Analysis of the trend of mortality from external causes in older adults in Brazil, 2000 to 2022

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Abstract

Objective: To analyze the trend of mortality due to external causes in older adults in Brazil within the temporal interval spanning from 2000 to 2022 and to identify the sociodemographic profile of mortality. *Method:* Ecological time-series study utilizing secondary data, encompassing mortality in older adults due to external causes in Brazil, spanning the period from 2000 to 2022. The data were collected from the databases of the Department of Informatics of the Unified Health System, population estimates, and census population data provided by the Brazilian Institute of Geography and Statistics. The absolute and relative frequency of the data were analyzed using Microsoft Excel 2010 software. The analysis of trends in mortality rates and segmented linear regression was conducted using Joinpoint, with statistical significance assessed through the Monte Carlo test. *Results:* During the investigated period, 572,608 deaths due to external causes were identified in individuals aged 60 years or older. Regarding the mortality pattern due to external causes in older adults, an increasing trend in mortality rates was observed for the majority of the studied period (2000 to 2013) with an annual percent change (APC) of 1.86 (95% CI: 1.5–2.2). *Conclusion:* The results indicate a growing trend in mortality among older individuals due to external causes, highlighting the need for prioritizing public policies that address this issue.

Keywords: Aged. Mortality. Cause of Death. Central Trend Measures.

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INTRODUCTION

The progressive increase in the older population should not be construed as a problem; rather, it is an achievement stemming from the processes of development and social advancement. Nevertheless, the physiological frailties and vulnerabilities resulting from the aging process in these individuals often render them victims, predominantly subjected to external causes such as violence and adverse health events. This phenomenon assumes exorbitant proportions in modern society, thus representing a significant public health issue[1].

External causes constitute one of the primary reasons for deaths worldwide, accounting for approximately 10% of global mortality and standing as the third leading cause of mortality among Brazilians from 2002 to 2015[2]. In Brazil, these events rank sixth among the causes of death in older adults, mainly due to injuries and/or trauma resulting from accidents such as pedestrian collisions and falls[3].

In this context, external causes, also referred to as accidents and violence, are considered events from the external environment that, through effects stemming from physical, chemical, or radioactive forces, can lead to damages with undesirable health consequences. They are closely associated with physical and neurological disabilities and can even result in the death of individuals when exposed to such events[4]. Linked to this, the aging process, along with diseases, renders this population segment more vulnerable, resulting in a decrease in quality of life, as well as disabilities, and often, mortality[3].

In Brazil, between the years 2010 and 2022, 3,239,168 recorded deaths due to external causes in the general population, of which 572,608 were individuals aged 60 or older. Notably, the study of mortality serves as a pertinent indicator for comprehending a society, as it can be considered a social and economic gauge, with the levels reflecting the degree of development within a region or country. Therefore, the execution of the present study is justified by the need to comprehend the patterns of mortality rates due to external causes in older adults and the profile of such deaths in the older adults. This aims to formulate hypotheses regarding the potential determinants of this mortality over the period, as well as to contemplate strategies that can be employed to mitigate such deaths. Thus, the findings of the study may consequently unveil the demand for specific policies and campaigns targeting at-risk population groups and their prevention[1,5].

In light of the foregoing, the objective of this study is to analyze the trend of mortality due to external causes in older adults in Brazil and identify the sociodemographic profile of these deaths within the time frame spanning from 2000 to 2022.

METHOD

This is an ecological time-series study that employed secondary data to investigate mortality in older adults due to external causes in Brazil, covering the period from 2000 to 2022. The unit of analysis encompassed the national territory and its five regions. The study population consisted of individuals aged 60 or older residing in Brazil.

Data collection took place in November 2023 using official public access databases from the Brazilian Ministry of Health, specifically from the Department of Informatics of the Unified Health System (Departamento de Informática do Sistema Único de Saúde - DATASUS), available through the Mortality Information System (Sistema de Informações sobre Mortalidade - SIM). This included preliminary mortality data for the year 2022. Furthermore, estimates of the resident population and census-based population data provided by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística - IBGE) for census years were also utilized.

