

Factors Related to Death Outcome Due to External Causes: An Integrative Review

Fatores Relacionados ao Desfecho de  bito por Causas Externas: Revis o Integrativa

Factores Relacionados con la Muerte por Causas Externas: Una Revisi n Integradora

RESUMO

Objetivo: identificar fatores relacionados aos  bitos por causas externas. **M todos:** revis o integrativa cuja fonte dos dados foram PubMed, LILACS e Scielo, utilizando os termos: causas externas, viol ncia, acidentes,  bito e mortalidade. Como crit rio de inclus o foram adotados ser estudos observacionais publicados nos  ltimos cinco anos. Foram encontrados 16.869 estudos, e ap s leitura de t tulos, resumos e dos textos na  ntegra, a amostra foi composta por 30 artigos. **Resultados:** Nos acidentes de tr nsito os fatores mais predominantes foram o sexo e a idade. Para suic dio e homic dio, os fatores sexo masculino e idade produtiva predominaram; o sexo feminino e idoso estiveram mais relacionados  s quedas. **Conclus o:** O estudo apontou fatores relacionados ao desfecho de  bito por causas externas e refor ou a import ncia de reconhecer esses fatores para identificar grupos, comportamentos e condi  es mais expostas a aumentar a probabilidade de  bito e, assim subsidiar an lises no sentido de evitabilidade desse desfecho.

DESCRIPTORES: Causas externas; Viol ncia; Acidentes;  bito; Mortalidade.

ABSTRACT

Objective: To identify factors associated with deaths from external causes. **Methods:** An integrative review using data from PubMed, LILACS, and SciELO, employing the terms: external causes, violence, accidents, death, and mortality. Inclusion criteria required studies to be observational and published within the last five years. A total of 16,869 studies were identified; following the review of titles, abstracts, and full texts, the final sample consisted of 30 articles. **Results:** Regarding traffic accidents, the most predominant factors were sex and age. For suicide and homicide, male sex and working age predominated, whereas female sex and older age were more closely associated with falls. **Conclusion:** The study identified factors associated with death from external causes and underscored the importance of recognizing these factors to pinpoint the groups, behaviors, and conditions that increase the likelihood of death, thereby supporting analyses regarding the preventability of this outcome.

DESCRIPTORS: External Causes; Violence; Accidents; Death; Mortality.

RESUMEN

Objetivo: Identificar factores asociados a las muertes por causas externas. **M todos:** Se realiz  una revisi n integradora utilizando datos de PubMed, LILACS y SciELO, empleando los t rminos: causas externas, violencia, accidentes, muerte y mortalidad. Los criterios de inclusi n exig an que los estudios fueran observacionales y publicados en los  ltimos cinco a os. Se identific  un total de 16.869 estudios; tras la revisi n de t tulos, res menes y textos completos, la muestra final qued  constituida por 30 art culos. **Resultados:** En cuanto a los accidentes de tr fico, los factores predominantes fueron el sexo y la edad. Para el suicidio y el homicidio predominaron el sexo masculino y la edad laboral, mientras que el sexo femenino y la edad avanzada se asociaron m s estrechamente con las ca das. **Conclusi n:** El estudio identific  factores asociados a la muerte por causas externas y subray  la importancia de reconocer dichos factores para determinar los grupos, comportamientos y condiciones que aumentan la probabilidad de muerte, contribuyendo as  a los an lisis sobre la prevenibilidad de este desenlace.

DESCRIPTORES: Causas Externas; Violencia; Accidentes; Defunci n; Mortalidad.

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INTRODUCTION

The World Health Organization's (WHO) International Classification of Diseases, 11th Revision (ICD-11), defines external causes as conditions resulting from injuries caused by factors external to the body, encompassing both unintentional and intentional events⁽¹⁾.

Accidents and violence constitute the largest group of external causes, and the literature indicates that the occurrence of these events is not random but is intrinsically linked to socioeconomic conditions, alcohol and drug use, working conditions, unsafe urban mobility, and weaknesses in the social protection system. In this context, broadly speaking, external causes lead—particularly in developing countries—to premature deaths, disabilities, reduced and quality of life. Furthermore, they have a significant impact on healthcare expenditures, particularly in urgent care, emergency, and rehabilitation services⁽¹⁻³⁾.

A study⁽⁴⁾ presents an analysis of expenditures resulting from hospital admissions due to external causes and shows that between 2008 and 2021,

R\$ 17.4 billion was allocated for this purpose, also highlighting a possible causal relationship between the impact of external causes and the deepening of socioeconomic inequalities.

The Pan American Health Organization (PAHO) reports that in the Americas in 2019, 2% of all deaths were due to traffic accidents, 3% to interpersonal violence, and 1.4% to suicide, accounting for 24%, 30%, and 15%, respectively, of all deaths from external causes, affecting, for the most part, men and young people⁽³⁾. National statistics for the same year showed that traffic accidents accounted for 2.43% of all deaths, interpersonal violence for 3.26%, and suicide for 1% of all deaths. Data from Brazil for the year 2024 on the same causes corresponded to 2.49%, 2.6%, and 1.09%, showing that there was a percentage decrease only in deaths due to assaults⁽⁵⁻⁶⁾.

In this regard, this study is justified by the importance of gathering knowledge about the factors related to deaths from external causes, which can aid in a more detailed characterization of who, when, and under what circumstances these deaths occur;

thus, the objective of the study was to identify factors related to deaths from external causes.

