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Suicide mortality: the reality of a city in the interior of the Northeast of Brazil

Mortalidade por suicídio: realidade de uma cidade no interior do nordeste brasileiro

Mortalidad por suicidio: realidad de un pueblo del noreste de Brasil

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ABSTRACT

Objective: To describe the epidemiological characteristics of suicide mortality in a city in the interior of the Northeast of Brazil. **Methods**: This is a descriptive and retrospective study conducted with secondary data. Data were collected on the 67 cases of suicide, which occurred in a city in the interior of the Northeast, extracted from the Mortality Information System of the Ministry of Health, from 2000 to 2015. The study included deaths from Intentionally Self-Injured Injuries according to the 10th Revision of the International Classification of Diseases. Variables were selected to characterize death, such as gender, age group, marital status, race/color, occupation, and method used. **Results**: The specific mortality coefficient estimative was at 8.77/100 thousand inhabitants in the evaluated period. The highest frequency was in the male population (76.1%), 40 to 49 years old (32.8%), with single marital status (53%), race / brown color (68.4%), with work experience agricultural (64.2%). There was a worrying coefficient among the elderly aged 60-69 years (12.44/100 thousand inhabitants. Hanging and self-poisoning by pesticides are two main means used. **Conclusion**: The suicide mortality data in the municipality are in line with global statistics and above state and national suicide rates. The profile of people who committed suicide is predominantly composed of men, mixed ethnicity, single, and who exercise agricultural activity as an occupation.

Descriptors: *Suicide; Uses of Epidemiology; External Causes.*

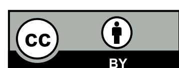
RESUMO

Objetivo: *Delinear as características epidemiológicas da mortalidade por suicídio em uma cidade no interior do Nordeste brasileiro.* ***Métodos:*** *Trata-se de um estudo descritivo e retrospectivo realizado com dados secundários. Coletaram-se dados referentes aos 67 casos de suicídio ocorridos em uma cidade no interior do Ceará, extraídos do Sistema de Informações sobre Mortalidade do Ministério da Saúde, de 2000 a 2015. O estudo incluiu mortes por lesões autoprovocadas intencionalmente, de acordo com a 10ª Revisão da Classificação Internacional de Doenças. Selecionaram-se variáveis para a caracterização dos óbitos, como gênero, faixa etária, estado civil, raça/cor, ocupação e método utilizado.* ***Resultados:*** *Estimou-se o coeficiente de mortalidade específica em 8,77/100 mil habitantes no período avaliado. A maior frequência encontrada foi na população masculina (76,1%), de 40 a 49 anos (32,8%), com estado civil solteiro (53%), de raça/cor parda (68,4%) e com atuação laboral agrícola (64,2%). Verificou-se coeficiente preocupante entre idosos na faixa etária entre 60-69 anos (12,44/100mil habitantes). Enforcamento e autointoxicação por pesticidas configuram-se como os dois principais meios utilizados.* ***Conclusão:*** *Os dados de mortalidade por suicídio no município encontram-se em consonância com as estatísticas globais, mas acima das taxas estaduais e nacionais de suicídio. O perfil das pessoas que cometeram suicídio é composto predominantemente por homens, etnia parda, solteiros e que exercem atividade agrícola como ocupação.*

