

RESEARCH ARTICLE

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EVALUATION OF DEATHS FROM EXTERNAL CAUSES IN A STATE IN BRAZIL

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ABSTRACT

Introduction: In the last century, infectious diseases were the main cause of death in Brazil and in the world, currently external causes are one of the major public health concerns. The present study aimed to assess deaths from external causes in a Brazilian state. **Materials and methods:** This is a retrospective descriptive comparative epidemiological study, using national databases from the Brazilian Institute of Geography and Statistics (IBGE) and the SUS Department of Informatics (DATASUS) from 2010 to 2017. **Results:** It was observed whereas in the state of Maranhão, deaths from external causes have increased over the years, aggressions are the main cause of death from external causes with 42% of the total, the age group of 80 years or more is the most susceptible with 15.44 per 1,000 inhabitants assessing each year of the study and men have a higher mortality rate compared to women. **Conclusion:** the results of the present study expose the heterogeneity of the indicator, suggesting that it is essential that health authorities are attentive to all these social determinants so that they can formulate public policies to the satisfaction of the specificity of their population.

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INTRODUCTION

Deaths from unnatural or external causes include accidents and cases of self-inflicted or suffered violence by others. They call the attention of health authorities, because they are sudden and unforeseen situations and statistics show that, unlike most communicable diseases, it affects more young people. Although deaths due to these facts are present in the history of mankind, only recently have they received the attention of researchers. In the United States, deaths from external causes represent a significant part of adverse health events in the country. In 2010 in the USA, cases of suicide and accidents occupied the second positions in the ranking of the main

causes of death (GELAYE KA, et al., 2018; SONDERMAN JS, et al., 2014). In the last century, the greatest concern of health authorities was with infection diseases, countries like India still present almost half of deaths from these factors, mainly in children aged 5 to 14 years. In 2016, India had the highest mortality rates in almost all categories, including communicable diseases. During the strengthening of public, health and epidemiological policies, Brazil managed to greatly reduce these deaths (FADEL SA, et al., 2019). Another factor that has changed the epidemiological profile of the number of morbidity and mortality in Brazil and in the world is the increase in life expectancy and, consequently, the increase in the elderly population. This scenario suggests a greater need

for attention to chronic and degenerative diseases in addition to the situation that is presented in the population with higher death rates from external causes (OLIVEIRA TC, MEDEIROS WR, LIMA KC., 2015). Deaths from non-natural causes are closely related to low levels of development in the country, their occurrence is closely related to socioeconomic disparities, they represent a serious health problem because of the social and economic impacts that accompany it. Violence in Brazil, for example, has great social determination, deaths by homicide and traffic accidents have as main victims men, blacks and poor people (MALTA DC, *et al.*, 2017; MESSIAS KLM, *et al.*, 2017). Deaths from external causes are such an unexpected event, studies show that when children lose their parents in traumatic events such as car accidents, suicides or homicides, this has the ability to modify the child's perspectives in relation to their professional and personal aspirations in the medium and long term (BURRELL LM and MEHLUM L and QIN P, 2020). Despite representing one of the most important aspects in vital statistics to support public health interventions, useful information on causes of death is not available in many countries. Sub-notifications are situations that are frequently observed in public records. Most developing countries do not have a complete vital registration system, in which deaths receive a death certificate completed by a doctor in the case of Brazil, this information is available at SIM and SIH-SUS systems (TEIXEIRA RA, *et al.*, 2019).

MATERIALS AND METHODS

A retrospective descriptive epidemiological study with a quantitative approach was carried out. The data included were all cases of death from all causes of residents in the state of Maranhão. The study was made with a time frame from 2010 to 2017, all information were present in DATASUS in the Systems: Brazilian Institute of Geography and Statistics (IBGE), SIM (Mortality Information System), SIH-SUS (Hospital Information System) and the Classification present in the International Disease Code (ICD-10). The period of searching for information and tabulation covered the period from 06/11/2019 to 02/01/2020. We use the tabulators: Tabnet, Microsoft Excel, Numbers for Macbook to build the tables and graphs. The data were analyzed and organized in the form of percentages, averages and proportions.

Variables analyzed: Information that, over the years 2010 to 2017, represented the situation of deaths from all causes and external causes, as well as the populations by age group and sex most exposed to this condition, were used as a basis for evaluation.

