



Suicide in historic cities of a Brazilian state

Suicídio em cidades históricas de um estado brasileiro

Suicidio en ciudades históricas de un estado brasileño

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Objective: to analyze the suicide rate in historical regions of Minas Gerais, Brazil. **Methods:** epidemiological study conducted in five historical regions of a Brazilian state. The data used were extracted from the Information Department of the National Health System. **Results:** the Historical Regions of Demonstrations and Wealth presented higher suicide rates when compared to the state's rate. In 11 of the 15 years analyzed, the Region of Wealth had rates higher than that of Minas Gerais. Regarding age group, average levels of suicide were found in the age group 20-59 years in 14 years studied. We also identified higher suicide rates among men in the Historical Regions. The most used methods in the Historical Regions were hanging, strangulation and suffocation. **Conclusion:** the distribution of suicide cases has enabled to understand the epidemiological characteristics of suicide in the Historical Regions of Minas Gerais during the period analyzed.

Descriptors: Suicide; Violence; Epidemiologic Studies; Mortality Rate.

Objetivo: analisar a taxa de suicídio em regiões históricas de Minas Gerais, Brasil. **Métodos:** estudo epidemiológico realizado em 5 regiões históricas de um estado brasileiro. Os dados utilizados foram extraídos do Departamento de Informática do Sistema Único de Saúde. **Resultados:** as Regiões Históricas das Manifestações e Riquezas apresentaram maiores taxas de suicídio quando comparado com a taxa do Estado. Em 11 dos 15 anos analisados, a Região das Riquezas apresentou taxa maior que a de Minas Gerais. Em relação a faixa etária constatou-se níveis médios de suicídio entre 20 e 59 anos em 14 anos estudados. Também se identificaram maiores taxas de suicídio de homens nas Regiões Históricas. Os meios de perpetração mais utilizados nas Regiões Históricas foram enforcamento, estrangulamento e sufocação. **Conclusão:** a distribuição dos casos de suicídio possibilitou conhecer as características epidemiológicas do suicídio nas Regiões Históricas de Minas Gerais durante o período analisado.

Descritores: Suicídio; Violência; Estudos Epidemiológicos; Coeficiente de Mortalidade.

Objetivo: analizar la tasa de suicidios en regiones históricas de Minas Gerais, Brasil. **Métodos:** estudio epidemiológico en cinco regiones históricas de un estado brasileño. Datos extraídos del Departamento Informática del Sistema de Salud. **Resultados:** las regiones históricas de las Manifestaciones y Riqueza presentaron tasas más altas de suicidio en comparación con la tasa estatal. En 11 de los 15 años analizados, la Región de las Riquezas presentó tasa superior a la de Minas Gerais. En cuanto al grupo de edad, se encontraron los niveles promedio de suicidios entre 20 y 59 años en 14 años estudiados. También se identificaron tasa de suicidios más altas en hombres en las Regiones Históricas. Los medios de perpetración más utilizados en las Regiones Históricas fueron colgando, estrangulamiento y sofocación. **Conclusión:** la distribución de los casos de suicidio permitió entender las características epidemiológicas del suicidio en las Regiones Históricas de Minas Gerais en el período analizado.

Descritores: Suicidio; Violencia; Estudios Epidemiológicos; Tasa de Mortalidad.

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Introduction

Throughout the world, there are 804,000 deaths due to suicide every year and it is estimated that every 40 seconds someone takes their own life. Global data shows that self-murder is the second leading cause of death among 15-29 year olds worldwide, drawing attention to the occurrence of this disease in the young population. Therefore, given its magnitude, global epidemiological data indicate this injury as a major public health problem. It is known that behind each committed suicide, there are even more attempts, and that mortality from this problem is considered preventable⁽¹⁾.

Despite the possibility of prevention, it is noticed that health services pay little attention to this problem, often trivializing the wish to die. Nevertheless, it is known that every suicidal behavior has a diagnosable mental disorder, thus requiring the health systems' attention to this problem⁽¹⁾.

