

Suicide mortality in people aged 60 and over in Brazilian municipalities between 1996 and 2007

Mortalidade por suicídio em pessoas com 60 anos ou mais
nos municípios brasileiros no período de 1996 a 2007

Liana Wernersbach Pinto¹
Simone Gonçalves de Assis¹
Thiago de Oliveira Pires¹

Abstract *The scope of this article was to assess the nationwide scale of suicides among the elderly. An overview of suicides in Brazilian municipalities was conducted to identify municipalities with the highest incidence of suicide. Data from the Mortality Information System (SIM/MS) were used for the period from 1996 to 2007, using the events with codes X60 through X84 and Y87.0 of the 10th review of the International Classification of Diseases (CID-10). The rates were standardized according to the criteria of the WHO. It was discovered that 3,039 Brazilian municipalities have records of suicide cases of people aged 60 and more in at least one of the triennia analyzed (54.6% of all the municipalities). A total of 29.3% of those municipalities were in the Southern Region, 29.6% in the Southeast and 27.5% in the Northeast. The State of Rio Grande do Sul has the highest percentage of municipalities with suicide cases in the four triennia (27.3%), followed by the States of São Paulo (17.4%) and Santa Catarina (9.1%). Between the first and the final triennium, it was observed that there was a reduction in 32 of the 51 municipalities with higher rates. The mean ratio of male/female deaths was 2.8 male deaths for every female death. The main method used is hanging, strangulation and suffocation among both men (58.2%) and women (49.8%).*

Key words *Suicide, The elderly, Mortality*

Resumo *Este trabalho teve como objetivo conhecer a magnitude do suicídio em idosos em nível nacional. Foi feita uma descrição da mortalidade por suicídio nos municípios brasileiros, visando estabelecer aqueles de maior frequência do evento. Empregou-se dados do Sistema de Informação sobre Mortalidade (SIM/MS) para o período de 1996 a 2007 (triênios), sendo utilizados os eventos com códigos X60 a X84 e Y87.0 da 10^a revisão da Classificação Internacional de Doenças (CID-10). As taxas foram padronizadas segundo critérios da OMS. Verificou-se que 3.039 municípios brasileiros têm registros de casos de suicídio de pessoas com 60 anos ou mais em pelo menos um dos triênios analisados (54,6% do total de municípios). Um total de 29,3% de municípios se localiza na região Sul, 29,6% na região Sudeste e 27,5% na região Nordeste. O Rio Grande do Sul concentra o maior percentual de municípios com casos nos quatro triênios (27,3%), sendo seguido pelos estados de São Paulo (17,4%) e Santa Catarina (9,1%). Quanto à evolução temporal, observou-se redução das taxas do triênio inicial para o triênio final em 32 dos 51 municípios com taxas mais elevadas em todo o período de análise. A razão média de óbitos homem/mulher foi de 2,8 mortes masculinas para cada morte feminina. O principal meio empregado é o enforcamento, estrangulamento e sufocação tanto entre homens (58,2%) quanto entre mulheres (49,8%).*

Palavras-chave *Suicídio, Idosos, Mortalidade*

¹Centro Latino-Americano de Estudos de Violência e Saúde Jorge Careli, Escola Nacional de Saúde Pública, Fundação Oswaldo Cruz. Avenida Brasil 4.036/700, Manguinhos. 21040-361 Rio de Janeiro RJ. lianawp@fiocruz.br

Introduction

According to the World Health Organization (WHO), approximately one million people die every year as a result of suicide, which is equivalent to one person dying every forty seconds, or 16 deaths per 100,000 inhabitants¹. The phenomenon's origins involve psychological, social, biological, cultural and environmental aspects¹.

The following groups of individuals are considered at-risk populations for suicide: young men (aged 15-49); the elderly, especially men; people suffering from mental diseases; people with a history of abuse of alcohol and drugs; and prisoners².