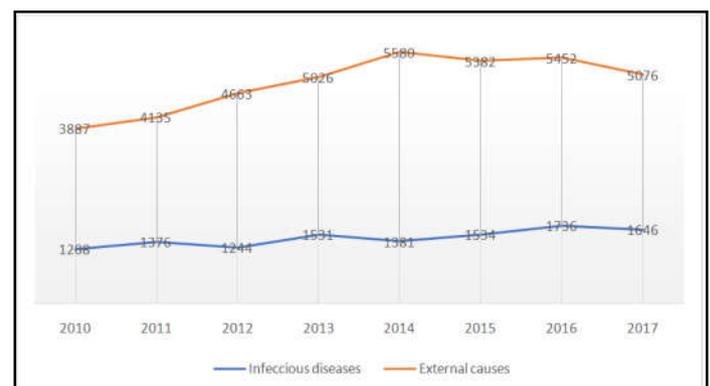
The indicators used for evaluation were: Absolute number of deaths per ICD chapter 10 of the variables: infectious diseases and external causes from the periods 2010 to 2017 in the state of Maranhão, Brazil. For this indicator, we used information from the Mortality Information System (SIM); Percentage of deaths due to external causes of morbidity and mortality according to the ICD 10 classification group for the periods 2010 to 2017 in the state of Maranhão, Brazil. For this indicator, we used information from the Mortality Information System (SIM - SUS); Amounts and proportions of deaths from external causes in the state of Maranhão from 2010 to 2017 by age group. For this indicator, we used data from the IBGE and the Hospital Information System (SIH-SUS); Hospital mortality rate due to external causes from the periods 2010 to 2017 by sex in the state of Maranhão, Brazil. For this

indicator, we used data from the IBGE and the Hospital Information System (SIH-SUS).

RESULTS AND DISCUSSION

In Estonia there were 28,964 deaths from external causes from 1997 to 2017, in the country external causes represented 10% of the total deaths. In India, 46.1% of deaths among children aged 5 to 14 years are due to communicable diseases, one of the aggravating factors in relation to deaths or accidents due to external causes demonstrated in a research carried out in Sweden, is the presence of mental illnesses, especially in schizophrenic patients. Research shows that the risk is 6 times higher in women and 8 times higher in men, compared to the normal population (ORRU H, ÅSTROM DO, 2017; OTTERMAN G, *et al.*, 2019; HÄLLGREN J, *et al.*, 2018). In a survey conducted in Brazil in the period from 2004 to 2013, the main cause of death from 1 to 49 years is injuries from external causes, in children under 1 year of age are conditions originating in the perinatal period and those over 50 are circulatory system diseases. In relation to all age groups, the total number of deaths from diseases of the circulatory system was 28.69% of the total and 12.58% from external causes. If we consider only the age group from 1 to 49, external causes appear first as a cause of death, being responsible for 41.12% of all deaths (MARQUES SHB, *et al.*, 2017). The total number of deaths in the state of Maranhão from 2010 to 2017 was 250,222, the highest rates were due to diseases of the circulatory system (77,641 deaths - 31.01%), followed by deaths from external causes (39,201 - 15, 66% of the total), in third place the neoplasms (28,833 deaths - 11.54% of the total) (DATASUS, 2020). Table 1 compares the absolute number of deaths from external causes and deaths from infectious diseases that represented the vast majority of deaths in the past century. With vaccination campaigns, preventive measures, programs aimed at health promotion, the expectation is that infectious and contagious diseases will stabilize. In fact, in relation to external causes, the deaths from these diseases are much smaller when assessing the period from 2010 to 2017. An individual is at risk of dying from infectious diseases, a proportion of 1.1: 3.9 from external causes. The highest results presented are from the year 2014, where 5,580 people died from external causes, as of 2014 the numbers suffer a slight decrease, presenting results of 5,076 cases in 2017 (DATASUS, 2020).

Table 1. Absolute number of deaths per ICD chapter 10 of the variables infectious diseases and external causes from the periods 2010 to 2017 in the state of Maranhão, Brazil