In Brazil, there were 152,013 deaths from external causes in 2012, of which 6.8% (10,321) were due to voluntary self-harm, representing a rate of 5 deaths per 100,000 inhabitants in the country⁽²⁾, which according to the coefficients set by the World Health Organization is considered low. When comparing the Brazilian regions, only the Central-West and South regions presented average rates of 6 and 8 deaths per 100,000 inhabitants respectively. The other regions have rates considered low, with 4 per 100,000 in the North and Northeast regions, and the Southeast with the same national rate⁽²⁾.

By analyzing the state of Minas Gerais, which accounted for 1,264 deaths from self-murder in the same year, characterizing an 8.9 percentage and rate higher than the national, with 6 deaths per 100,000 inhabitants⁽²⁾. From 1996 to 2007, there were 123,986 deaths from external causes in the state, of which 7.6% resulted from self-murder. As for the period from 2006 to 2009, there was an 8.5 percentage from the 49,466 deaths from external causes⁽³⁻⁴⁾.

Males present higher mortality from suicide

given the choice of more lethal methods in this group. In adolescence, literature reveals a predominance of hospitalizations among women and deaths among men, with the prevalence of self-poisoning in females and hanging and handgun discharge in males⁽⁵⁾.

It is noteworthy the presence of suicidal behavior among young people, which despite considered low is relevant with regard to the number of deaths. Between 1980 and 2002, there were 2,121 deaths from this injury in Minas Gerais. When analyzing hospitalizations between 1998 and 2003, we found 14,443 cases in the National Health System, of which 16.2% belong to the age group 10-19 years⁽⁵⁾. The increasing suicide rates in these groups have constituted a global trend⁽⁶⁾. Considering the young victims of this problem and all the years of potential life lost, since they cease to be economically productive for the Minas state, we highlight the resulting economic losses and emphasize the psychological and social consequences from the number of deaths. When thinking about a scenario of preventable deaths, these factors draw attention.

Descriptive and retrospective epidemiological study based on secondary data on deaths of residents in Minas Gerais, between 2006 and 2009, registered in the Mortality Information System, showing that the state has an average suicide rate, but with an irregular distribution among macro-regions. There is a higher incidence of suicide among men and higher concentration of these rates for both genders in the West, Northwest, and South Triangle of the state. People aged 20-49 years accounted for 67.4% of all suicides in the state. Hanging is the most common method for committing suicide in all state macro-regions. The distribution of suicide cases enabled to identify the risk areas in the macro-regions of Minas Gerais⁽⁷⁾.

Suicidal behavior constitutes a preventable act of violence and given the abovementioned magnitude, it highlights the need for knowledge of health professionals about the theme. Nursing, as a profession with significant performance in all health

care levels (promotion, prevention, and assistance), plays an important role in this context, being imperative to know the characteristics of this injury as well as its specificities to act in order to avoid it.

For this purpose, it is worth highlighting the importance of knowing the epidemiological characteristics of suicide deaths in the historical cities of Minas Gerais. Therefore, this investigation aimed to analyze the suicide rates and identify the methods used in the historical regions of that state from 1997 to 2011.

Method

Descriptive and retrospective epidemiological study based on secondary data, comprising the deaths from suicide of residents from Minas Gerais, between 1997 and 2011, registered in the Mortality Information System through the Information Department of the National Health System. This department has information about the mortality data since 1996, but we chose to exclude this year because some municipalities were not yet emancipated at that time, which would compromise data analysis. Data collection occurred from February to April 2014. Based on the regional analysis of the events, the knowledge allows implementing actions and evaluating interventions aimed at the prevention, control of health injuries, and establishment of public policies in the health area⁽⁸⁾.