External causes were presented according to the International Classification of Diseases, 10th revision (ICD-10), categorized into nine groups: transport accidents (V01-V99), other external causes of accidental injuries (W00-X59), intentionally self-inflicted injuries (X60-X84), assaults (X85-Y09), events with undetermined intent (Y10-Y34), legal interventions and operations of war (Y35-Y36), complications of medical and surgical care (Y40-Y84), sequelae of external causes (Y85-Y89), and supplementary factors related to other causes (Y90-Y98)[6].

The study had a sample comprising a total of 572,608 deaths due to external causes in older adults. The outcome variable was the mortality rate due to external causes in the older adults. Thus, for the analysis, mortality rates were calculated for the entire set of external causes. This calculation involved dividing the total number of deaths of older adults from all types of external causes during a specific period by the total number of older individuals' residents in that period, multiplied by 100,000. The other independent variables addressed in the study included: types of external causes, gender, age group, race/ethnicity, educational level, marital status, year, and region.

The data were statistically analyzed and presented in the form of tables and a graphical representation (figure), categorized and processed electronically using Microsoft Excel 2010 software. The analyses of trends in mortality rates among older adults due to external causes, spanning from 2000 to 2022, were conducted using the statistical program Joinpoint, version 4.6.0 (http://surveillance.cancer.gov/joinpoint/).

For this purpose, estimates of the annual percentage change (APC) were calculated using segmented linear regression (joinpoint regression), identifying potential points of inflection. The analysis considered a 95% Confidence Interval (CI95%) and a significance level of 5% for each detected trend. Statistical significance was assessed using the Monte Carlo permutation test, which adjusts the best-fit line for each segment.

Furthermore, as this study utilized publicly accessible, unrestricted, and non-identifiable data, it was exempt from review by the Research Ethics Committee, in accordance with Resolution number 510/2016 of the National Health Council.

DATA AVAILABILITY

The entire dataset supporting the results of this study has been made available on the Open Science Framework (OSF) and can be accessed at https://doi.org/10.17605/OSF.IO/ZWC67.

RESULTS

During the investigated period, 572,608 deaths due to external causes were identified in older adults. Of these, nearly half, 194,423 (42.9%), were attributable to the group of causes titled "other external causes of accidental injuries" (W00-X59), which includes falls (W00-W19); exposure to inanimate mechanical forces (W20-W49); exposure to animate mechanical forces (W50-W64); accidental drowning and submersion (W65-W74); other accidental threats to breathing (W75/W84); exposure to electric current, radiation, and extreme environmental temperatures and pressures (W85-W99); exposure to smoke, fire, and flames (X00-X09); contact with hot substances or objects (X10-X19); contact with poisonous animals and plants (X20-X29); exposure to forces of nature (X30-X39); accidental poisoning by exposure to harmful substances (X40-X49); excessive exertion, travel, and deprivation (X50-X57); and accidental exposure to other and unspecified factors (X58-X59)[6].

Regarding the mortality patterns due to external causes in older adults, the findings indicate an increasing trend for the majority of the studied period (2000-2013) (APC=1.86; CI95%: 1.5–2.2), $p<0.001$.

Table 1. Distribution of the Mortality Rate due to External Causes in Older Adults, Joinpoint Location, and Annual Percentage Change (APC) (n=572,608). Brazil, 2000 to 2022.

Year	Crude Rate	Adjusted Rate	APC Value (CI)	Segment
2000	92.45	92.18	1.86* (1.5 - 2.2)	1
2001	95.11	93.9	1.86* (1.5 - 2.2)	1
2002	95.23	95.64	1.86* (1.5 - 2.2)	1
2003	97.23	97.42	1.86* (1.5 - 2.2)	1
2004	100.36	99.24	1.86* (1.5 - 2.2)	1
2005	101.74	101.09	1.86* (1.5 - 2.2)	1
2006	100.19	102.97	1.86* (1.5 - 2.2)	1
2007	102.32	104.89	1.86* (1.5 - 2.2)	1
2008	107.07	106.84	1.86* (1.5 - 2.2)	1
2009	107.00	108.83	1.86* (1.5 - 2.2)	1
2010	114.70	110.86	1.86* (1.5 - 2.2)	1
2011	114.10	112.92	1.86* (1.5 - 2.2)	1
2012	114.66	115.02	1.86* (1.5 - 2.2)	1
2013	115.85	117.16	*Joinpoint* 1	1 - 2
2014	117.77	117.39	0.20 (-0.4 – 0.8)	2
2015	117.19	117.62	0.20 (-0.4 – 0.8)	2
2016	119.92	117.85	0.20 (-0.4 – 0.8)	2
2017	120.33	118.08	0.20 (-0.4 – 0.8)	2
2018	119.34	118.31	0.20 (-0.4 – 0.8)	2
2019	118.37	118.55	0.20 (-0.4 – 0.8)	2
2020	110.97	118.78	0.20 (-0.4 – 0.8)	2
2021	118.49	119.01	0.20 (-0.4 – 0.8)	2
2022	124.02	119.24	0.20 (-0.4 – 0.8)	2