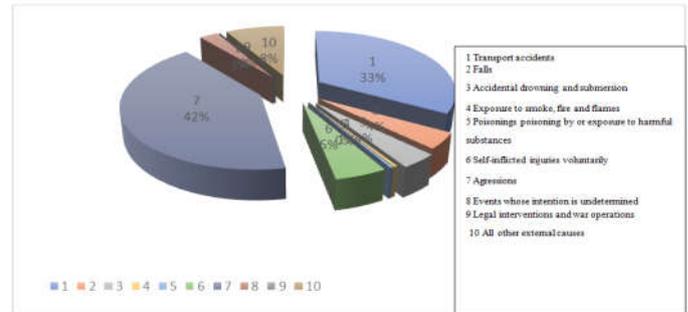


SOURCE: DATASUS, 2020

In Hungary there were 154,211 deaths from external causes from 1995 to 2014, suicide, self-mutilation, accidental falls and traffic accidents were the most common causes, with 53,769 (34.9%), 51,015 (33.1%) and 24,367 (15.8%) respectively. In the age groups above 65 years, the most common external cause of death is falls, falls are multifactorial events influenced by environmental and behavioral characteristics. A study on the occurrence of falls in the elderly found the highest incidence rate in the female population and was associated with advanced age, physical inactivity, lack of self-perceived health and quantity of medications used, however, this incidence is not the same among young people, in the USA in a survey conducted from 1999 to 2007, mortality from unintentional falls went from 29.4 to 55 per 1000,000 inhabitants (LANTOS T, *et al.*, 2019; MEIRELLES JUNIOR RC, *et al.*, 2019; HU G, BAKER SP, 2012). In another study, when the type of external cause was evaluated, it was evidenced that 33.4% of deaths were caused by traffic accidents, followed by falls, which represented 28.6% of the cases, in the female gender the falls presented the highest proportion of cases, with 42.3%, followed by traffic accidents, with 27.3% (CARMO EA, *et al.*, 2017). In a study carried out in the regions of Brazil, it was observed that there is a tendency towards an increase in the number of homicides, mainly in the North and Northeast regions. Between 1998 and 2012, the State of Bahia, for example, went from the twenty-second to the fifth position in the ordering of homicide rates according to federal units in Brazil (SOUZA TO, *et al.*, 2019). Situations such as development and migration processes are situations in which external causes can be affected, with an increase, in the state of Rondônia, recent migratory processes have impacted on the results of homicide deaths, remaining as the main external cause of death in the state. Regarding deaths by suicide or self-mutilation, the trend has remained stationary, and car accidents have also increased. The demographic growth and the impact of this migration that occurred in the state of Rondônia alert to issues of formulation of public policies that contribute to the reduction of accidents, violence, suicides or self-mutilation and other causes of mortality (PEREIRA PPS, *et al.*, 2020). In China, the percentages of deaths from external causes are: 25.0% from car accidents, 13.1% from suicide, accidental poisoning 10.7%, from accidental falls 7.6%. The analysis of the cause of death is essential to assess the health situation of the population, defining priorities for public health. Deaths due to external causes are closely related to the environment in which the patient is, in a study conducted in Ethiopia, in rural residents, accidental drowning and submersion, falls and transport accidents were the most prevalent, the external causes of death were higher among people over 15 years of age, which can be attributed to the nature of adults to dedicate themselves to agriculture and other physically demanding jobs, drowning and transport accidents had their greatest number among children aged 5 and 14 (REBHOLZ, *et al.*, 2011; GELAYE KA, *et al.*, 2018).

Another interesting aspect to be evaluated is the seasonality pattern, in Hungary, seasonality patterns were observed for suicide, accidental falls and traffic accidents, with its greatest occurrence in June, December and September, the study authors suggest that cohort studies with a longer period, they must be carried out in order to better assess this situation (LANTOS T, *et al.*, 2019). In Africa and Asia in 2014, a total of 5,884 deaths from external causes were recorded. Approximately a quarter of these deaths occurred in children

under the age of 15. Causes of death were dominated by childhood drownings in Bangladesh and transport-related deaths and intentional injuries elsewhere (STREATFIELD K, *et al.*, 2014). As seen in the course of the discussion, external causes are a very heterogeneous factor, varying according to country, seasonality, age group and customs in the region. Graph 1 shows the percentages of deaths from external causes from 2010 to 2017 in the state of Maranhão - Brazil. Group 7 "Aggressions" represents the largest percentage 42%, followed by "transport accidents" with 33% of the total.



SOURCE: DATASUS, 2020

Graph 1. Percentage of deaths due to external causes of morbidity and mortality according to the ICD 10 classification group for the periods 2010 to 2017 in the state of Maranhão, Brazil