Descritores: *Suicídio; Aplicações da Epidemiologia; Causas Externas.*

RESUMEN

Objetivo: *Delinear las características epidemiológicas de mortalidad por suicidio de un pueblo del Noreste de Brasil.* ***Métodos:*** *Se trata de un estudio descriptivo y retrospectivo realizado con datos secundarios. Se ha recogido los datos de 67 casos de suicidio ocurridos en un pueblo de Ceará registrado en el Sistema de Informaciones de Mortalidad del Ministerio de la Salud*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entre 2000 y 2015. El estudio ha incluido las muertes por lesiones auto provocadas a propósito según la 10ª Revisión de la Clasificación Internacional de Enfermedades. Se ha elegido variables para la caracterización de los óbitos como el género, la franja de edad, el estado civil, la raza/el color de la piel, la ocupación y el método utilizado. ***Resultados:*** *Se ha estimado el coeficiente de mortalidad especifico de 8,77/100 mil habitantes para el período evaluado. La mayor frecuencia encontrada ha sido de la población masculina (76,1%) entre 40 y 49 años (32,8%), solteros (53%), de raza/color de la piel pardo (68,4%) y con actuación laboral agrícola (64,2%). Se ha verificado el coeficiente preocupante entre mayores en la franja de edad entre 60 y 69 años (12,44/100 mil habitantes). Ahorcamiento y auto intoxicación por pesticidas son los dos principales medios utilizados.* ***Conclusión:*** *Los datos de mortalidad por suicidio del municipio están en consonancia con las estadísticas globales pero por encima de las tasas estaduales y nacionales de suicidio. El perfil de las personas que han practicado el suicidio está formado de hombres, con la etnia parda, solteros y que tienen la ocupación en la actividad agrícola.*

Descriptores: *Suicidio; Usos de la Epidemiología; Causas Externas.*

INTRODUCTION

Suicidal behavior is a complex and multifactorial phenomenon that includes self-inflicted forms of violence, in which the individual intentionally takes his own life[1-3]. Suicide encompasses attitudes ranging from acts of self-harm to more serious actions, such as ideation of death, elaboration of a plan, and obtaining the means to act[4]. It presents itself as a serious public health problem, as it is mentioned among the top ten causes of death in all age ranges and covers all regions of the world[1-3].

Suicidal behavior is usually caused by psychiatric disorders, stress, interpersonal conflicts, violence, and impulsivity[4-7]. Among the disorders related to the risk of suicide, the following stand out: mood disorders, especially depression and bipolar disorder; mental and behavioral disorders, resulting from the use of psychoactive substances, such as alcoholism and smoking; and personality disorders and schizophrenia[2,4,8,9]. Coping with alcoholism and smoking are priority themes of the National Health Promotion Policy (*Política Nacional de Promoção da Saúde - PNPS*)[10].

The design of the epidemiological profile of suicide in Brazil has grown significantly in recent decades. Compared to other countries, the suicide mortality rate is lower, but, when considering the absolute numbers, the country occupies the eighth world position and evolves, according to time series studies, with a progressive growth trend[6,9,11].

Mortality rates are estimated at around 10,000 annual deaths, which is equivalent to 5.5 deaths / 100 thousand inhabitants in 2015[2,9,12]. An ecological study on suicide in Brazil showed high coefficients in the southern states, with an emphasis in Rio Grande do Sul. Among the Brazilian municipalities, the highest coefficients occurred in Taipas do Tocantins, in the state of Tocantins (79.68 deaths / 100 thousand inhabitants), in Itaporã, Mato Grosso do Sul (75.15 deaths / 100 thousand inhabitants), and in Mampituba, Rio Grande do Sul (52.98 deaths / 100 thousand inhabitants)[13].

Due to the big repercussion of the phenomenon in the world, suicide prevention has become a relevant pillar for health promotion and is part of the World Health Organization's Mental Health Action Plan, whose goal is to reduce suicide rates in countries by 10% by 2020[14,15]. In Brazil, the Ministry of Health (MoH) has been promoting the National Strategy for Suicide Prevention since 2006[16]. The expansion of the mental health service coverage, the increase of accessibility to Psychosocial Care Centers (*Centro de Atenção Psicosocial - CAPS*), the implementation of community educational initiatives and integrative therapies are examples of actions and measures proposed at the national level[5,13,16].

In April 2019, Law No. 13,819 was enacted, which institutes the National Policy for the Prevention of Self-mutilation and Suicide. The law creates a national system, in cooperation with states, municipalities, and the Federal District, to prevent suicide and self-harm. This measure constitutes a legal framework so that possible regulations can be implemented in the national territory to prevent suicide[17].

These actions appear as initiatives by the MoH trying to reduce the incidence of cases in Brazil, aimed at reducing the rates of suicide deaths and the damage caused to the people, directly and indirectly, involved in this act. Such policies are important since the health network faces challenges to develop preventive and care actions related to suicide[13,16,17].