The state of Minas Gerais, located in the Southeast Region of Brazil, has 853 municipalities and is divided into 5 Historical Regions: Region of Arts (Cataguases, Mariana, Ouro Preto, Congonhas, Brumadinho, Diogo de Vasconcelos, Itabirito, and Ouro Branco), Region of Demonstrations (São Thomé das Letras, São João del Rei, Itapeçerica, Campanha, Baependi, Prados, and Tiradentes), Region of Traditions (Pitangui, Lagoa Santa, Sabará, Santa Luzia, and Caeté), Region of Wealth (Catas Altas, Santa Bárbara, Nova Era, São Gonçalo do Rio Abaixo, Bom Jesus do Amparo, Barão de Cocais, and Itabira), and

Region of Stories (Januária, Paracatu, Diamantina, Conceição do Mato Dentro, and Serro).

To calculate the Mortality Rate for the state Historical Regions, the following categories were used: Specific Mortality Rate (total number of deaths divided by the total population $\times 10^5$), Mortality Rate by Gender (number of deaths of one gender divided by the population from this same gender $\times 10^5$), and Mortality Rate by Age (number of deaths of certain age group divided by the population of this group $\times 10^5$).

Age groups were divided into three major groups: 10-19 years; 20-59 years; and 60 years and older. For these calculations, we used the categories X60 to X84 from the tenth revision of the International Classification of Diseases (ICD-10), which includes all diagnosis of intentional self-harm or self-poisoning, suicide (attempted)⁽⁹⁾. Mortality rates were obtained from the mortality statistics published by the Information Department of the National Health System of the Ministry of Health⁽²⁾.

The research took place in compliance with Resolution No. 466/2012 of the National Health Council, and the Ethics Committee for Research Involving Human Subjects of the Central West Campus Dona Lindu approved the project under Protocol No. 300,666/2013.

Results

From 1997 to 2011, there were 1,599,659 deaths in Minas Gerais, with 10.4% from external causes (166,022). Among the 166,022 deaths resulting from external causes, we identified 8.0% due to suicide, representing 13,378 deaths. Of these, 6.2% (832 deaths) occurred in the state historical regions. The Region of Traditions accounted for 24.5% of all suicides (204 deaths), followed by the Region of Arts (20.9%), of Wealth (20.8%), of Stories (17.2%), and of Demonstrations (16.6%). It was verified that among the 32 municipalities of the historical regions of Minas Gerais, the city of Itabira leads the list of absolute numbers, with 109 deaths (13.1%) from self-murder,

followed by Santa Luzia (10%), Paracatu (8.7%), São João Del Rei (8.5%), and Sabará (6.7%). Deaths from suicide of these five cities combined represent 47.0% of total suicides of the Historical Regions (391 deaths). Among the municipalities of the historical regions of Minas Gerais, only Tiradentes (Region of Demonstrations), with 3.1% of the total population, did not had any record of suicide in the period.

In the 15 years studied, from 1997 to 2011, we observed that suicide mortality rates found in the state characterize average levels in eight years (2003 and 2005-2011), according to the World Health Organization (average: between 5 and 15/100,000 inhabitants). When analyzing the rates at the Historical Regions, it was verified an average level in 2006 and 2010. When specifically evaluating the Region of Wealth, it presented average suicide levels in 12 years, nine years in the Region of Demonstrations, and four

years in the Region of Stories. Results revealed that the Historical Regions presented higher suicide rates in 1998, 1999, 2000, and 2006, when compared to the state rate.

In 11 of the 15 years analyzed, the Region of Wealth had higher rates than that of Minas Gerais, followed by the Region of Demonstrations that showed the highest rate in nine years of investigation. During the study period, the Regions of Arts and of Traditions presented low suicide rates (less than 5/100,000 inhabitants.). When specifying the regions, we identified higher rates than the state in the Region of Wealth (1997-2000, 2002-2007, 2010, and 2011), of Demonstrations (1997, 2002-2006, 2008, 2010, and 2011), of Arts (1997, 1999, and 2000), of Stories (2002, 2006, and 2010), and of Traditions (1998 and 1999) (Table 1).

