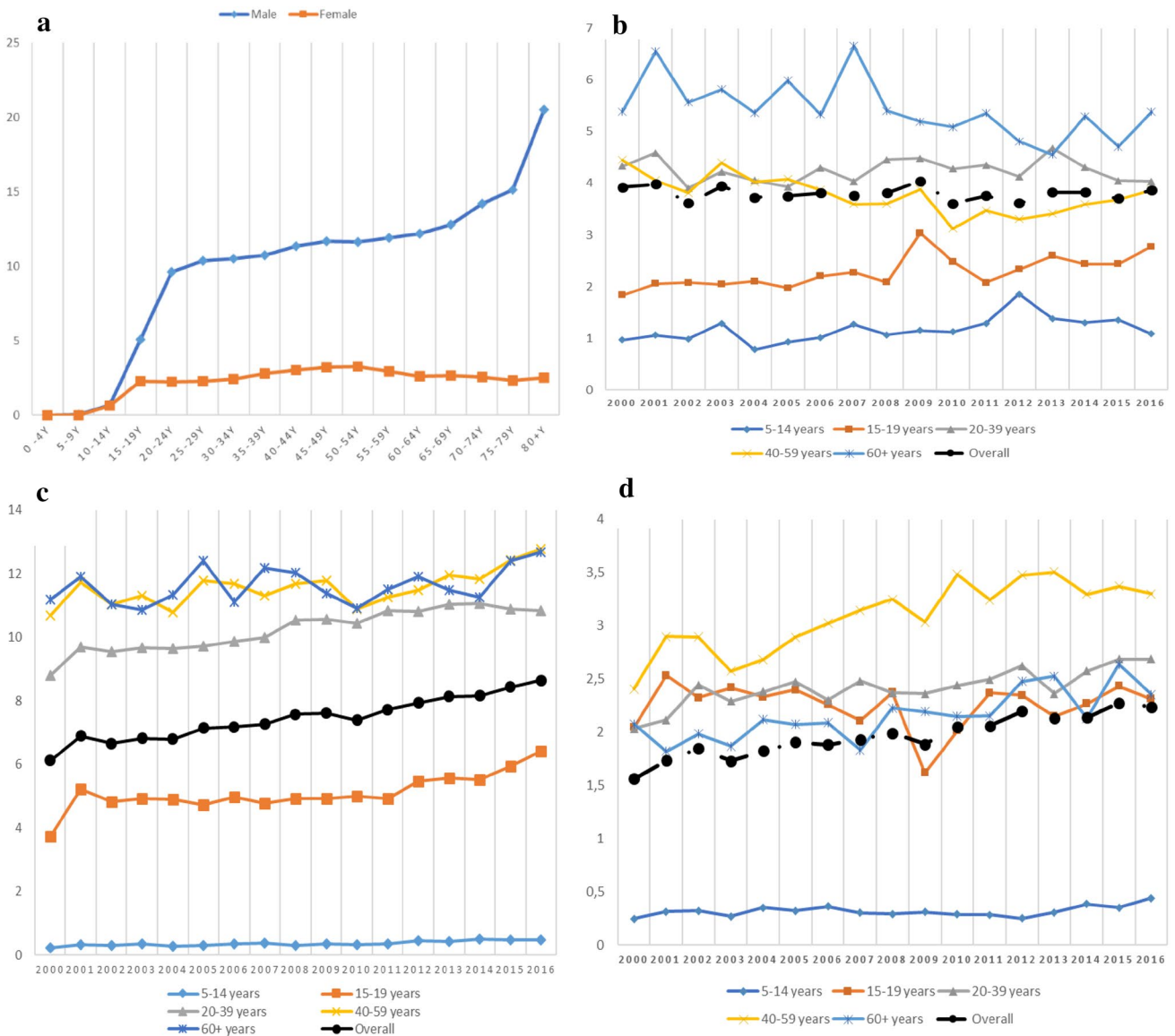


Fig. 1 **a** Suicide rates stratified for sex and age group in Brazil between 2000 and 2016 ($n=156,292$), DATASUS; **b** trends in male to female risk ratio between 2000 and 2016. **c** Male age stratified

suicide rates between 2000 and 2016; **d** female age stratified suicide rates between 2000 and 2016

men occurred in the age range of 20–39 years. Similar findings were verified by Bando et al. [10] that demonstrated an increase in the suicide rate in men aged 25–44 years. Some possible reasons for this finding include reduced religious support [20], increase in the number of divorces [21], higher proportion of young people living with stepfather/stepmother or single parents [22], higher unemployment rates [23], and substance abuse [21]. In addition, WHO [14] shows that low- and middle-income countries have higher suicide rates among young adults than developed countries. Poverty seems to especially affect young people through lack of perspective, family adversity, exposure to stressful events, and reduced access to education

[24]. On the other hand, a study conducted in Australia found a reduction in the suicide rate in younger men, possibly as a consequence of their available suicide prevention strategies [8]. It is worth mentioning that this pattern is more evident in developed countries. In Brazil, this pattern was especially evident in the Southeast and did not occur in the North. This could suggest association with income and/or urbanization.

Among the limitations of this report, the data on suicide mortality were obtained from the database of the SIM/DATASUS, limiting the evaluation of important variables that may be associated with the outcome, such as diagnosis of psychiatric disorders, terminal diseases, medical

treatment, lifetime suicide attempts and family psychiatric history. Additionally, there is the possibility of underreporting of cases, presently not examined in the Brazilian registry. Nevertheless, the SIM/DATASUS database is nationally recognized and widely used in epidemiological studies since it includes cases of suicide from the whole country.

Brazil is one of the few countries in the world where suicide rates continue to increase [14]. These results highlight points that still need to be studied, such as the highest suicide cumulative incidence proportion in the elderly male population. Furthermore, reasons for the increase over time in suicide incidence proportion in men in the age range of 20–49 years and in women between 35 and 64 years remain undefined.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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