Thus, aiming to improve mental health promotion and the development of subsidies for the planning of preventive actions in health services, this study aims to outline the epidemiological characteristics of suicide mortality in a city in the Brazilian Northeast.

METHODS

It is a descriptive, retrospective, and time-series study from 2000 to 2015 conducted with secondary data. Data from the Mortality Information System (MIS) were selected on suicide cases in the municipality of Morada Nova, a city in the interior of the state of Ceará, with an estimated distance of 162 kilometers from the capital Fortaleza, located in Mesorregião do Jaguaribe and microregion of Baixo Jaguaribe. It has a population estimated at 61,890 people, according to population estimates for the year 2019, and a territorial area of 2,778,578 square kilometers, and a demographic density estimated at 22.33 inhabitant/km^2[18,19].

The inclusion criterion for the causes of death related to suicide followed the categorization of the tenth version of the International Statistical Classification of Diseases and Related Health Problems (CID-10)[20], selected by groupings that include intentional self-harm: medicines, biological and unspecified substances (X60-X64); pesticides and chemicals (X68-X69); hanging, strangulation and suffocation (X70); smoke, fire, and flames (X75-X77); bladed weapon and blunt objects (X78-X79) and unspecified means (X84).

Sociodemographic variables were selected to characterize deaths, such as gender, age group (10 to 19, 20 to 29, 30 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79 years), marital status, race / color and occupation.

The quantification of the resident population was defined through population estimates, Census data, and inter-census projections from the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística - IBGE*)[18,19]. The population projections for the municipal geographic level by age group used to calculate the specific mortality coefficient are available until 2015. For this reason, we selected the study period between 2000 and 2015.

The suicide specific mortality coefficient was calculated by adding the number of deaths between 2000 and 2015, as a numerator multiplied by 100 thousand inhabitants, and the denominator was the sum of the resident population in the same period registered[21].

The program Statistical Package for Social Sciences (SPSS Inc.), version 23.0, was used for tabulation, distribution, and statistical data analysis.

This study complied with the National Health Council (NHC) ethical precepts, Resolution no. 510, of April 7, 2016. Due to the exclusive use of public domain data, made available on the websites of the Informatics Department of the Unified Health System (*Departamento de Informática do Sistema* Único *de Saúde - DATASUS*) and without identifying the subjects, submission to the Research Ethics Committee is waived.

RESULTS

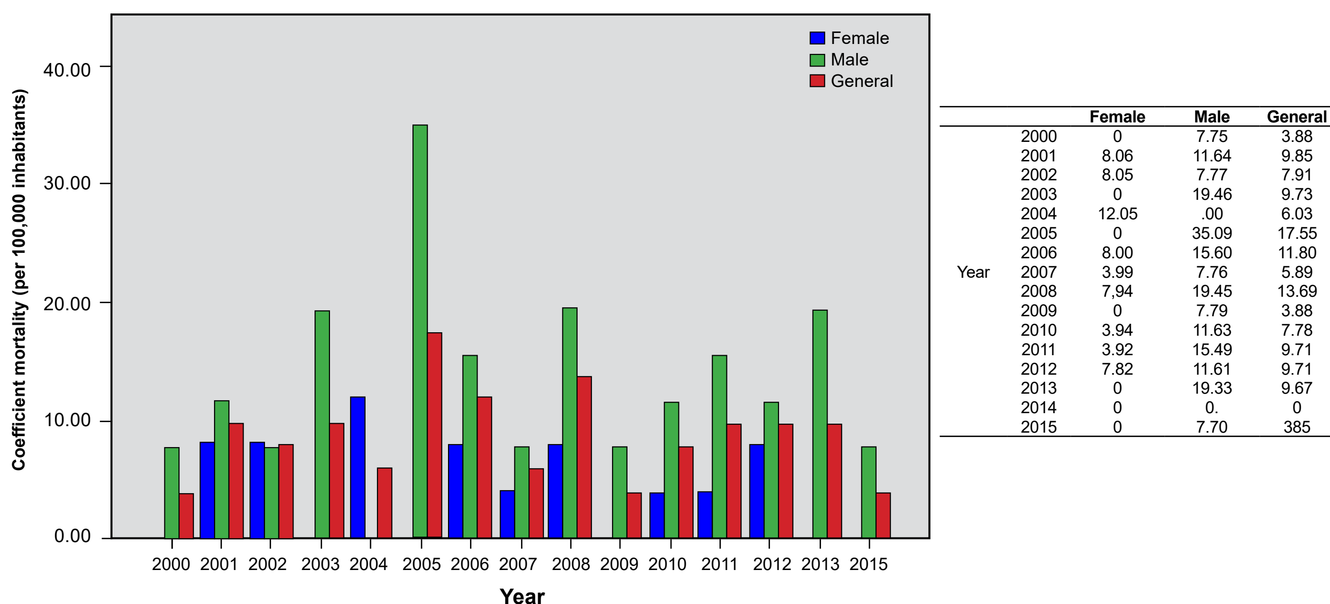
From 2000 to 2015, 67 suicide deaths were recorded in Morada Nova, with a mortality coefficient of 8.77 / 100 thousand inhabitants. The minimum coefficient indicated 3.92 / 100 thousand inhabitants in 2009, and the maximum occurred in 2005, with an estimate of 17.8 deaths / 100 thousand inhabitants, as shown in Figure 1.