Table 1 - Suicide mortality rate per 100,000 inhabitants

Year	Minas Gerais	Historical Regions	Region of				
			Arts	Demonstrations	Traditions	Wealth	Stories
1997	3.8	3.5	4.0	6.1	2.0	6.1	1.4
1998	3.5	3.5	2.0	2.0	4.7	6.0	2.7
1999	2.9	3.1	3.9	1.3	3.3	5.4	0.9
2000	3.4	3.8	3.5	2.0	3.0	6.1	4.9
2001	4.4	2.8	2.5	3.3	2.2	3.3	3.6
2002	4.4	4.3	3.1	5.9	4.1	5.4	4.4
2003	5.1	4.3	3.6	7.8	3.5	5.9	3.1
2004	4.8	4.8	3.6	11.6	3.0	5.8	4.4
2005	5.2	4.1	2.9	7.6	2.6	7.8	3.0
2006	5.2	5.4	4.0	9.5	3.2	6.1	8.2
2007	5.2	4.0	4.0	4.4	2.3	6.6	5.1
2008	5.3	4.2	3.4	6.8	4.1	3.9	4.2
2009	5.6	4.1	4.7	5.5	2.5	4.9	4.6
2010	5.6	5.1	2.8	6.8	4.9	7.4	6.0
2011	6.4	4.9	3.8	7.4	2.4	9.2	5.5

Men constituted 81.9% of all suicides in the state Historical Regions from 1997 to 2011. The ratio of suicide rates in the Historical Regions between men and women indicates greater proportion in 1998 (9:1) and lower in 2008 (2:1). During the study period, the suicide rate by gender in the state and

Historical Regions presented low suicide level, less than 5/100,000. It was observed that the Historical Regions had higher rates of self-murder among women in 2002 and 2008, and presented higher rates among men in 1998-2000, 2004, 2006, and 2010, compared to that of Minas Gerais state (Table 2).

Table 2 - Suicide mortality rate by gender per 100,000 inhabitants

Year	Females		Males		Ratio	
	Minas Gerais	Historical Regions	Minas Gerais	Historical Regions	Minas Gerais	Historical Regions
1997	0.7	0.7	3.1	2.9	4.2	4.3
1998	0.7	0.3	2.8	3.2	3.9	9.8
1999	0.6	0.3	2.4	2.8	4.2	8.4
2000	0.6	0.6	2.7	3.2	4.4	5.7
2001	0.9	0.4	3.5	2.4	3.8	6.2
2002	1.0	1.2	3.4	3.1	3.5	2.7
2003	1.0	0.5	4.1	3.9	4.3	8.6
2004	1.0	0.8	3.8	4.0	3.6	4.8
2005	1.1	0.7	4.1	3.4	3.6	5.3
2006	1.1	0.9	4.2	4.5	3.9	5.3
2007	1.1	0.8	4.1	3.3	3.8	4.2
2008	1.1	1.3	4.2	2.9	3.6	2.3
2009	1.2	1.0	4.4	3.1	3.6	3.2
2010	1.2	0.6	4.4	4.5	3.6	8.0
2011	1.4	1.2	4.9	3.7	3.4	3.1

According to age group, there were 13,342 deaths from suicide in the age groups 10-19 years, 20-59, and 60 and older, one death occurred among 5-9 year olds, and 35 had unknown age. It was verified that suicides in the Historical Regions among people 10-19 years, 20-59 years, and 60 years and older accounted for 7.3%, 81.0%, and 11.7% of the total suicides, respectively. According to the World Health Organization, the rate found in the state of Minas Gerais and the Historical Regions for the age group 10-19 years from 1997 to 2011 is considered low. Among 20-59 year olds were found average levels of suicide in 14 years of the study in the state, except in 1999, and in 11 years in the Historical Regions, except in 1999, 2001, and 2007-2009. The age group 60 years and older had average levels of suicide in the state in

12 years of study except in 1997, 1999, and 2000, and in the Historical Regions in 2003, 2006, and 2007. It was noted that the Historical Regions presented higher suicide rates in six years in the age group 10-19 years, five years in 20-59 years, and two years among people aged 60 and older, compared with the rates of Minas Gerais state (Table 3).