Suicide is a complex phenomenon, with multiple causes, and whose occurrence cannot be attributed to one single characteristic or stressor event³. Several studies attempted to identify risk factors and methods of protection against suicide^{4,5}. The analysis of these studies show that causes vary depending on the sex and age group analyzed. For the elderly population, risk factors include the decrease of social support and isolation, mourning, alcohol abuse, loss of independence, depression, and the existence of diseases³. According to Conwell *et al.*⁵, risk factors associated to the elderly also depend on age group. Therefore, factors associated to individuals aged around 60 are not the same as those associated with individuals aged circa 85⁵.

Another important aspect about suicide among the elderly refers to the ratio between attempts and the actual death. Whereas in other age groups this number varies between 100 and 200 attempts for each death, among elderly individuals it is of 2 to 3 attempts for every accomplished act. Thus, the existence of previous attempts is an important predictive factor of suicide among the elderly⁴.

The requirements for a death to be considered suicide vary from country to country. There are nations that require external evidence of the intention to commit the act - such as a note, for instance - and there are places where a trial is carried out to determine the intentions. Suicide is considered illegal in India. However, in most countries the police and medical doctors are responsible for privately declaring whether a certain death was the result of suicide. Differences between countries in terms of whether a death is considered suicide (and also in terms of the way the fact is recorded) create a substantial underestimation in the statistics of death by suicide³.

A recent study by the WHO rated 106 countries based on the completeness, coverage and

quality of information about vital statistics. Brazil was classified in the medium-quality category, along with countries such as Belgium, Austria, Uruguay, Italy and the Netherlands, among others. Regional differences between the countries are seldom discussed in scientific literature⁶.

In Brazil, several studies indicate the presence of problems related to both the quantity and the quality of death records obtained from the national databases of health information^{7,8}. One could suspect that suicide, due to all the factors related to it (such as religious and financial aspects - life insurance is not redeemable in case of suicide), has even higher rates of subnotification than deaths associated to other external causes. According to Mello-Jorge *et al.*⁸, 67.2% of deaths due to unclear causes occur among individuals aged 60 years or above.

Suicide methods most commonly used in several countries are hanging, strangulation and suffocation. In some countries, there is a predominance of firearms (United States) and intoxication by pesticides (China). Men tend to use more aggressive methods¹. Studies show that the elderly tend to use more violent and lethal methods, such as hanging and firearms (the latter being especially common among men) in different cultural contexts^{4,9,10}.

Expanding the research about suicide among the elderly in Brazil is key to show which Brazilian municipalities have greater occurrence of the phenomenon and which groups are more vulnerable, so that concrete actions can be planned and implemented aiming at these individuals. The fact that the population above age 60 is growing in the world and in Brazil, and raising even more the already high statistics, is yet another aspect that reinforces the importance of investigating suicide among these individuals^{4,5,11}.

The objective of this paper is to nationally assess the magnitude of the problem of suicide among the elderly. With this purpose, it describes suicide mortality in Brazilian municipalities in an attempt to identify where it occurs more frequently.

Materials and Methods

This study is part of a project called "Is it possible to prevent the anticipation of the end? Suicide among the elderly in Brazil and possibilities of action by the health sector", whose goal is to expand the knowledge about suicide among the elderly in the country, a serious public health problem that has no reference studies in national lit-

erature. The research was approved by the Committee of Ethics in Research of the National School of Public Health / Oswaldo Cruz Foundation.

This is a descriptive study of suicide mortality among individuals aged sixty or more in Brazilian municipalities between 1996 and 2007. It relies on data from the Mortality Data System (SIM), Ministry of Health / Department for the Analysis and Tabulation of Data of the Unified Health System (DATASUS) between years 1996 and 2007. This study uses the 10th revision of the International Classification of Diseases, and employs events with codes X60 to X84 and Y87.0, which are: "intentional self-harm" and "sequelae of intentional self-harm". The data were aggregated and analyzed in four trienniums (1996-98, 1999-2001, 2002-04 and 2005-07).

The numerator considered in the mortality rates was the number of deaths by suicide in the triennium, and the denominator was the population estimate supplied by the Fundação Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics - IBGE) for the triennium's middle years (1997, 2000, 2003 and 2006). Rates of mortality by suicide were calculated according to sex. The rates were standardized according to the WHO standard, and a software written in FORTRAN was used¹². The proportional mortality rate according to the method employed (category ICD -10) was also calculated.