During the time interval of the study (2000-2015), there was no record of death only in 2014. The male suicide mortality coefficient reached 13.21 deaths/100 thousand inhabitants, being higher than the female, which corresponded to 4.25 deaths/100 thousand inhabitants, that is, equivalent to a ratio of 3.18:1. The suicide mortality rates for women exceeded male rates only in 2002 and 2004.

In Table I, analyzing the proportion of deaths according to sociodemographic characteristics, it is observed that suicide mainly covered the male population (76.1%). The age group prevailed between 40 and 49 years of age (32.8%), and single marital status predominated, with a total of 52.2% of cases, followed by married marital status, with 37.3%. The brown race showed prevalence in 58.2% of the cases. Regarding the occupational situation, there was a predominance of 64.2% of workers in the agricultural sector, followed by workers in repair and maintenance services (10.4%).

Regarding the age group, the highest suicide mortality coefficients are ordered between 40-49 years (20.57 / 100 thousand inhabitants) and 60-69 years (12.44 / 100 thousand inhabitants), as shown in Table II.

As for the methods used, 49.3% (n = 33) of the deaths resulted from intentional self-harm caused by hanging, strangulation, and suffocation, followed by pesticide autointoxication, with 31.4% (n = 21), as shown in Table III.



		Female	Male	General
Year	2000	0	7.75	3.88
	2001	8.06	11.64	9.85
	2002	8.05	7.77	7.91
	2003	0	19.46	9.73
	2004	12.05	.00	6.03
	2005	0	35.09	17.55
	2006	8.00	15.60	11.80
	2007	3.99	7.76	5.89
	2008	7,94	19.45	13.69
	2009	0	7.79	3.88
	2010	3.94	11.63	7.78
	2011	3.92	15.49	9.71
	2012	7.82	11.61	9.71
	2013	0	19.33	9.67
	2014	0	0.	0
	2015	0	7.70	385

Figure 1 - Coefficient of suicide mortality (per 100,000 inhabitants), according to gender and general population. Morada Nova, Ceará, Brazil (2000-2015).
Source: Mortality Information System; DATASUS (2020).

Table I - Sociodemographic characterization of cases of death by suicide in Morada Nova, Ceará, Brazil (2000-2015).

Sociodemographic Characterization		n	%
Gender	Male	51	76.1%
	Female	16	23.9%
	Total	67	100%
Age (years)	10-19	5	7.5%
	20-29	14	20.9%
	30-39	10	14.9%
	40-49	22	32.8%
	50-59	8	11.9%
	60-69	7	10.4%
	70-79	1	1.5%
	Total	67	100%
Marital Status	Single	35	53.0%
	Married	25	37.9%
	Widower / widow	3	4.5%
	Judicially separated	3	4.5%
	Total	66	100%
Race/color	White	16	28.0%
	Black	1	1.8%
	Brown	39	68.4%
	Indigenous	1	1.8%
	Total	57	100%
Ocupation	Agriculture, forestry and fisheries	43	69.3%
	Repair and maintenance services	7	11.3%
	Members of the government and leaders of organizations	4	6.5%
	Armed forces, police and firefighters	3	4.8%
	Production of industrial goods and services	3	4.8%
	Others	2	3.3%
	Total	62	100%

Source: Mortality Information System; DATASUS (2020).