APC = Annual Percentage Change; CI = Confidence Interval. *p<0.005, indicating statistical significance. Source: Research data, 2023.

Table 2 presents a specific analysis of the types of external causes of mortality by age group and gender, primary groups of external causes, race/ethnicity, educational level, and marital status. Among the groups of external causes, transport accidents (V01-V99) were identified as the leading cause of mortality in individuals aged 60 to 69 years, totaling 67,004 (32.92%) deaths; and the second leading cause of mortality among individuals aged 70 to 79 years, with 41,631 (25.29%) deaths, predominantly affecting males.

Otherwise, the group composed of other external causes of accidental injuries (W00-X59) was the primary contributor to mortality among individuals aged 70 to 79 years and 80 years or older, claiming the lives of 68,121 (41.39%) and 130,170 (62.20%) older individuals in both age groups, respectively, with variations in the predominant gender depending on the age range affected.

Regarding race/ethnicity, it can be observed that white and mixed-race older adults combined were the most affected by external causes, accounting for nearly 90% of deaths across all age groups. In the groups of older adults aged 60 to 69 and 70 to 79, a predominance of male mortality, regardless of their race/ethnicity. However, among individuals aged 80 years or older, females were the most affected.

About education, it was observed that over 75% of older adults who died from external causes had a maximum of seven years of education, regardless of age group. Regarding marital status, regardless of age group, the most prominent feature was deaths among married and male older individuals.

Regarding the distribution of the proportionality of deaths in older adults due to external causes in males compared to females, it was observed that the group of causes represented by assaults (X85-Y09) was able to victimize six times more men than women. Subsequently, self-inflicted intentional injuries (X60-X84) were four times more fatal in men than in women. Nonetheless, complications of medical and surgical care (Y40-Y84) resulted in more deaths among women than men (0.84:1).

Table 2. Distribution of deaths due to external causes, race/ethnicity, education, and marital status of older adults, according to age group and gender (n=572,608). Brazil, 2000 to 2022.