In addition to standardized rates, the tables also show: a) the percentual difference between the years of beginning and end of the analysis (D%); b) the quality of vital statistics, measured by calculation of the ratio of deaths due to events with unknown intent. This ratio used as numerator the number of deaths by suicide classified by the ICD-10 under codes Y10 to Y34 (insufficient information available to distinguish between accident, self-harm or aggression) that occurred in each of the periods; the denominator used was the number of deaths due to external causes in the same period.

Since it was impossible for this paper to include the rates of every Brazilian municipality, we selected those with rates above 10/100,000 inhabitants during the entire period analyzed for the characterization of geographic distribution. The analysis of these data occurred by means of absolute and relative frequencies. The difference between the rates of the first and last triennium for the municipalities selected was also calculated (D%).

The applications used in the construction of the database and execution of the analyses were

EXCEL and SPSS 19.0. TabWin 3.6b was used in the construction of the choropleth map.

Results

Between 1996 and 2007, 91,009 deaths by suicide occurred among people aged 10 or above in the country: on average, 7,584 individuals took their lives annually. Out of this total, 14.2% (12,913 deaths) occurred among people aged 60 or above (with an annual average of 1,076 elderly individuals). In general, suicide mortality is higher among men than women, both when considering the population aged 10 and above (79.2% vs. 20.8%) and those aged 60 or above (82.2% vs. 17.8%).

It was found that 3,039 Brazilian municipalities have records of cases of suicide of individuals aged 60 or over in at least one of the trienniums analyzed (54.6% of the total number of municipalities). Among the ones with a registry of deaths of elderly people, 48.1% have cases recorded in only one triennium, 14.0% in three trienniums and 11.9% (362 municipalities) in all four trienniums under study. It was observed that 29.3% of the municipalities with cases between 1996 and 2007 are located in the South, 29.6%, in the Southeast and 27.5% in the Northeast.

Concerning municipalities with a registry of deaths by suicide among people aged 60 or above in the four trienniums of the analysis, (N = 362), 44.5% are located in the South, 30.7% in the Southeast, 13.3% in the Northeast and 9.1% in the Midwest. Only 2.5% of municipalities with cases in the four trienniums are from the North. In terms of federation units, Rio Grande do Sul had the highest percentage of municipalities with cases in the four trienniums (27.3%), followed by the States of São Paulo (17.4%) and Santa Catarina (9.1%).

Considering only the last triennium of the study (2005-07), 29.8% (1659) Brazilian municipalities had cases of suicide among people aged 60 or over, of which 30.1%, 28.9% and 28.5% were respectively located in the South, Southeast and North of the country.

The distribution of suicide rates among people aged 60 or over through the regions and units of the Federation in the triennium 2005-2007 is shown in Figure 1. The figure indicates a scarcity of municipalities with deaths by suicide in the group under study in the North of the country.

The South and Southeast call attention due to the amount of municipalities with cases of suicide among the elderly in the 2005-2007 triennium.

nium, as shown in Figure 1. We can also observe the clearly higher number of municipalities in the state of Rio Grande do Sul with rates classified in the last interval of the distribution.

2,527 municipalities had no cases between 1996 and 2007. The North, Northeast and Southwest had no cases in respectively 67.7%, 53.5% and 46.0% of their municipalities in the period. 42.5% municipalities of the Midwest had no deaths in the period. The lowest number of municipalities with no cases was found in the South, 25.1%. The distribution per federation unit is itemized in Table 1. It reveals that Amapá, Amazonas, Acre, Maranhão, Tocantins, Roraima, Paraíba and Pará are the states with the highest number of municipalities without cases. Rio Grande do Sul, Rio de Janeiro, Mato Grosso do Sul, Pernambuco and Santa Catarina, on the other hand, were the states with the lowest numbers of municipalities without cases between 1996 and 2007.