METHOD

This is an integrative review, whose research question was: “What factors are associated with deaths from external causes?” The search strategy utilized the following keywords: external causes, violence, accidents, death, and mortality—all contained in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH)—combined with the Boolean operators AND and OR. The inclusion criteria used were: observational studies that drew on data regarding individuals of any age group who died from external causes, published in any language within the last 5 years (from January 2020 through November 2025), with at least a title and abstract available and indexed in the Latin American and Caribbean Social and Health Sciences (LILACS), National Library of Medicine (PubMed), and Scientific Electronic Library Online (SciELO) databases. Regarding the inclusion

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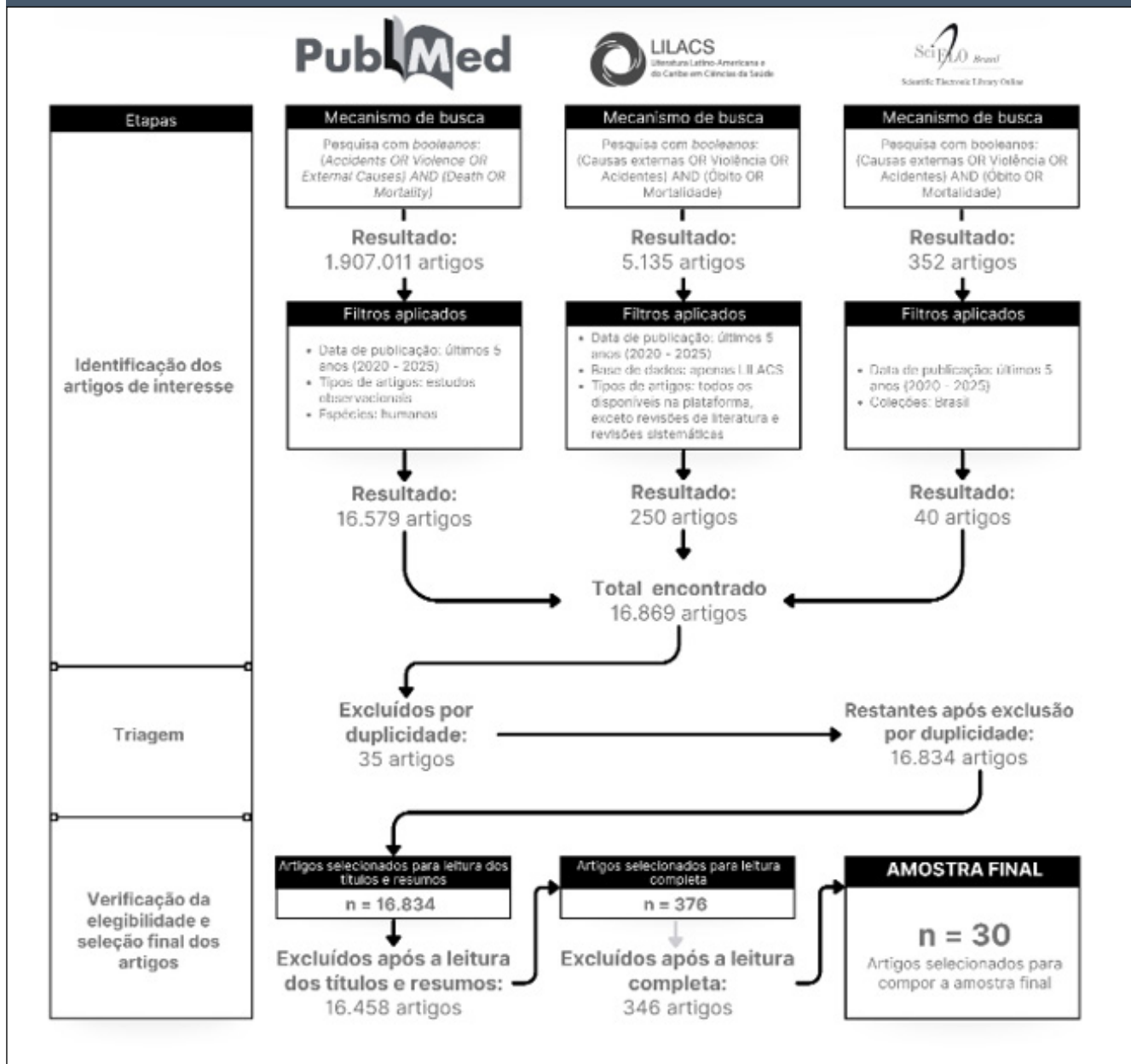
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criterion of death from an external cause, we verified whether the underlying cause of death was cited in the article and was consistent with the classification of the condition in Chapter XX [External causes of morbidity and mortality (V01-Y98)] of the ICD-10. The use of ICD-10 rather than ICD-11 is justified here,

since the majority of the studies used the former. Publications that did not address the research question were excluded, as were those outside the search range; duplicate publications were counted only once; and literature reviews, editorials, manuals, and guidelines were also excluded. The complete search strategy followed the

steps detailed in the flowchart in Figure 1. state, country, and year of data collection. Both must be legible, and the author must cite the appropriate source. List the source below the illustrations with their respective authors.

Figure 1: Flowchart of the search strategy and identification of the studies, Mato Grosso, Cuiab , 2026.



Source: Data from the study. Prepared by: Agra EAP, Landim GS, Sodr  GR, Aquino NC, Carlota ACM, Souza CVP, Ara jo YB, 2026.

Given the final sample, we proceeded to read all included texts in their entirety and complete a semi-structured questionnaire comprising the following information: identification of the article by title, journal, authors, year of publication, country, database/library, study design, data source, underlying cause of death (ICD-10), main variables used, analysis, key related factors found in the results and discussion, in order to facilitate the summarization and synthesis of knowledge.