Variables	Age group								
	60 to 69 years old			70 a 79 years old			80 years or older		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
	n (%)			n (%)			n (%)		
Types of External Causes									
Traffic Accidents	14394 (7.07)	52601 (25.84)	67004 (32.92)	12093 (7.35)	29533 (17.94)	41631 (25.29)	6024 (2.88)	13019 (6.22)	24321 (11.62)
Other external causes of accidental injuries	14271 (7.01)	42288 (20.78)	56561 (27.79	29046 (17.65)	39064 (23.73)	68121 (41.39)	79197 (37.84)	50962 (24.35)	130170 (62.20)
Intentional self-harm injuries	4252 (2.09)	16852 (8.28)	21104 (10.37)	2182 (1.33)	9947 (6.04)	12129 (7.37)	846 (0.40)	4569 (2.18)	5416 (2.59)
Assaults	3286 (1.61)	25176 (12.37)	28464 (13.98)	1990 (1.21)	9945 (6.04)	11935 (7.25)	1142 (0.55)	3538 (1.69)	4682 (2.24)
Events of undetermined intent	5776 (2.84)	17660 (8.68)	23440 (11.52)	8937 (5.43)	13098 (7.96)	22036 (13.39)	21380 (10.22)	13127 (6.27)	34512 (16.49)
Legal interventions and military operations	8 (0.00)	46 (0.02)	54 (0.03)	4 (0.00)	29 (0.02)	33 (0.02)	14 (0.01)	21 (0.01)	35 (0.02)
Complications of medical and surgical care	2712 (1.33)	3037 (1.49)	5749 (2.82)	3901 (2.37)	3695 (2.24)	7596 (4.62)	5069 (2.42)	3023 (1.44)	8094 (3.87)
Sequels of external causes	290 (0.14)	875 (0.43)	1166 (0.57)	435 (0.26)	675 (0.41)	1110 (0.67)	1334 (0.64)	721 (0.34)	2055 (0.98)
Total	44989 (22.10)	158535 (77.89)	203542 (100.00)	58588 (35.60)	105986 (64.39)	164591 (100.00)	115006 (54.95)	88980 (42.52)	209285 (100.00)
Race/Ethnicity									
White	25353 (12.43)	79312 (38.88)	104666 (51.31)	36585 (22.23)	59595 (36.21)	96181 (58.44)	79040 (38.74)	55923 (27.41)	134966 (66.16)
Mixed	14902 (7.30)	62558 (30.66)	77463 (37.97)	15921 (9.67)	35337 (21.47)	51263 (31.15)	25204 (12.35)	24178 (11.85)	49385 (24.21)
Black	2575 (1.26)	9197 (4.51)	11772 (5.77)	2848 (1.73)	5383 (3.27)	8231 (5.00)	4461 (2.19)	3656 (1.79)	8118 (3.98)
Unspecified	1984 (0.97)	6521 (3.20)	8519 (4.18)	2572 (1.56)	4443 (2.70)	7024 (4.27)	4874 (2.39)	3841 (1.88)	8732 (4.28)
Asian	295 (0.14)	839 (0.41)	1134 (0.56)	555 (0.34)	983 (0.60)	1540 (0.94)	1260 (0.62)	1203 (0.59)	2464 (1.21)
Indigenous ethnicity	125 (0.06)	327 (0.16)	452 (0.22)	107 (0.07)	245 (0.15)	352 (0.21)	167 (0.08)	179 (0.09)	346 (0.17)
Total	45234 (22.17)	158754 (77.82)	204006 (100.00)	58588 (35.60)	105986 (64.39)	164591 (100.00)	115006 (56.37)	88980 (43.62)	204011 (100.00)

to be continued

Continuation of Table 2

Variables	Age group								
	60 to 69 years old			70 a 79 years old			80 years or older		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
	n (%)			n (%)			n (%)		
Educational level									
No formal education	6030 (4.16)	16728 (11.55)	22759 (15.72)	10396 (8.80)	14498 (12.27)	24895 (21.08)	26372 (17.33)	14755 (9.70)	41129 (27.03)
1 to 3 years	9021 (6.23)	33111 (22.87)	42133 (29.10)	13141 (11.13)	23697 (20.06)	36841 (31.19)	26772 (17.60)	20910 (13.74)	47683 (31.34)
4 to 7 years	9191 (6.35)	34744 (23.99)	43935 (30.34)	11330 (9.59)	21566 (18.26)	32898 (27.85)	19913 (13.09)	16819 (11.06)	36733 (24.14)
8 to 11 years	5811 (4.01)	19814 (13.68)	25626 (17.70)	5448 (4.61)	10637 (9.01)	16085 (13.62)	10049 (6.61)	8174 (5.37)	18226 (11.98)
12 years or more	2715 (1.88)	7629 (5.27)	10344 (7.14)	2473 (2.09)	4920 (4.17)	7393 (6.26)	3603 (2.37)	4765 (3.13)	8368 (5.50)
Total	32768 (22.63)	112026 (77.37)	144797 (100.00)	42788 (36.23)	75318 (63.77)	118112 (100.00)	86709 (56.99)	65423 (43.00)	152139 (100.00)
marital status									
Single	10093 (5.39)	33106 (17.68)	43200 (23.07)	10714 (7.01)	16285 (10.66)	27000 (17.67)	17523 (9.18)	10038 (5.26)	27563 (14.44)
Married	16991 (9.07)	80621 (43.06)	97614 (52.13)	15740 (10.30)	56224 (36.80)	71968 (47.10)	12474 (6.53)	39334 (20.60)	51811 (27.14)
Widower	10302 (5.50)	10903 (5.82)	21205 (11.33)	24539 (16.06)	16157 (10.57)	40698 (26.64)	74518 (39.03)	29061 (15.22)	103584 (54.26)
Legally separated	4185 (2.24)	16579 (8.85)	20765 (11.09)	3531 (2.31)	7684 (5.03)	11215 (7.34)	3064 (1.60)	3414 (1.79)	6478 (3.39)
Other	544 (0.29)	3909 (2.09)	4453 (2.38)	322 (0.21)	1586 (1.04)	1908 (1.25)	337 (0.18)	1131 (0.59)	1468 (0.77)
Total	42115 (22.49)	145118 (77.50)	187237 (100.00)	54846 (35.90)	97936 (64.10)	152789 (100.00)	107916 (56.53)	82978 (43.47)	190904 (100.00)