Table II - Coefficients of suicide mortality, according to age group, in Morada Nova, Ceará, Brazil (2000-2015).

Age		10-19 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years
Year	2000	-	-	11.34	16.62	-	-	-
	2001	6.63	28.40	-	-	21.43	-	-
	2002	-	9.37	11.30	31.58	-	-	-
	2003	7.03	9.28	11.33	30.62	-	-	-
	2004	-	-	-	29.70	20.43	-	-
	2005	-	18.34	22.81	28.89	20.14	57.50	-
	2006	-	9.06	-	42.16	19.85	28.28	-
	2007	7.81	-	-	13.69	19.61	-	-
	2008	7.96	26.89	-	13.36	19.38	27.14	-
	2009	-	-	11.40	13.10	-	-	-
	2010	-	9.18	-	25.79	-	25.77	-
	2011	-	9.23	11.21	25.43	-	25.18	-
	2012	-	-	33.27	12.57	17.46	-	-
	2013	-	9.42	-	24.95	16.82	-	41.74
	2014	-	-	-	-	-	-	-
	2015	9.03	-	-	-	-	22.79	-
	Total	2.56	8.61	7.51	20.57	10.34	12.44	2.78

Source: Mortality Information System; DATASUS (2020).

Table III - Distribution of methods used in suicide according to the categories of ICD-10 *, Morada Nova, Ceará, Brazil (2000-2015).

Distribution of methods used in suicide	n	%
Hanging, strangulation and suffocation (X70)	33	49.2
Pesticides and chemicals (X68-X69)	21	31.3
Medicines, biological and unspecified substances (X60-X64)	3	4.5
White weapon and blunt objects (X78-X79)	2	3.0
Smoke, fire and flames (X75-X77)	2	3.0
Unspecified means (X84)	6	9.0
Total	67	100.0

Source: Mortality Information System; DATASUS (2020); *ICD-10: International Classification of Diseases

DISCUSSION

The city of Morada Nova had a suicide mortality rate (8.77/100 thousand inhabitants) higher than the coefficient observed in the state of Ceará (5.1/100 thousand inhabitants) and the national coefficient (5.5/100 thousand inhabitants)[12,22,23]. In 2005, there was a coefficient in Morada Nova of 17.8 deaths by suicide/100 thousand inhabitants, approximately three times the state and national coefficients. Suicide cases in rural areas show significant growth[24,25]. A Brazilian study showed an association with low income, difficulty in accessing mental health services, and a reduction in the prescription of antidepressant medications[26].

The stratification of the suicide mortality rates is considered low when the rate is less than 5 deaths/100 thousand inhabitants, average between 5 and less than 15 deaths/100 thousand inhabitants, high between 15 and less than 30 deaths/100 thousand inhabitants, and very high when there are 30 or more deaths / 100 thousand inhabitants[27]. According to the mentioned criterion above, mortality by suicide in Morada Nova is considered as average for the total population. However, for the group aged 40-49 years, it presents a high level.

Regarding epidemiology between genders, the mortality ratio between men and women has been constant in the historical series of different population studies, being estimated in the ratio 3:1[5,11,28], which corroborates the local findings, corresponding to the 3.18:11 ratio. The association of sex with the method used to attempt or commit suicide is evident in national and foreign surveys[4,6,11].

Men choose more lethal methods such as hanging and using a fire gun than women. The lower occurrence of suicide among women has been attributed to the low prevalence of substance abuse and the presence of greater spiritual engagement[4,23]. Besides, women recognize early signs of risk for suicidal behavior and seek health networks more frequently, especially during acute episodes of psychiatric disorders[4], while men have characteristics and behaviors more prone to suicide, including impulsivity[8,23].