After completing the 30 check-

lists, the information was consolidated and the results were compiled. In the discussion, we chose to group the findings from studies addressing the same underlying cause of death as follows: accidents (V01–X59), subdivided into transportation accidents (V01–V99) and other external causes of accidental injury (W00–X59) and their subclassifications; intentionally self-inflicted injuries (X60–X84); assaults (X85–Y09); and events of undetermined intent (Y10–Y34). Other causes were not discussed but were included in the classification of external

causes (V01–Y98) of the respective selected study. As this was a review study using publicly available data, evaluation and approval by the Ethics and Research Committee involving human subjects were not required.

RESULTS

Table 1 presents information on the selected articles regarding title, authors, and year of publication, ICD classification, and factors related to death mentioned by the authors of each study.

Table 1: Articles included in the final study sample by study title, authors, year, ICD-10 classification, and factors related to the outcome of death, Mato Grosso, Cuiabá, 2026.

Title, authors and year	ICD-10	Factors related to death
Análise da tendência da mortalidade por causas externas em pessoas idosas no Brasil, 2000 a 2022. Dias DEM, Costa AÁS, Martins KDL, Alexandrino A, Nogueira MF, Marinho CSR, 2024 ⁽⁷⁾ .	V01 - Y98	Sex, age group, race/skin color, education level, marital status, year, and region
Diagnóstico situacional de mortalidade entre adolescentes em condição de vulnerabilidade. Neto JADS, Silva ACS, Knupp VMDAO, Souza ACD, Góes FGB, Silva ÍR, 2020 ⁽⁸⁾ .	V01 - X59, X85 - Y09	Age, sex, race
Epidemiología del trauma de alta energía en Chile: análisis ecológico con registros públicos. Barahona M, Alegría A, Amstein C, Cárcamo M, Barahona M, 2024 ⁽⁹⁾ .	V01 - X59	Country income level, proportion of health expenditure relative to total expenditure, physician density and health investment, age, sex, type of health insurance, healthcare institution, type of trauma, affected organs, and place of death
Evolución del nivel de mortalidad vial en Argentina en el periodo 1998-2017. Escanés G, Ribotta BS, González LM, Escanés G, Ribotta BS, González LM, 2020 ⁽¹⁰⁾ .	V01 - V99	Sex, age, jurisdiction of residence
Mortalidad en accidentes por moto en Venezuela, y su relación con Políticas Públicas de seguridad vial y preventiva, 1996-2018. Rísquez A, Chique J, Manresa C, Sáenz M, 2023 ⁽¹¹⁾ .	V01 - V99	Year and temporal evolution, age, sex, mode of transport
Mortalidad en estudiantes universitarios según causas de muerte (2004-2018). Marconi A, Westaby K, Donovan V, Ranum N, Roberts C, 2023 ⁽¹²⁾ .	X60 - X84, Y10 - Y34, V01 - V99	Demographic data, academic data, year of death
Mortalidade por causas externas no estado de Rondônia: análise de série temporal de 1999 a 2015. Pereira PPS, Araújo LX, Moreira KFA, Figueiredo ACMG, 2020 ⁽¹³⁾ .	X60 - X84, X85 - Y09, Y10 - Y34, V01 - V99	Sex, age group, race/skin color, health region
Perfil de óbitos associados à trauma abdominal submetidos ao instituto médico-legal do município de Toledo-PR. Aliseda MM, Sabec-Pereira DK, Leite J, Pereira KF, 2024 ⁽¹⁴⁾ .	X60 - X84, X85 - Y09, V01 - V99	Sex, age, type of injury, circumstance of death (intentional or accidental), most affected organ, abdominal trauma as exposure
Recálculo de las tendencias de mortalidad por accidentes, suicidios y homicidios en Argentina, 1997-2018. Santoro A, 2020 ⁽¹⁵⁾ .	X60 - X84, X85 - Y09, V01 - V99, Y10 - Y34	Age, sex, region of residence
Sex differences in suicide mortality in Newfoundland and Labrador: An observational study with medical examiner data from 1997 to 2016. Wilson MM, Pollock NJ, Power ND, Karaivanov Y, Mulay S, Reccord C, 2022 ⁽¹⁶⁾ .	X60 - X84	Age, sex at birth, circumstances of death, recent social factors, medical history
Fatores associados ao óbito infanto-juvenil por acidentes de trânsito em rodovias federais brasileiras. Costa ALM, Oliveira-Figueirêdo DS, Rocha FL, 2025 ⁽¹⁷⁾ .	V01 - V99	Sex, region, time of day, weather condition, type of road, type of accident, type of vehicle