* The excluded data were disregarded for all age groups. Source: Research data. 2023.

Table 3. Distribution of deaths by gender and proportional mortality of the male population compared to the female population due to external causes in older adults (n= 572,608). Brazil, 2000 to 2022.

Types of External Causes	Male	Female	Proportion
	n (%)	n (%)	Male: Female
Traffic accidents	95153 (16.63)	32511 (5.68)	2.93:1
Other external causes of accidental injuries	132314 (23.13)	122514 (21.42)	1.08:1
Self-inflicted injuries	31368 (5.48)	7280 (1.27)	4.31:1
Assaults	38659 (6.76)	6418 (1.12)	6.02:1
Events with undetermined intent	43885 (7.67)	36093 (6.31)	1.22:1
Legal interventions and military operations	96 (0.02)	26 (0.00)	3.69 :1
Complications of medical and surgical care	9755 (1.71)	11682 (2.04)	0.84:1
Sequels of external causes	2271 (0.40)	2059 (0.36)	1.10:1
Total	353501 (61.79)	218583 (38.21)	1.62:1

Source: Research data. 2023.

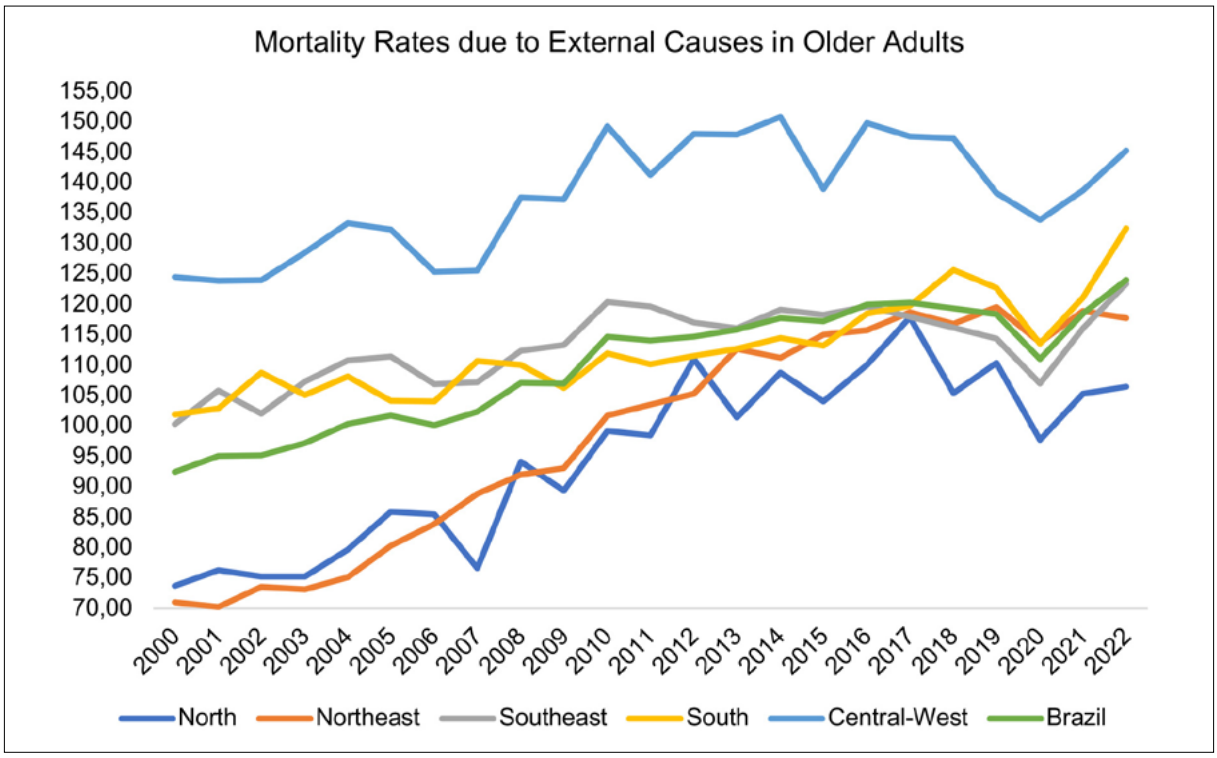

Figure 1. Distribution of mortality rates due to external causes in older adults in Brazil and its regions (n=572,608). Brazil, 2000 to 2022.

According to Figure 1, during the analyzed period, the mortality rate due to external causes in older adults in Brazil varied from 92.45/100,000 inhabitants in 2000 to 124.02/100,000 inhabitants in 2022, corresponding to an Average Annual Percent Change (AAPC) (AAPC=1.2; CI95%: 0.9–1.5) (2000-2022). Concerning the regions of Brazil, all of them showed an increase in their mortality rates due to external causes in older adults, with the central-west region registering the highest rates (AAPC=0.6; CI95%: 0.1–1.1) throughout the years, compared to the national average.

The northern region showed an average percentage increase of 44.39% in its mortality rates due to external causes in older adults during the period. Regarding the northeast region, although it achieved the lowest mortality rate due to external causes in older adults (70.26) in 2011, throughout the time series, it was the region with the highest annual percentage change in the country (APC=3.85; CI95%: 3.5–4.2), thus indicating the highest growth trend in mortality rates due to external causes in older adults compared to other regions of Brazil.

The southeast region exhibited an apparent fluctuating pattern in its mortality rates due to external causes in older adults. However, a real growth trend from 2000 to 2011 (APC: 1.36; CI95%: 0.7–2.0), followed by a non-significant reduction in the subsequent period. Among the Brazilian regions, the South had the lowest annual percentage change during the period (APC=0.89; CI95%: 0.7-1.1). However, for most of the study period, it recorded mortality rates due to external causes in older adults above the national average.