In Morada Nova, the highest mortality rates, according to the age group, occur in the population aged 40-49 years; however, there is an increase in the elderly aged 60 to 69 years. The increased incidence of suicide in the senile population is evidenced in other studies[9,23,29]. A study that evaluated suicide mortality in the elderly in Bahia found an increase of 206.3% in the mortality rate, which went from 2.2/100 thousand inhabitants in 1996 to 6.8/100 thousand inhabitants in 2013, with an annual increase of 11%[29].

Single marital status, predominant among the population assessed in the city from Ceará, is recognized as one of the sociodemographic factors with clear relation to suicidal behavior, mainly when associated with social isolation. The majority marital status presented a similar frequency with a study carried out with the population of Ceará, with an estimated frequency between 53-58%[22].

Workers linked to the occupation of agricultural services had a higher relative frequency of suicide mortality in the municipality, representing 64.2% of the population sample. Suicide has been reported as a worrying problem in rural populations, including agricultural workers, in different regions of the world, such as Brazil, India, and Spain[24,30,31].

The results of a Brazilian study, conducted in a municipality in Rio de Janeiro with high use of pesticides, pointed out that the agricultural class presented an odds ratio for death by suicide with a range between 4.5 and 9.4 compared to the general population[25]. In India, in 2015, about 20,000 inhabitants died as a result of self-poisoning by pesticides[31]. In 2011, after regulation and banning of the insecticide Endosulfan, there was a small but relevant decrease in overall suicide rates and a higher decline in suicide rates caused by pesticides[31].

In Spain, suicide rates have reproduced high prevalence in regions with a predominance of agricultural activity and intense pesticide use[24]. The high mortality of farmers by suicide would be reflecting the precarious conditions of survival, the economic difficulties, and/or the intense exposure to pesticides/pesticides[4,32,33].

Pesticides can be absorbed directly by mucous membranes, the gastrointestinal tract, and the respiratory tract. Chronic exposure to pesticides, especially organophosphates, can cause changes in the level of the neuroendocrine system. Thus, excessive stimulation exerted by pesticides on nerve receptors can alter variations in serotonin levels. These changes in the serotonin concentration may be related to the etiology of several psychiatric disorders with triggering suicidal behavior[6].

The regulations and strategies implemented to restrict the means of committing suicide, such as controlling the use of pesticides/pesticides and firearms through pacts and regulations, can reduce the incidence of suicide and are recommended as universal prevention instruments[23,34]. It is worth mentioning that, because of the rigidity of the regulation of access to other means, the greater accessibility and the degree of lethality inherent to hanging may explain the increase in the number of suicides by this means[4].

The data analysis tabulation on suicide in Morada Nova, based on SIM, demonstrated that, despite the improvement in the quality of the information in the registration of death certificates, there was no record in the field “education” in the population afflicted by suicide. This data reveals the persistence of flaws in the quality of filling out death certificates, pointing out the need to improve the quality of records and obtain information regarding the circumstances of deaths[23,28]. The lack of schooling records was a limitation, also present in another survey, which used data from the population of the state of Ceará[22].

Underreporting is another limitation. Suicide mortality in Brazil may have more expressive numbers because of the underreporting resulting from social stigma and socio-cultural motivations that favor the omission of cases and cause a loss in recognition of the real panorama of the magnitude of suicide throughout the territory. Another relevant factor for underreporting is the difficulty of services identifying the intentionality of external causes of death. Cause such as drowning, accidental intoxication, intentional car accident, and death from undefined causes conceal a considerable proportion of suicide cases[2,4,8,23].

Besides, there is an evident gap in the epidemiological panorama regarding studies of suicidal behavior in small and medium-sized cities[26]. Therefore, this study aims to contribute to the dissemination of knowledge in this perspective and also to point to the need for further studies in the area.

CONCLUSION

The suicide mortality data in the investigated municipality are in line with global statistics but above state and national suicide rates. The profile of people who committed suicide is predominantly composed of men, of mixed race/color, single and who carry out the agricultural activity as an occupation.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

CONTRIBUTIONS

Sérgio André de Souza Júnior contributed to the preparation and design of the study; the acquisition, analysis and interpretation of data; and the writing and revision of the manuscript. **Cássia Ferreira Rodrigues** contributed to the writing and revision of the manuscript.

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