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Mapa dos homic�dios ocultos no Brasil entre 1996 e 2021. Cerqueira DRC, Lins GOA, 2025 ⁽¹⁸⁾ .	X85 - Y09	Sex, race/skin color, age, marital status, education level, location of the incident, instrument of the underlying cause of death, year, month, day of the week, and Federal Unit of occurrence
Mortalidade por causas externas de inten��o indeterminada nas regi�es do Brasil, 2012 a 2021. Oliveira LR, Melanda FN, S� EAS, Jesus MB, Silva HT, 2025 ⁽¹⁹⁾ .	Y10 - Y34	Geographic region of Brazil, year/period, temporal trend
Mortality in Brazilian federal highway police officers: time series from 2001 to 2020. Marins EF, Ferreira RW, Freitas FC, Dutra GFAA, Vasconcelos J�nior JR, Caputo EL, 2022 ⁽²⁰⁾ .	X60 - X84, X85 - Y09, V01 - X59	Sex, age, length of service, region of operation
Mortality patterns in municipalities of a mining region before the Brumadinho dam failure, state of Minas Gerais, Brazil. Malta DC, Reis GM, Veloso GA, Cardoso LSM, Hartz ZMA, Cunningham M, et al., 2023 ⁽²¹⁾ .	X60 - X84, X85 - Y09, V01 - X59	Age, municipality, triennium, Brazilian Deprivation Index (income, education, and household conditions)
O impacto da mortalidade por causas externas na esperan�a de vida nos munic�pios produtores de petr�leo da Bacia de Campos/ RJ. Moraes MX, Souza J, Passarelli AH, 2023 ⁽²²⁾ .	V01 - Y98	Period, sex, age, municipality
Perfil e evolu��o da mortalidade por causas externas em Joinville (SC), 2003 a 2016. Cardoso S, Gaertner MHCN, Haritsch L, Henning E, Kropiwiec MV, Franco SC, 2020 ⁽²³⁾ .	V01 - V99, X60 - X84, X85 - Y09	Sex, age, race/skin color
Trends in mortality due to traffic accidents in Brazil during the period from 1997 to 2015 for the male population. Dalpiaz A, Schneider IJC, Pereira A, Cardoso RB, Marcolino AM, Barbosa RI, 2022 ⁽²⁴⁾ .	V01 - V99	Sex, age, year, states, regions
Complex versus simple suicides in Northern Tunisia: A 17 years autopsy-based study. Kort I, Bchir K, Belleli M, Hmandi O, Mannoubi S, Allouche M, 2025 ⁽²⁵⁾ .	X60 - X84	Type of suicide (simple or complex, planned or unplanned), sex, age, history of mental illness, number of methods used, type of suicidal method
Fatal road traffic accidents and injuries: a preliminary study. Sartori A, Russo A, Sardo A, Raniero D, 2025 ⁽²⁶⁾ .	V01 - V99	Type of victim, time to death, cause of death, distribution of external and internal injuries, toxicological findings
Assessing fall mortality by field-relevant categories at an urban level i trauma center. Gross C, Menard J, Mull J, Diaz-Zuniga Y, Skarupa D, Crandall M, 2024 ⁽²⁷⁾ .	W00 - W19	Category of fall (fall from standing height, higher or lower than standing height), age, sex, race, type of health insurance, GCS (Glasgow Coma Scale), ISS, presence of traumatic brain injury, length of stay in Intensive Care Unit (ICU)
Drowning mortality in Catalonia (2019-2022). Suelves JJM, Barberia ME, Casades�s VJM, Ortega SM, Xifr� CA, 2024 ⁽²⁸⁾ .	W65 - W74	Medicolegal cause, type of aquatic environment (swimming pools, natural waters), age, sex, date of death, municipality of origin
Mortality due to traffic accidents in Colombia: Profiles of pedestrians and cyclists, 1998-2019. Montenegro MG, Agudelo CMC, Mu�oz RDI, 2023 ⁽²⁹⁾ .	V01 - V99	Sex, age, geographic variables, education level, classification of the individual in traffic
Heat-related mortality in the extreme summer of 2022—an analysis based on daily data. Huber V, Breitner BS, He C, Matthies WF, Peters A, Schneider A, 2024 ⁽³⁰⁾ .	W85 - W99	Duration of heat exposure, heat intensity, geographic location
Air pollution deaths attributable to fossil fuels: observational and modelling study. Lelieveld J, Haines A, Burnett R, Tonne C, Klingm�ller K, M�nzel T, 2023 ⁽³¹⁾ .	X40 - X49	Age, income, socioeconomic status, geographic region, life expectancy, etiological variables associated with the cause of death
Epidemiology of suicide mortality in Paraguay from 2005 to 2019: a descriptive study. Santacruz E, Duarte ZD, Benitez RG, Ca�ete F, Smits D, Barengo NC, 2024 ⁽³²⁾ .	X60 - X84	Age, sex, education level, primary cause of death, state of residence, location of suicide, method of suicide
Suicides among adults in Paraguay: An 18-year national exploratory study (2004-2022). Torales J, Barrios I, Melgarejo O, Tullo GJE, D�az NR, O'Higgins M, 2023 ⁽³³⁾ .	X60 - X84	Method of suicide, age, sex, place of residence, location where the act was carried out
Factors associated with the homicides of women who are victims of violence. Barros SC, Pimentel DR, Oliveira CM, Bonfim CV, 2021 ⁽³⁴⁾ .	X85 - Y09	Sex, age, race/skin color, marital status, type of injury, area of occurrence