DISCUSSION

This study presented national data on mortality rates due to external causes in older adults, aged 60 years and older, in Brazil, from 2000 to 2022. At this juncture, a temporal analysis of deaths due to external causes was conducted. Based on the findings, an increase in mortality rates due to external causes in the older population was observed until the year 2013, followed by a possible stabilization, with a higher percentage of mortality among males and in the age

group between 60 and 69 years. Traffic accidents, other external causes of accidental injuries, and assaults were the main causes of deaths in this population.

External causes have shown an ascending trend across all age groups in Brazil, particularly in the older population. The increasing trend of mortality due to external causes in this demographic underscore the need for special attention to these types of injuries, given that the aging process tends to contribute to this phenomenon.

The study also revealed that the period from 2000 to 2013 accounted for the highest annual percentage change in mortality rates due to external causes in older adults, representing an average annual growth of APC: 1.86%, with statistical significance. Subsequently (2014 to 2022), the mortality rates due to external causes in older adults exhibited an apparent stability, although the data for this period did not show statistical significance (APC=0.20; CI95%: -0.4–0.8). The increasing proportion of older adults in the population, coupled with social inequalities and low quality of life, places this group of individuals in a vulnerable situation for various causes of death, including external causes.

According to Paiva and Fonseca[7], in 2019, out of the 1,349,801 deaths recorded in Brazil, approximately 142,800 (10.6%) were due to external causes, making it the 4th leading cause of total deaths. However, some government actions have been implemented. From the year 2000 onwards, with the establishment of policies for the prevention and control of these occurrences, notably the National Policy for the Reduction of Morbimortality from Accidents and Violence (2001), designed primarily to mitigate morbimortality resulting from accidents and violence in the country; and, in the realm of older adults, the inception of the Pact for Life and the National Policy on the Health of Older Adults (2006).