Of 362 municipalities with a record of suicide cases in the four trienniums, 299 (82.6%) had rates above 10/100,000 inhabitants during the entire period of the analysis (1996-2007). Table 2 shows rates for 51 municipalities selected among those with rates above 10 deaths per 100,000 inhabitants. It includes municipalities with 24 or more cases in the period of the analysis (in an attempt to overcome the problem created by the effects of the small population on the rates).

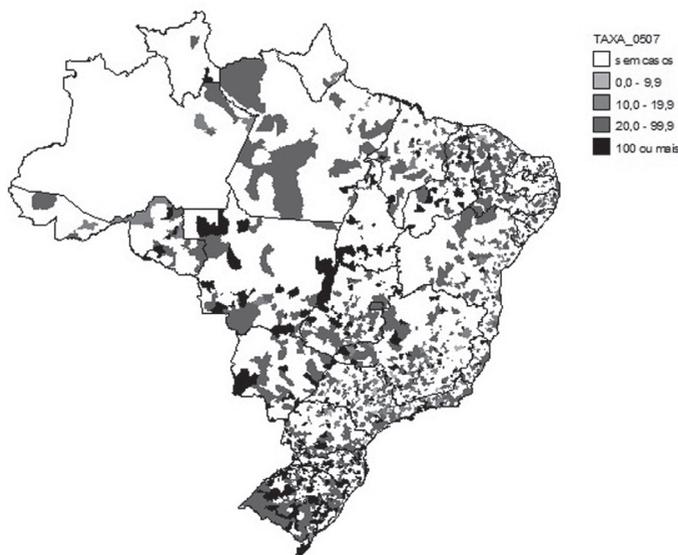


Figure 1. Suicide rates (per 100,000 inhabitants) among people aged 60 or above in Brazilian municipalities, 2005-2007.

Table 2 shows that 24 (47.1%) municipalities with high suicide rates between 1996-2007 are located in the state of Rio Grande do Sul. São Paulo appears on the list with 10 municipalities with rates above 10/100,000 in the four trienniums and number of deaths greater than or equal to 24. Three municipalities of Rio de Janeiro and Santa Catarina are on the list. The table also shows that at the end of the period, 19 municipalities experienced an increase in the rate when compared to the 1996-98 triennium and 32 showed a decrease in the rate when compared to the first triennium of the analysis. When it comes to the average percentage of deaths with unknown intent, a variation between 1.1 and 19.7% was found, with an average of 7.6% and standard deviation of 4.0%. A percentage below 10% was found in 39 of the 51 municipalities listed.

In the 1996-98 triennium, in 15 of the 51 municipalities listed in Table 2 the percentage of deaths classified as unknown lesions was above

Table 1. Percentage of municipalities without cases between 1996 and 2007 by Brazil's federation units (FU) and regions.

Region	FU	%	
North	Rondônia	44,2	
	Acre	77,3	
	Amazonas	80,6	
	Roraima	66,7	
	Pará	65,7	
	Amapá	81,3	
	Tocantins	69,8	
	Maranhão	74,7	
	Northeast	Piauí	62,5
		Ceará	29,9
Rio Grande do Norte		46,7	
Paraíba		66,4	
Pernambuco		27,6	
Alagoas		57,8	
Sergipe		53,3	
Bahia		54,2	
Minas Gerais		57,1	
Southeast		Espírito Santo	28,2
	Rio de Janeiro	18,5	
	São Paulo	37,5	
	Paraná	31,8	
South	Santa Catarina	27,6	
	Rio Grande do Sul	18,1	
	Mato Grosso do Sul	25,6	
Midwest	Mato Grosso	50,4	
	Goias	43,5	
	Brasília	0,0	

Table 2. Suicide mortality among individuals aged 60 or above in municipalities with the highest rates (2005-2007 triennium) and with at least 24 deaths in the period. Brazil, 1996-2007.