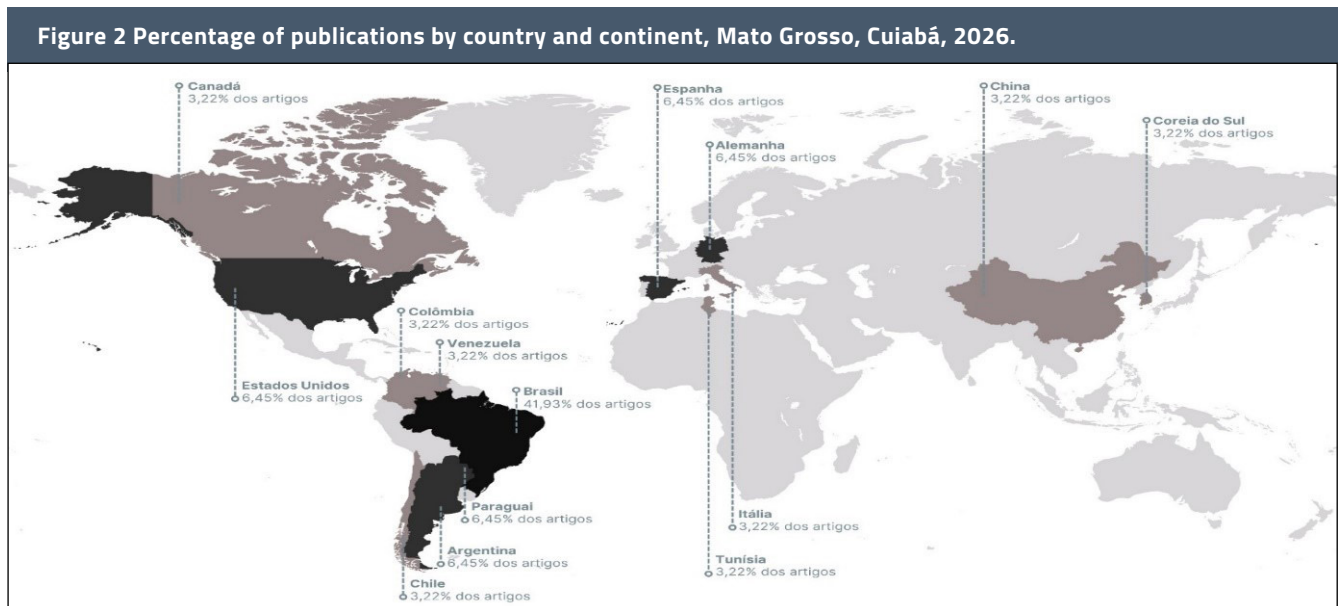
Ten-year trend analysis of mortality due to external causes of injury in people with disabilities, South Korea, 2008-2017. Kim YS, Kwon S, Ho SH, 2021 ^[35] .	V01 - V99, W00 - W19, W65 - W74, X00 - X09, X40 - X49, Y10 - Y34, X60 - X84, X85 - Y09	Disability, temporal evolution, sex, age, type of disability
Descriptive study of a series of deaths due to accidental falls in the elderly. Caballero CP, Barber� ME, Suelves JJM, Garc�a SF, 2021 ^[36] .	W00 - W19	Age, sex, comorbidities, date of death, place of origin of the corpse, type of fall, main cause of death, treatments used, number of medications in use

Source: Study data, 2026. Prepared by: Agra EAP, Landim GS, Sodr  GR, Aquino NC, Carlota ACM, Souza CVP, Ara jo YB, 2026.

Regarding the country with the highest number of published studies on the topic, Brazil had the largest number of published articles, at 41.93% (n = 13); other countries

had a relatively smaller share. Among these, Germany, Paraguay, and Argentina were the countries with two publications each. Regarding the distribution by continent, it is evident that

Europe and the Americas account for the majority of the selected scientific output, followed by Asia, which had a more modest percentage of contributions, as illustrated in Figure 2



Source: Study data, 2026. Prepared by: Agra EAP, Landim GS, Sodr  GR, Aquino NC, Carlota ACM, Souza CVP, Ara jo YB, 2026.

Regarding the distribution by underlying cause of death, studies on transportation accidents (V01-V99) numbered 13; intentionally self-inflicted injuries (X60-X84) totaled 12; and deaths due to assaults (X85-Y09) totaled 11. It should be noted that, in some cases, a single study addressed multiple causes. Other categories in Chapter XX were represented in smaller numbers, including accidental poisonings and exposure to harmful substances (X40-X49), events

of undetermined intent (Y10-Y34), falls (W00-W19), accidental drowning and submersion (W65-W74), exposure to smoke, fire, and flames (X00-X09), and exposure to electric current, radiation, and extreme environmental temperatures and pressures (W85-W99). In two studies, the classification was maintained within the broader categories of Chapter XX of the ICD-10 (V01-Y98), since these studies—which were exclusively Brazilian—address, to some extent,

all major ICD groups related to external causes. A similar situation was observed in some of the studies classified as accidents (V01-X59), which were aggregated because they included both transportation accidents and other forms of trauma, along with their respective assessed factors.

To describe the specific factors related to death, the variables describing who, when, and where each fatal outcome occurred were observed and recorded, and then tallied in re-