Despite the establishment of these policies, the generated indicators are insufficient to fully reflect the impact on the older adult population. This is due to a fracture in the comprehensiveness of care, underscoring the imperative need for the coordination of care networks, especially those pertaining to health promotion actions and the prevention of ailments[7].

Concerning gender, it was evidenced that males were the most prevalent in mortality due to external causes among individuals aged 60 to 79 years and 70 to 79 years, affirming that external causes, in addition to affecting young adult males, are also accountable for a considerable number of deaths among older men.

Regarding age group, individuals aged 80 years or older were the most significant victims of external causes, followed by those aged 60 to 69 years, with transport accidents identified as the primary causes responsible for these fatalities. This phenomenon can be explained by the fact that this demographic is more active compared to individuals of higher age, ensuring an active life with improved levels of independence and autonomy, and demonstrating greater social participation, thus potentially being more exposed to accidents and violence[8].

According to the literature, the mobility of actively engaged older adults contributes to the occurrence of accidents within the urban areas of cities, thereby augmenting the vulnerability of this population to such incidents[9]. Moreover, the aging process, the prevalence of comorbidities, alcohol consumption, traffic dynamics, and structural challenges in spaces frequented by older individuals are risk factors that escalate vulnerability to traffic accidents[10].

Consequently, older individuals classified as pedestrians, in addition to potential limitations arising from functional conditions, coupled with inadequate traffic infrastructure and the adoption of inappropriate behaviors in transit, such as imprudence on the part of car and motorcycle drivers, contribute to the susceptibility of older adults to transportation accidents. Another noteworthy aspect is the behavior of older adults in traffic, particularly during street crossings, wherein certain situations arise without due attention to the use of crosswalks and traffic signals[10].

The group of causes denominated as other external causes of accidental injuries was the most prevalent among older adults due to external factors. It is crucial to emphasize that within this group, falls constituted the second most significant cause of fatalities resulting from external causes in the older population, particularly among individuals aged over

80, with the female demographic in this age bracket experiencing a higher incidence. Such an occurrence is justified by various intrinsic and extrinsic factors, such as polypharmacy, iatrogenic effects, and the decline in functional capacity, which contribute to the occurrence of minor injuries, fractures, cranial traumas, and hip fractures[8,11].

In accordance with this, falls among older adults further compromise the aging process, constituting injuries to capabilities, impairing functionality, and predisposing individuals to subsequent episodes of falls. Furthermore, these events stem from the progression of chronological age, a consequence of the effects of age-related changes, pathologies, and the environment in which one resides, wherein, in many situations, adequate accessibility for older individuals is not ensured. A study on the analysis of mortality due to external causes in older adults across Brazilian capitals from 1996 to 2005 revealed that falls accounted for an average of 22.5% of fatalities[12].

Despite not exhibiting a high prevalence in external cause-related deaths among older adults, complications from medical and surgical care were evident as causes of mortality across all age groups of older adults. This underscores the imperative for attention to this type of cause, considering that the various factors inherent to aging already render the older adults more vulnerable, thereby increasing the necessity for surgical procedures, especially in the context of falls. An epidemiological study conducted with older individuals following hip fracture occurrences at a teaching hospital in Rio de Janeiro revealed that out of 167 seniors who experienced falls, 39 sustained hip fractures. These fractures, coupled with chronic illnesses, contributed to a postoperative mortality rate of 8.2%. This event occurred prior to hospital discharge, affecting predominantly the female population, which is more susceptible to falls and, consequently, more prone to experiencing hip fractures with higher prevalence[13].

About the proportionality of deaths due to external causes between genders, the study identified assaults as the most prominent type of external cause of mortality. A ratio of six men to each woman was observed in deaths caused by assaults among older individuals. The literature suggests that men more frequently expose themselves to situations involving accidents and violence due to behaviors that reaffirm masculinity, demonstrating greater power and demanding virility and aggressiveness. These behaviors render them more susceptible to premature deaths from preventable causes[1].