FU	Municipality	General population aged 60 or above			
		Rate 1996-98	Rate 2005-07	Δ%	NE
SP	Ribeirão Preto	15,7	12,4	-21,0	9,7
SP	São José do Rio Preto	25,8	13,3	-48,5	8,6
RJ	Duque de Caxias	16,1	13,7	-14,9	8,5
RJ	Petrópolis	45,6	14,4	-68,4	6,2
AM	Manaus	26,0	15,4	-40,8	2,0
PE	Recife	22,4	15,5	-30,8	6,8
SP	Osasco	20,7	15,5	-25,1	9,5
SP	Campinas	11,7	15,8	35,0	12,6
MG	Belo Horizonte	17,3	16,0	-7,5	10,0
SP	Santo André	19,7	17,8	-9,6	9,6
RS	Rio Grande	50,4	18,0	-64,3	11,0
SP	São Paulo	24,4	20,1	-17,6	10,1
SP	São Bernardo do Campo	10,9	20,6	89,0	12,0
SP	Mogi das Cruzes	30,6	21,9	-28,4	8,0
PR	Curitiba	30,8	23,4	-24,0	5,7
SC	Joinville	46,8	24,0	-48,7	1,6
RS	São Leopoldo	61,0	24,1	-60,5	6,4
RS	Canoas	65,9	24,2	-63,3	7,7
DF	Brasília	21,9	24,5	11,9	1,2
RS	Viamão	53,7	25,5	-52,5	9,6
MS	Campo Grande	40,9	25,6	-37,4	4,8
CE	Fortaleza	22,1	27,2	23,1	5,3
RS	Porto Alegre	40,3	27,2	-32,5	4,8
RS	Santa Maria	42,8	27,3	-36,2	19,7
PI	Teresina	44,7	28,2	-36,9	2,7
GO	Goiânia	17,5	28,7	64,0	7,6
SC	Florianópolis	36,5	29,3	-19,7	5,8
RJ	Campos dos Goytacazes	53,9	30,7	-43,0	4,9
SP	Santos	29,3	33,9	15,7	12,7
SC	Blumenau	27,7	35,8	29,2	1,2
SP	Marília	23,9	38,2	59,8	8,8
RS	Novo Hamburgo	97,2	39,1	-59,8	7,2
RS	São Gabriel	105,2	40,0	-62,0	10,8
RS	Gravataí	66,6	43,8	-34,2	5,7
RS	Passo Fundo	45,2	52,1	15,3	6,9
MS	Dourados	83,6	53,9	-35,5	2,2
RS	Pelotas	56,0	56,5	0,9	3,4
RS	Sant'Ana do Livramento	91,3	60,2	-34,1	16,9
RS	Caxias do Sul	33,4	60,8	82,0	1,1
RS	Bagé	59,9	60,9	1,7	7,9
RN	Mossoró	26,7	65,3	144,6	8,5
RS	Taquara	108,0	79,8	-26,1	6,2
RS	Cachoeira do Sul	37,6	82,5	119,4	6,3
RS	Canguçu	174,2	85,7	-50,8	6,1
RS	Santa Cruz do Sul	41,3	105,4	155,2	8,1
RS	Caçapava do Sul	196,7	106,7	-45,8	6,1
RS	Santiago	106,3	111,4	4,8	14,6
RS	São Lourenço do Sul	17,8	138,4	677,5	5,0
RS	Candelária	88,1	147,2	67,1	16,1
RS	Lajeado	191,1	185,6	-2,9	4,4
RS	Venâncio Aires	100,7	242,9	141,2	10,1

Δ% - difference between trienniums $((tx_{05-07} - tx_{96-98})/tx_{96-98}) * 100$; NE - average percentage of deaths due to events with unknown intent (Y10-Y34) in the period 1996-2007.

10%. In 2005-07, although in 15 municipalities the percentage was above 10%, none of the values was above 20% (a fact that had occurred in the first triennium analyzed). During the last triennium, the percentage of unknown lesions was above 15% in only three municipalities, vis-à-vis nine in the first triennium.

Concerning the deaths classified as unknown lesions, in the 1996-98 triennium 22.6% of Brazilian municipalities had percentages considered adequate (below 10%). In 31.6% of municipalities, the numbers in the triennium exceeded 10% (inadequate) and information was not available for 45.9% of municipalities. For the 2005-2007 triennium, the percentage of municipalities classified as adequate (unknown lesions below 10%) increased to 31%. The percentage of inadequate dropped to 26.6% and in 42.5% of the municipalities data were not available.