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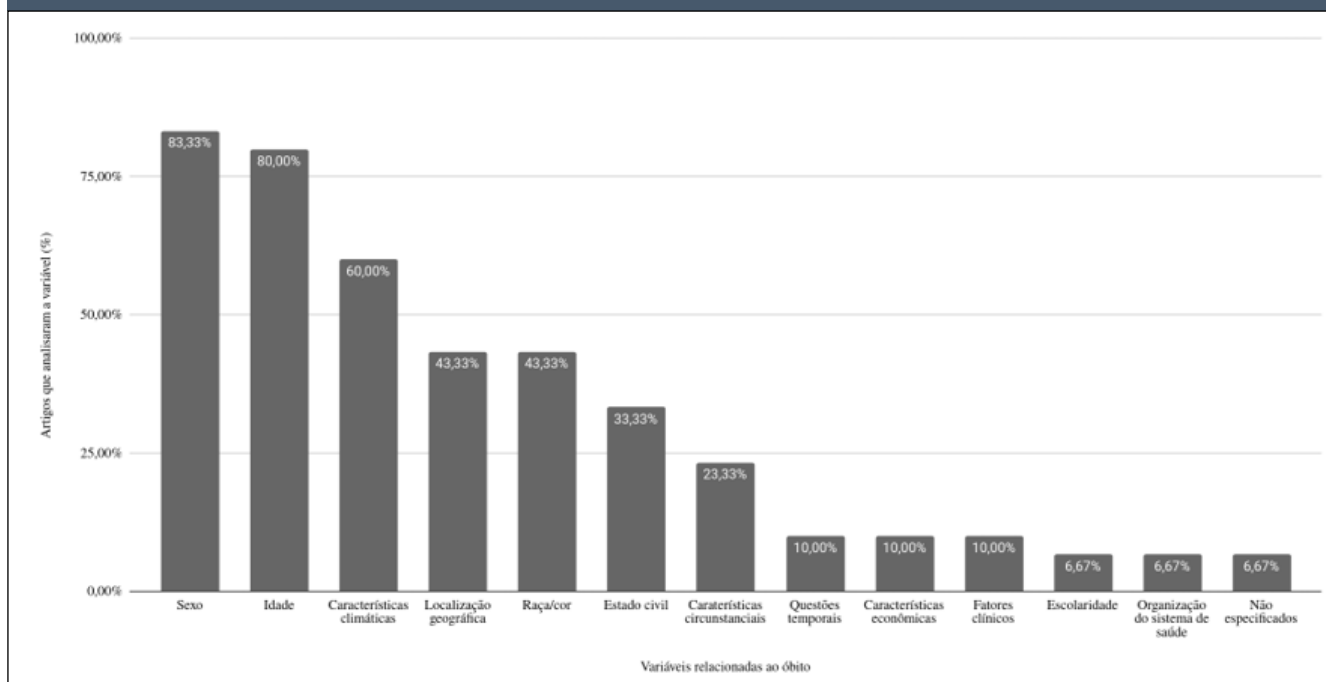
lation to the total number of articles that specifically mentioned each one. Some variables were aggregated because they reflected the same theme but used different terms; for example, geographic location, which encom-

passed municipalities, states, regions, and other places. From this perspective, the factors that appeared most frequently were sex, age, and geographic location.

In addition, factors such as tem-

poral issues, circumstantial characteristics of death, and clinical factors appeared in a lower percentage, while nonspecific factors and those related to the healthcare system were the least frequent, as shown in Figure 3.

Figure 3: Distribution of death-related factors mentioned in the selected studies, Mato Grosso, Cuiab , 2026.



Source: Study data, 2026. Prepared by: Agra EAP, Landim GS, Sodr  GR, Aquino NC, Carlota ACM, Souza CVP, Ara jo YB, 2026.

DISCUSSION

Overall, the profile of traffic accident (TA) deaths was predominantly among men of working age⁽¹⁰⁻¹¹⁾. In an analysis of trends in TA deaths in Brazil between 1997 and 2015, a decline in the overall mortality trend was observed, although there was no significant change in this rate for men⁽²⁴⁾. The ratio of deaths between men and women varied depending on the type of vehicle, ranging from 1:3 to 1:13 for pedestrians and cyclists, respectively⁽²⁹⁾. Despite this male-dominated trend, a study conducted in the city of Verona found that women were the primary victims in car accidents, contrasting with another study⁽²⁶⁾.

With regard to age, the most affect-

ed group was those aged 15 to 49⁽¹⁰⁻¹¹⁾, although in Brazil the analysis focused specifically on people aged 20 to 29⁽²⁴⁾. In an assessment of child and adolescent deaths in the country, the most affected group was preschool-aged children⁽¹⁷⁾, and there was a reduction in the death rate among those aged 0 to 14 in a study conducted in Joinville⁽²³⁾. A study that assessed external causes of death among older adults in Brazil between 2000 and 2022 found that workplace accidents were the leading cause of death for those aged 60 to 69 and the second leading cause for those aged 70 to 79, with an upward trend⁽⁷⁾. The age group of those who died from accidents differed, averaging 74 years in Verona⁽²⁶⁾, whereas in Colombia, it was people over 60,

followed by those aged 25 to 44⁽²⁹⁾; cyclists had a mean age of 25⁽²⁶⁾, while car and motorcycle drivers followed the aforementioned trend of being of working age⁽²⁴⁾.

In terms of geographic location, there were 4,524 and 2,100 traffic-related deaths in Argentina and Venezuela, respectively⁽¹⁰⁻¹¹⁾. In both countries, as well as in Colombia and Brazil, there was an overall decrease in total deaths over the years analyzed, from 1998 to 2019. In Brazil, while the South and Southeast regions showed a decrease in this type of death, the North and Northeast regions showed an increase in mortality. Specifically regarding the Midwest, only the Federal District and Mato Grosso showed statistical significance,

with the latter experiencing a 1.5% increase in deaths. The differences among the regions were associated with educational level, alcohol consumption, vehicle fleet size, and poor enforcement of traffic regulations, even though Brazil's Traffic Code has been in effect since 1998^(24,30).

When comparing deaths among men involved in accidents, deaths involving motorcycles resulted in more fatalities than those involving automobiles⁽²⁴⁾, which is also consistent with the Italian study⁽²⁶⁾. An American study reports that 53% and 27% of the deaths were among drivers and pedestrians, respectively, differing from the findings of other studies⁽¹²⁾. Motorcycle-related mortality proved to be an important social indicator, associated with more affordable purchase prices, inconsistent quality control of mandatory safety equipment such as helmets, and a lack of specific regulations regarding alcohol consumption by riders⁽¹¹⁾.