As for the methods used, it was observed in Historical Regions that 49.0% of deaths from suicide were classified as hanging, strangulation and suffocation (X70), 17.8% as intentional self-poisoning (X60 to X69), and 13.3% as self-harm by handgun discharge (X72 to X74). These categories presented the highest prevalence in the state and together comprised 80.2% of the occurrences in the Historical Regions (Table 4).

Table 3 - Suicide mortality rate by age group per 100,000 inhabitants

Year	Minas Gerais*	Historical Regions*	Minas Gerais	Historical Regions	Minas Gerais	Historical Regions
	10-19	10-19	20-59	20-59	≥ 60 years	≥ 60 years
1997	1.7	1.5	6.0	5.9	4.4	3.3
1998	1.3	0.4	5.3	7.0	5.6	1.1
1999	1.5	2.6	4.5	4.9	3.9	1.1
2000	1.1	3.0	5.5	6.0	3.1	1.0
2001	2.0	1.1	6.7	4.0	5.5	3.8
2002	1.7	2.2	6.7	7.0	5.7	4.7
2003	2.2	1.1	7.8	6.6	6.8	8.3
2004	2.0	1.8	7.6	8.0	5.2	4.6
2005	1.5	0.7	8.1	7.0	7.0	4.4
2006	1.8	2.1	8.2	8.0	6.3	8.8
2007	2.1	1.2	7.5	6.0	6.3	5.9
2008	2.0	2.4	7.7	6.3	5.9	2.9
2009	1.4	1.2	8.2	6.0	6.7	4.1
2010	1.6	2.0	8.2	8.0	5.4	2.0
2011	2.7	1.2	8.8	7.0	7.2	4.0

Table 4 - Percentage distribution of suicide mortality rate according to ICD-10 categories

ICD-10 Category	Historical Regions
	n (%)
Intentional self-poisoning (X60 to X69)	148 (17.8)
Intentional self-harm by hanging, strangulation and suffocation (X70)	408 (49.0)
Intentional self-harm by drowning and submersion (X71)	25 (3.0)
Intentional self-harm by handgun discharge (X72 a X74)	111 (13.3)
Intentional self-harm by explosive material (X75)	1 (0.1)
Intentional self-harm by smoke, fire and flames (X76)	24 (2.9)
Intentional self-harm by sharp and blunt object (X78 and X79)	29 (3.5)
Intentional self-harm by jumping from a high place (X80)	24 (2.9)
Intentional self-harm by jumping or lying before moving object (X81)	3 (0.4)
Intentional self-harm by crashing of motor vehicle (X82)	8 (1.0)
Intentional self-harm by other specified means (X83)	1 (0.1)
Intentional self-harm by unspecified means (X84)	50 (6.0)
Total	832 (100.0)

Discussion

Even though the Historical Regions present average levels of suicide in 2006 and 2010, these rates were irregularly distributed among the various state Historical Regions. The highest rate of self-inflicted violence of the period was verified in the Region of Demonstrations in 2004 with 11.6 deaths per 100,000 inhabitants, while Minas Gerais, in the same year, presented a rate of 4.8/100,000. Suicide involves a complex set of factors that interact throughout a person's life, varied and uniquely. This complexity belongs to genetic, biological, psychological, social, historical and cultural factors known as triggers that blend with others that apparently stimulated the outcome⁽¹⁰⁾. Exploratory ecological study conducted in Recife shows that neighborhoods in the tourist region concentrate the highest risk of violence inflicted, specifically homicide⁽¹¹⁾.