Table 3 presents the rates of two trienniums for elderly men in forty municipalities selected (highest rates in the 2005-07 period, and twelve or more deaths in the period). Considering the male population, most of the municipalities listed belong to the state of Rio Grande do Sul (75%). It must be mentioned that, due to space constraints, the table does not include all the municipalities that met the mentioned selection criteria for male individuals. In fact, 123 municipalities had rates above 10/100,000 in the four trienniums, and 12 or more cases in the period. Considering the total amount of municipalities that meet the mentioned criteria, the geographic distribution does not suffer any modifications and the state of Rio Grande do Sul continues to lead the ranking with 35.8% of the municipalities of the list, followed by São Paulo (21.1%), Santa Catarina (9.8%) and Paraná (8.9%). As for the quality of information about the deaths of elderly men (Y10-Y34), in 29 municipalities the percentages were below 10%.

Table 3 also shows the rate of suicide for women aged 60 or above in the selected municipalities (those with rates above 10/100,000 in the four trienniums during the period of the analysis). It was also unnecessary to select according to number of deaths, since only thirteen municipalities met the first criteria established. Nine municipalities (69.2%) are in Rio Grande do Sul. Only three municipalities (Pelotas – 21 deaths, Teresina – 15 deaths and Venâncio Aires – 10 deaths) had ten or more deaths during the 1996-2007 period. In only one municipality, the percentage of deaths due to events with unknown intent (Y10-Y34) was above 10%.

As for the methods employed, (Table 4), 56.7% of deaths by suicide that occurred between 1996 and 2007 were classified under category X70 (Intentional self-harm by hanging, choking and suffocation), 13.0% under category X74 (Intentional self-harm by other and unspecified firearm discharge) and 4.8% under X84 (Intentional self-harm by unspecified methods). These were the categories with highest occurrence.

An analysis of the method used according to sex reveals that hanging continues to be the main method employed both by men (58.2%) and women (49.8%), followed, in the case of men, by intentional self-harm by other firearm discharge (14.9%; X74) and, in the case of women, by intentional self-harm by smoke and fire (8.8%; X76). The third most used method by men was intoxication by ingestion of pesticides (4.8%; X68). In the case of women, the third most frequently used method of suicide was jumping from a high place (Table 4).

The male-to-female death ratio was 2.8 men for every woman. However, in 25% of the municipalities these numbers increase to 4 men for every woman. In a small number of locations, this ratio exceeds 6:1.

Discussion

This paper intended to provide data on cases of death by suicide among individuals aged 60 or more in the municipalities of Brazil between 1996 and 2007. In more than half of Brazilian municipalities there were cases of death of elderly individuals by suicide in at least one of the trienniums analyzed, with a special mention to the South as a whole, and to the state of Rio Grande do Sul more specifically. These data allow us to perceive the relevance of the problem for the country, and the unequal epidemiological distribution in place.

Brazil is ranked 73rd in the world for the occurrence of suicide, with rates that are considered low, albeit borderline medium^{1,13}. This fact can be related to the still precarious study about the subject¹⁴, to the subnotification that evidently exists, and to historical, cultural and economic aspects that lie at the base of the epidemiological profile of the country.

The scarcity of scientific publications about this subject starts to change with the publication of several studies specifically focusing on scientific groups such as: people who intentionally ingest pesticides in the Midwest¹⁵; populations with

Table 3. Suicide mortality among elderly individuals of both sexes aged sixty or above and municipalities with highest rates (05-07 triennium). Brazil, 1996-2007.