Regarding the circumstantial factors associated with death, the studies identified: accidents occurring at dawn, weather conditions that partially impaired vision, accidents occurring in rural areas, weekends, and failure to use seat belts, in addition to alcohol consumption^(17,26). It was also associated with a low level of education and not having health insurance⁽²⁹⁾. In Brazil, being a federal highway patrol officer between 2001 and 2020 was also a factor related to death from traffic accidents⁽²⁰⁾.

Regarding the clinical factors reported in the Italian study⁽²⁶⁾, cardiogenic and neurogenic shock were common in motor vehicle accidents, with pedestrians suffering more frequently from multiple organ failure, respiratory failure, pulmonary embolism, and sepsis. The injured areas varied: pedestrians and car occupants had more head injuries, which were rare among motorcyclists, who were more likely to suffer rib or sternum fractures⁽²⁶⁾.

. Contusion injuries were the most common cause of death resulting from abdominal trauma, which was prevalent in accident-related deaths⁽¹⁴⁾.

Factors related to the healthcare system, such as the density of physicians per capita and health expenditures in WHO member countries, were associated with traffic accident-related deaths, with higher mortality rates observed in countries with lower health expenditures and lower physician density. These data may vary by region, which could explain differences in mortality rates between Mato Grosso and other states based on investments in healthcare⁽⁹⁾.

An analysis of mortality patterns due to other external causes of accidental injury—specifically falls—revealed that older adults are the most affected, with a sharp increase beginning in the fifth decade of life and peaking among individuals aged 80 and older⁽³⁵⁾. Furthermore, a study from Tarragona noted that women had a higher average age at death than men (82.9 and 77.6, respectively), while men had a slightly higher overall mortality rate⁽³⁶⁾.

Furthermore, polypharmacy was associated with deaths: 82% of the victims were taking at least one medication, while 57.5% were taking five or more simultaneously. There is also an association with the prevalence of comorbidities, which is higher among women and in patients admitted from hospitals⁽³⁵⁻³⁶⁾.

Regarding fall height, studies in trauma centers show that the “median lethal dose” corresponds to falls from heights between 6.61 meters and 14.6 meters, with falls from heights above 18 meters resulting in a mortality rate close to 100%⁽²⁷⁾. In the home environment, falls from stairs or furniture have a higher fatality rate (60%) compared to falls on the same level (40%)⁽³⁶⁾.

The included studies indicate that deaths from accidental drowning

and submersion exhibit an epidemiological profile characterized by a predominance of males and a higher incidence among middle-aged and older adults. In this context, in Catalonia, between 2019 and 2022, the average age at death was 57.2 years, with more than half of the deaths occurring in individuals over 60 years of age⁽²⁸⁾. Regarding the location of the incident, drownings occur predominantly in natural bodies of water or in swimming pools, with the latter being more common among children up to 4 years of age. From this perspective, there is a risk profile for adults and the elderly, which may be associated with functional limitations, and a risk for children due to inadequate supervision in these environments. Furthermore, seasonality showed a significant correlation, with mortality being higher in July and August, as well as a higher frequency on weekends, associated with leisure activities⁽²⁸⁾. Regarding exposure to electrical current, radiation, and extreme environmental temperatures and pressures, this classification was represented by only one study⁽³⁰⁾, which focused solely on deaths due to heat waves in Germany after the year 2000. Regarding risk factors, temperature is cited; it was analyzed as “excess risk temperature” (ERT), defined as the average daily temperature that could actually impact mortality.

In addition, temperature was classified as moderate or intense, with moderate temperature defined as being above the (TRE) and below the 95th percentile of average daily temperatures, while intense temperature was defined as being above the 95th percentile, which was more strongly associated with death⁽³⁰⁾.

Burns were identified as one of the least frequent causes of mortality and were analyzed in only one study⁽³⁵⁾, specifically describing cases among people with disabilities. The mortality rate was highest in the age groups

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of 30 to 39, 60 to 69, and over 80 years of age, with no significant progressive increase observed with advancing age. With regard to sex, men were more affected overall, with adult and older men being significantly impacted, while only women over 70 had a mortality rate above zero. Furthermore, mental disorders and physical disabilities were associated with higher age-adjusted mortality⁽³⁵⁾.

Deaths resulting from accidental poisoning or intoxication due to exposure to harmful substances—such as prolonged exposure to air pollutants from the burning of fossil fuels—are a leading cause of death from intoxication. In this regard, more than half of the deaths resulting from such exposure are linked to cardiometabolic diseases, such as ischemic heart disease, stroke, and diabetes. In addition, one-fifth of the deaths are attributed to other unspecified diseases⁽³¹⁾. In a regional analysis, death rates are highest in South and East Asia, which are densely populated regions with high levels of air pollution. At the same time, Eastern Europe and the Middle East are also significantly affected⁽³¹⁾.

Studies examining deaths from intentional self-inflicted injuries have shown that men aged 15 to 24, followed by those aged 25 to 44⁽³²⁾, are the most frequently affected. Age varied by sex: men aged 20 to 24 were most affected, while women in the 35–39 age group were the most affected⁽¹⁶⁾. Being employed or retired, living in a rural area, using a firearm, and having higher serum blood alcohol levels were the factors associated with self-inflicted injuries among men. As for women, living alone was the factor associated with this type of outcome⁽¹⁶⁾. For both sexes, the most common method was hanging, strangulation, and suffocation^(16,33). In an analysis of trends in deaths from self-inflicted injuries in Paraguay between 2005 and 2019, the proportion of deaths by hanging increased,

reaching nearly three-quarters, while deaths by poisoning and firearm use decreased⁽³²⁾. Regarding complex suicide, in which more than one method is used to increase effectiveness or reduce the risk of pain, the most common combination was poisoning and hanging, followed by falls from a height and drowning⁽²⁵⁾.