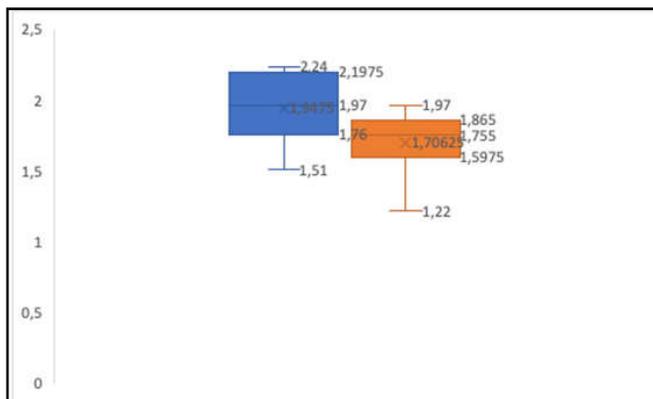
Mortality from external causes is higher in youth, when other causes of death, such as chronic diseases, are still uncommon. In a study conducted in Russia in 2012, the proportion of deaths from external causes in all deaths between men and women is highest in the 15-19 age group. In the Netherlands, the number of children dying from external causes has decreased in recent decades, mainly due to the efforts of the Dutch government, the number of deaths due to intentional self-mutilation shows an alarming increase in the period 1969–2011 mainly between the age group 0 to 19 years (KVASHA E, KHARKOVA T, YUMAGUZIN V, 2014; GIJZEN S, *et al.*, 2014). In Estonia from 1997 to 2017 82% of cases of external mortality were in the age group below 65 years of age and 78% were male. These deaths were evenly distributed throughout the year and a decreasing trend was observed over the study periods (ORRU H, ÅSTROM DO., 2017). Table 2 shows that over the 8 years of study the greatest risk of death from external causes in Maranhão is in the age group of 80 years or more (15.44 per 1,000 inhabitants), contrary to most recent studies, followed by patients in age group from 20 to 29 years old (9.33 per 1,000 inhabitants) the results are justified by the great occurrence of falls in the elderly, who today represent a public health problem in Brazil and by the high incidence of aggressions and car accidents in the age group from 20 to 29 years old.

Table 2. Quantities and proportions of deaths from external causes in the state of Maranhão from 2010 to 2017 by age group

Age range	Number of deaths	Proportion
less 1 yearold	209	1,59524936
1 to 4 yearsold	543	1,04826052
5 to 9 yearold	469	0,68167911
10 to 14 yearsold	766	1,03451862
15 to 19 yearsold	4063	5,83144358
20 to 29 yearsold	11942	9,33573385
30 to 39 yearsold	8485	9,1883896
40 to 49 yearsold	4817	7,13842196
50 to 59 yearsold	3064	6,34665496
60 to 69 yearsold	1918	6,07698571
70 to 79 yearsold	1428	7,88688832
80 yearsold or more	1286	15,448932

SOURCE: DATASUS, 2020

There is a greater risk for the male population to suffer deaths from external causes. A study carried out in the state of Piauí showed that from 2001 to 2012 there is an upward trend for this population. Being a man is a risk factor for: suicide, homicide and accidental death, the predisposition is explained because men have a greater participation in dangerous activities, extreme sports and lifestyle that exposes them more to these risks (DOURADO SBPB, *et al.*, 2016; SONDERMAN JS, *et al.*, 2014). In southern Sweden from 1998 to 2014 falls were more frequent in men and people over the age of 70, the absolute number of deaths from falls increased by 87.9% in men and 55.7% in women. In 70.3% of deaths from falls, falls were recorded as an underlying cause, with values slightly higher for men than women (KIADALIRI AA, *et al.*, 2017). In China, the homicide mortality rate between 10 and 14 years old was higher for men than for women, in India and China, suicide mortality rates were higher for girls than for boys between 10 and 14 years old. On the other hand, in Mexico, it was higher for boys than for girls, increasing annually by an average of 2.8% (2.9-6.6). In Hungary from 1995 to 2014 the percentage of deaths from external causes was 66.3% men and 33.7% women (FADEL SA, *et al.* 2019; LANTOS T, *et al.*, 2019). The 50-59 age group among male people had a higher proportion of deaths 30.2%. Although suicide mortality rates are the same for men and women, mortality for each of the other causes of external injuries is consistently higher among men than women (OLIVEIRA JCAX, *et al.*, 2017; REBHOLZ, *et al.*, 2011).



SOURCE: DATASUS, 2020

Graph 3. Hospital mortality rate due to external causes from 2010 to 2017 by sex in the state of Maranhão, Brazil

Graph 3 shows the hospital mortality rates due to external causes from the years 2010 to 2017, what we observed is that, corroborating with most researches, the rates are higher in males, 2.24 in 2012, representing the highest frequency and 1.51 representing the minimum. In females, the highest rate is 1.97 and the lowest is 1.22. There are no great variations in relation to the years evaluated, being then, a variable considered of constant distribution, the medians for the male and female sex are, consecutively, of 1.94 and 1.76 as shown in the graph.

Conclusion

Although deaths from external causes are the second most frequent in the state of Maranhão, social, physiological, economic and psychological factors are decisive for their occurrence, making them so relevant. The damage from such an unexpected event is devastating for families and the social

environment. According to the above, an increase in the occurrence of these events, it is essential that there is awareness on the subject, given its heterogeneity in relation to age groups, sex, social context and environment in which the patient is inserted. It is important that health authorities are aware of all these social determinants so that they can formulate public policies to the satisfaction of the specificity of their population.

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