In 11 of the 15 years analyzed, the Region of Wealth presented rates higher than that of Minas Gerais, followed by the Region of Demonstrations with higher rates in nine of the years studied. In the Region of Wealth, all municipalities are located

in the Central State macro-region, and in the Region of Demonstrations, the municipalities are part of the Central South and South State macro-regions. Focusing on the spatial aspects of a data distribution is essential for describing patterns of spatial association. This is particularly important when it comes to suicide, because there is what the literature calls “contagion effect”, in which the act of taking one’s own life, when triggered by an individual, can affect the behavior of others under the same psychological and socioeconomic conditions⁽⁷⁾. State macro-regions have different characteristics as regards the population distribution, population density, and socioeconomic characteristics⁽⁷⁾. Regional inequalities affect the health area, resulting in higher concentration of services, equipment, and specialized human resources. The South, Center, and Minas Triangle regions stand out for their greater economic development and higher concentration of services, equipment, and specialized human resources⁽¹²⁾.

The man/woman relationship is a well-documented aspect of suicide epidemiology. These results also highlight higher incidence of the phenomenon among men in the Historical Regions, which are similar to those found in other national studies, such as those developed in the regions and capital cities of Brazil (1980 and 2006), in the State of Espírito Santo (1980-2006), and in the State of Minas Gerais⁽⁶⁻¹³⁾. Several factors can explain this gender difference. There are higher rates of completed suicide among men than in women, since man usually seek a drastic solution in the extreme act⁽¹⁴⁾.

People aged 20-59 years presented average levels of suicide in the Historical Regions in 11 years of the study. Epidemiological analysis of suicide rates registered between 1980 and 2006 in Brazil shows that suicide rates had greater increase among individuals aged 20-59 years (30.0%)⁽⁶⁾. Such findings reflect a global trend of increased suicide rates among young people, which became the main risk group in a third of countries⁽¹³⁾.

Regarding the most commonly used methods in the Historical Regions, hanging was the most

frequent, in 49.0% of cases. Similar data to that found in the literature, both nationally and statewide, which identified hanging as the most widely used method of suicide^(6,13). The methods used to commit suicide depend on specific local customs, as well as the different historical contexts⁽¹⁵⁾. In this context, the prevalence of hanging can be explained because it characterizes a simple and easy to achieve method^(6,13).

Conclusion

This study enabled to identify the epidemiological characteristics by analyzing the suicide rates and the methods used in the Historical Regions of Minas Gerais compared to the state rate over the analysis period.

In some of the years, it was noticed that the suicide rate of the regions analyzed exceeded the statewide rate, sometimes reaching more than double of that, as occurred in 2004 in the Region of Demonstrations. This fact reveals the need for a wide and more detailed investigation on this population, taking into account their habits and lifestyle that may influence these rates, considered relatively high in relation to the state.

This research allowed verifying the predominance of males among the cases of suicide and of hanging as the method of choice, corroborating data in the literature.

Regarding the adult age group with the highest number of average suicide rates in both the state and the Historical Regions, it points out the years of potential life lost, focusing on the need for attention to this issue and the psychological comorbidities that may be associated with it, in order to avoid this harm to the population.

Therefore, it is worth highlighting the importance of health professionals in preventing this problem, requiring the knowledge about the specificities and characteristics of the target population of this assistance. Thus, it was identified the need for further research on the topic by health professionals, especially nurses, in order to understand the suicidal

behavior, an issue very common in the health scenario and often with overlooked factors within the very services.

This study presented limitations concerning the few references in the literature on suicide in cities with tourist and historical characteristics, indicating the need for greater scientific contribution on the suicide approach in these contexts. It is also noteworthy that, since this is a secondary data analysis, there might be underreporting of the information, as the researcher was not responsible for its collection.

Collaborations

Simões BF and Cantão L contributed to the data collection and analysis, drafting of the article, and final approval of the version to be published. Botti NCL contributed to the design, analysis, drafting, and critical review of the article.

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