FU	Municipality	General population aged sixty or above			
		Rate 1996-98	Rate 2005-07	Δ%	NE
Men*					
CE	Tenente Portela	967,4	593,4	-0,4	9,1
SC	Palmitos	849,6	524,7	-0,4	-
RS	Santa Vitória do Palmar	67,3	512,0	6,6	8,9
RS	Venâncio Aires	207,4	476,2	1,3	4,3
RS	Arroio do Meio	181,5	475,2	1,6	2,3
RS	Lajeado	417,2	376,9	-0,1	-
PR	Marechal Cândido Rondon	241,0	305,9	0,3	-
RS	Três Passos	349,9	304,8	-0,1	13,6
SC	São Miguel do Oeste	316,1	284,8	-0,1	1,8
RS	São Sepé	136,3	278,5	1,0	20,0
RS	São Lourenço do Sul	37,5	251,5	5,7	2,9
RS	Santa Cruz do Sul	86,6	241,7	1,8	2,3
RS	Gramado	592,9	235,9	-0,6	6,1
RS	Sapiranga	120,5	234,8	1,0	7,2
RS	Santiago	196,4	226,2	0,2	14,1
RS	Camaquã	117,1	196,6	0,7	2,1
RS	Vacaria	282,3	191,4	-0,3	7,4
RS	Caçapava do Sul	430,8	186,5	-0,6	4,7
RS	Candelária	216,7	185,8	-0,1	15,3
RS	Encruzilhada do Sul	484,9	182,9	-0,6	6,3
RS	Uruguiana	50,8	182,5	2,6	3,6
RS	São Borja	113,0	179,7	0,6	6,3
RS	Taquara	246,1	174,5	-0,3	4,5
CE	Tauá	134,8	173,3	0,3	4,1
RS	Teutônia	318,0	172,3	-0,5	2,4
PR	Campo Largo	131,9	170,3	0,3	6,6
RS	Canguçu	318,2	160,0	-0,5	3,1
RS	Sapucaia do Sul	129,9	159,8	0,2	3,4
RS	Cachoeira do Sul	74,2	157,3	1,1	7,9
SC	Pomerode	716,5	150,7	-0,8	-
RJ	Teresópolis	46,7	142,3	2,1	10,7
RS	Bagé	100,9	132,2	0,3	1,2
RS	Pelotas	102,3	127,7	0,3	7,1
RS	Rosário do Sul	55,5	126,0	1,3	12,5
RS	Caxias do Sul	49,8	121,6	1,4	1,3
SP	Mogi Guaçu	66,3	115,8	0,8	4,3
RS	Passo Fundo	91,4	114,7	0,3	2,9
PR	Francisco Beltrão	40,1	111,3	1,8	0,7
RS	Sant'Ana do Livramento	214,0	110,9	-0,5	14,8
GO	Aparecida de Goiânia	57,2	102,8	0,8	2,0
Women					
RS	Três de Maio	69,0	233,5	2,4	2,1
RS	Agudo	90,2	156,0	0,7	8,6
RS	Venâncio Aires	28,0	68,7	1,5	4,3
CE	Aquiraz	51,5	33,7	-0,4	7,5
RS	Montenegro	39,1	28,7	-0,3	5,7
RS	Santiago	32,2	28,7	-0,1	14,1
MS	Dourados	18,9	28,3	0,5	2,0
RS	Santa Cruz do Sul	16,5	25,9	0,6	2,3
PI	Teresina	13,9	17,5	0,3	2,2
RS	Pelotas	28,6	17,1	-0,4	7,1
SP	Bragança Paulista	17,4	12,3	-0,3	6,3
RS	Bagé	27,3	11,4	-0,6	1,2
RS	São Leopoldo	57,9	10,4	-0,8	4,7

Δ% - difference between trienniums ((tx05-07 - tx96-98)/tx96-98)*100. NE - average percentage of deaths from events with unknown intent (Y10-Y34) in the period 1996-2007. * Municipalities with 12 or more deaths in the period.

Table 4. Suicide mortality among individuals aged 60 or above according to ICD-10 category and sex. Brazil, 1996 to 2007.