It is important to highlight that the increase in the number of older individuals contributes to a rise in issues related to this segment of the population, particularly those associated with aggression by caregivers in both familial and/or institutional settings. This is attributed to heightened financial, social, and psychological dependency. This circumstance results in a series of harms for older adults, encompassing both physical and mental consequences. These effects include psychosomatic illnesses, diminished physical defenses, alterations in activities of daily living, dehydration, changes in appetite patterns, malnutrition, depression, loss of identity, suicide attempts, and even death[13].

According to a study published in 2018, Latin America was considered the region with the highest mortality rates due to assaults (19.9/100,000 inhabitants), followed by the Caribbean (16.3/100,000), Africa (10.1/100,000), North America (5.6/100,000), Asia (2.1/100,000), Oceania (1.3/100,000), and Europe (1.2/100,000). According to the authors, the high mortality rates due to assaults in Brazilian regions are concentrated in the North, Northeast, and Midwest. However, the association between assaults and high mortality rates in older individuals may be related to pronounced social inequalities, low levels of education, among other factors[1].

Another group of externally caused mortality with gender-relevant significance was represented by intentionally self-inflicted injuries, with a ratio of four men to one woman. The literature suggests that this occurrence stems from the aging process, wherein many men, upon aging, retire from professional life. This transition marks a new phase of life with the cessation of the traditional roles of economic provider and familial reference, leading to social repression. Consequently, a heightened risk of isolation, sadness, stress, and a desire to end one's

life. The situation of social isolation and loneliness becomes a risk factor for suicide[14,15].

Regarding the distribution of mortality rates due to external causes in older individuals across regions of Brazil (2000-2022), the study observed an overall upward trend in deaths throughout the examined period and across all regions. However, mortality rates in the South, Southeast, and Midwest regions stood out as the highest in comparison to the country's average rate.

Nonetheless, in some areas such as the North region, a pronounced underreporting regarding the registration of the cause of death due to external causes, often being confused with other reasons, particularly complications and hospital infections. Additionally, a scarcity of healthcare services offered to the older population, with a weakening of public policies due to various factors, primarily those related to mismanagement[16].

In the Brazilian national scenario, a noteworthy upward trend across all regions, with particular emphasis on the North and Northeast, where a significant variation was observed. Conforming to Carmo et al.[8] (2017), this regional difference is likely a result of local cultural and socioeconomic disparities, as the literature highlights a higher occurrence of accidents and violence among those less privileged individuals with low educational levels living in precarious conditions. Nevertheless, the South and Southeast regions exhibit lower rates of illiteracy and social inequalities. Additionally, most municipalities with good human development in Brazil are concentrated in these regions.

Thus, the need for effective implementation of policies and programs directed towards the health of the older population is glaring. Among these initiatives is the National Health Policy for Older Adults, which, within the context of external causes, emphasizes the importance of undertaking preventive actions for accidents, violence, and avoidable factors.

A limitation of this study is the use of secondary data extracted from DATASUS, which may contain some underreported information. Nevertheless, the provided information is representative for Brazil, conferring external validity to the research.

CONCLUSION

In evaluating the situation of mortality due to external causes, in all its multiple aspects and within the temporal scope of this study, it was evidenced from the results a trend of increasing mortality among older individuals due to external causes.

Among the highlighted causes, traffic accidents, other external causes of accidental injuries, and assaults stood out. Concerning age group, a greater predominance among individuals aged 60 to 69 years. The male gender was more affected among the causes, reaffirming gender as a risk factor for mortality among older individuals.

The findings of this research underscore the urgent need for the development of additional public health, safety, and social policies for the older population, as well as the reinforcement of existing policies. The older population deserves attention and care from society.

Thus, it is suggested that further studies be conducted on this topic to contribute to the refinement of public policies aimed at prevention and, consequently, the reduction of mortality rates influenced by external causes, which can and should be prevented. Alternatively, this study provides an overview of the current epidemiological situation regarding mortality due to external causes in older individuals.

AUTHORSHIP

- Danilo E. M. Dias - conception and design or analysis and interpretation of data, drafting the paper or critically revising it, approval of the version to be published.
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