In the Paraopeba Basin, the region surrounding Brumadinho, Brazil, the number of suicides and assaults was proportionally higher than in the state of Minas Gerais and the country as a whole between 2000 and 2018. This region faced vulnerabilities and a lack of infrastructure, as well as socioeconomic deprivation, prior to the Brumadinho accident, reflecting a lack of infrastructure and public policies, which may explain the negligence in managing the accident⁽²¹⁾. Other associated factors included substance abuse, legal conflicts, and the presence of psychiatric disorders⁽¹⁶⁾. Suicide was also the leading cause of death compared to other causes among South Koreans with disabilities. In this population, mortality was 2.5 times higher than in the general population⁽³⁵⁾.

With regard to factors related to violent deaths, homicides primarily affect men between the ages of 15 and 39. Male gender was strongly associated with violent death, although total homicide mortality among men decreased significantly with advancing age⁽²³⁾.

The association with age was also significant among adolescents, with the 17- to 19-year-old group being proportionally more affected—exclusively boys, mostly of mixed-race descent, and residing in outlying areas⁽⁸⁾. In Joinville, total homicides have become the leading external cause of death in recent years, surpassing traffic accidents and other causes, although the latter continued to be significant specifically among females. A downward trend in deaths was observed in

the 0–14 age group⁽²³⁾. In line with this trend, a study⁽²¹⁾ found that homicides accounted for twice as many deaths as traffic accidents in the most recent period analyzed (2015–2018) compared to the first (2000–2003), with a total increase of nearly 100% in homicides from 2000 to 2018.

In contrast, a study⁽¹³⁾ concludes that violent deaths decreased by 1.98% per year from 1999 to 2015 in the state of Rondônia, following the trend seen in other Brazilian states, while other causes tended to increase or remain stable.

In oil-producing municipalities in the Campos Basin (RJ), assaults were the predominant external cause of death between 2010 and 2019, particularly among men, suggesting a potential relevance of the oil industry and its associated risks, in addition to the socioeconomic precariousness of a region dependent on this relatively unstable economic sector during the period analyzed⁽²²⁾.

Regarding deaths related to violence against women in Pernambuco, 1,162 deaths were reported between 2011 and 2016, caused by physical violence, assault with a sharp object, repeated violence, and, primarily, firearm-related injuries. The largest percentage of female victims were over 20 years of age, Black or mixed-race, and unmarried⁽³⁴⁾.

In cases of undetermined intent (EII) in Rondônia, these causes were more prevalent among males aged 20 to 39 and of mixed-race ethnicity; deaths occurred primarily in the Madeira-Mamoré and Vale do Guaporé regions, which are densely populated areas⁽¹³⁾. This same demographic profile was contrasted with another study⁽¹²⁾. (2023), in which mortality among college students at an American university was significantly higher among women, those over 35 years of age, those who had graduated or were in a more advanced stage of their degree program, and those of non-white

race or ethnicity. More specifically, a study of people with disabilities in South Korea showed a predominance in age groups over 70, affecting more men, whose most commonly associated disabilities were neurological conditions, cardiac disorders, mental disorders, respiratory disorders, and epilepsy⁽³⁵⁾.

In an Argentine study⁽¹⁵⁾, classification as IBD was found to underestimate other classifications of causes of death due to a lack of descriptive information. Using probabilistic imputation, homicides were found to be the most underestimated causes, followed by self-inflicted injuries and accidents. Homicides would show a 45.7% increase during the analyzed period compared to data without imputation. Furthermore, it was noted that for homicide and suicide, the early years analyzed had higher imputation rates than the later years (1997 to 2018), which may reflect a trend toward improvement in death reporting⁽¹⁵⁾.

Similarly, a study conducted in Brazil reported that 128,567 homicides occurring between 1996 and 2021 were not correctly identified, suggesting that 43.6% of EIs are actually due to violent deaths⁽¹⁸⁾. Between 2012 and 2021, EIs accounted for 7.8% of

deaths from external causes, showing a positive percentage change in the historical series analyzed, particularly in the Midwest (124.4%) and Southeast (69.4%), while Brazil as a whole showed a 41.1% change over the same time period⁽¹⁹⁾.

This review contributes by providing a comprehensive overview of the epidemiological profile of mortality from external causes, highlighting differences by type of event, sex, age, region, and social context, and demonstrating its impact on life expectancy and health inequalities. The assessment of these variables also enabled the identification of at-risk groups, including factors that are not well documented, such as characteristics of the health care system. This analysis may be important for the formulation of future public policies and the design of new studies that address these factors in greater depth. Among its limitations, this integrative review may have been subject to selection bias and inclusion bias. Regarding the selection of outcomes, some articles may have identified various outcomes but addressed only the most severe ones, which may limit the scope of the knowledge produced

The study identified factors related to deaths from external causes. The reviewed literature reinforces the notion that men and young people are the groups most frequently represented in deaths resulting from traffic accidents, assaults, and self-inflicted injuries, which are the most commonly recorded classifications.

We were able to integrate findings from multiple national and international contexts, allowing us to compare the Brazilian situation with that of other countries and to inform the prioritization of population groups and regions for surveillance and prevention efforts regarding deaths from external causes. It is necessary to identify which individual, collective, and structural factors influence the described outcome, requiring a broader understanding so that they can be fully described and taken into account in public health decisions. Finally, the study highlights the importance of identifying groups, behaviors, and conditions that may increase the likelihood of death from specific causes, which opens the door to analyzing the potential preventability of these events.

CONCLUSION

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