ICD-10 category	Men		Women	
	N	%	N	%
X68 Intentional self-poisoning by exposure to pesticides	505	4,8	123	5,4
X69 Intentional self-poisoning by exposure to other and unspecified chemicals and noxious substances	301	2,8	90	3,9
X70 Intentional self-harm by hanging, strangulation and suffocation	6179	58,2	1142	49,8
X71 Intentional self-harm by drowning and submersion	122*	1,1	83	3,6
X72 Intentional self-harm by handgun discharge	385	3,6	29**	1,3
X74 Intentional self-harm by other and unspecified firearm discharge	1578	14,9	103	4,5
X76 Intentional self-harm by smoke, fire and flames	126	1,2	202	8,8
X78 Intentional self-harm by sharp object	241	2,3	46	2,0
X79 Intentional self-harm by blunt object	187	1,8	60	2,6
X80 Intentional self-harm by jumping from a high place	219	2,1	144	6,3
X84 Intentional self-harm by unspecified means	483	4,5	132	5,8
Other categories	292	2,5	139	5,9

Note: * Category X70 occupies the 11th position among men. ** Category X72 occupies the 13th position among women.

a high number of European descendants, especially those located in the South and Southeast¹⁶⁻¹⁸ and indigenous populations¹⁹. There are traditional epidemiological studies carried out in different cities of Brazil that include distribution by sex, age, suicide method and other variables²⁰⁻²². This material, however, deals with a broad age range, which again reiterates the scarcity of studies about suicide among elderly individuals in Brazil. After the 2000's, in general, there have been a growing number of articles about the subject, even though their focus continues to be the description of suicide according to traditional epidemiological variables.

Therefore, knowing the geographic and temporal distribution of deaths by suicide in Brazilian municipalities and attempting to correlate these data with the context where they are found is fundamental. Such knowledge would allow for a more appropriate definition of preventative actions, since tracking the entire elderly population is impracticable and not recommended due to the low number of cases. Tracking could be indicated to specific groups, based on knowledge of predisposing factors⁴.

The results of the men/women ratio showed a predominance of deaths among men, reaching 4:1 in 25% of municipalities, a finding that verifies literature data⁴. Szanto *et al.*²³ inform that suicide among men is two to four times more frequent than among women in adult life, reaching a ratio of 8-12:1 at around age 75.

Hanging, strangulation and suffocation were the predominant methods used to commit sui-

cide. The use of firearms was also frequent. The unavailability of means is considered an important factor in reducing the number of deaths, which is the case with the civil disarmament policies. In that regard, preventing access to means that facilitate hanging (and similar acts) represents a challenge to public health, given their immediate availability³.

The broad variation in suicide rates among the elderly in the two temporal extremities 1996/1998 and 2005/2007 – now increasing, then decreasing - became evident through the data presented to Brazilian municipalities with high rates for the phenomenon. Such richness in the scenario points toward the need to better know the different social determinants that exist in municipalities and regions that may influence the occurrence of suicide among the elderly in the country. It must be mentioned that the temporal variation studied in this article would require more in-depth temporal analysis studies, with the purpose of better understanding the reality of municipalities where suicide among elderly individuals is more frequent.

The presence of a significant number of events with unknown intent is a cause for concern, as it indicates a subnotification of deaths by suicide among the elderly. According to Laurenti *et al.*²⁴, in spite of the decline in the percentage of deaths due to undefined causes in the country, (from 20% to 13%)²⁵, Brazil is still not among countries with high information quality, as data coverage is still incomplete and the proportion of “undefined causes” is still high. A study carried

out in the European community demonstrates the barriers found by several countries of this economic block in suicide research: in spite of decreasing rates found in several countries, data validity is uncertain, recording procedures too varied, and prevention mechanisms too frail²⁶.

Suicide is a preventable event, and several of its risk factors can be altered, such as the presence of physical and mental diseases. Treating depression is a key aspect in suicide prevention. Physical exercise and changes in lifestyle also seem to be important. Improving social contact, support and community integration also appear to be effective⁴. As it becomes recognized as a problem that affects especially the eldest among the elderly, specific care can and must be taken by means of tailoring the guidelines provided by the World Health Organization²⁷ and the Brazilian Ministry of Health²⁸ to this group.

Collaborators

LW Pinto participated in all stages of development of this article. MCS Minayo and SG Assis participated in the stages of ideation, discussion of results and final writing. TO Pires participated in data analysis.

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