DOI: https://doi.org/10.36489/saudecoletiva.2020v10i55p2797-2814

Epidemiological and sociodemographic characterization of trafic accidentes: an integrative literature review

Caracterización epidemiológica y sociodemográfica de accidentes de tráfico: una revisión integrativa de la literatura

Caracterização epidemiológica e sociodemográfica de acidentes de trânsito: uma revisão integrativa da literatura

ABSTRACT
The objective was to characterize the sociodemographic and epidemiological profile of victims of traffic accidents in Brazil. Method: Integrative review, carried out in the search strategies SciELO Brazil - (Scientific Electronic Library Online), LILACS (Latin American Center for Health Information) and in Brazilian universities. Inclusion criteria: articles that presented specificity to the theme, containing the selected descriptors, published between 2011 and 2019. And exclusion criteria: articles that did not contemplate the objectives and prior to 2011. Results: Of 52 articles, 20 remained as a final sample. It was identified that the majority of victims are young adult men belonging to the lower class, from the Northeast and North regions and motorcycle users. Accidents occur most commonly on weekends and at night, being the frontal collision the most frequent. Among the main causes is the human factor. Conclusion: based on these results, it is possible to affirm the need for improvements in Brazilian traffic legislation and enforcement.
DESCRIPTORS: Public Health; Wounds and injuries; Traffic accident.

RESUMEN
El objetivo fue caracterizar el perfil sociodemográfico y epidemiológico de las víctimas de accidentes de tránsito en Brasil. Método: Revisión integradora, realizada en las estrategias de búsqueda SciELO Brasil - (Biblioteca Electrónica Científica en línea), LILACS (Centro Latinoamericano de Información en Salud) y en universidades brasileñas. Criterios de inclusión: artículos que presentaron especificidad al tema, conteniendo los descriptores seleccionados, publicados entre 2011 y 2019. Y criterios de exclusión: artículos que no contemplaban los objetivos y anteriores a 2011. Resultados: De 52 artículos, 20 quedaron como muestra final. Se identificó que la mayoría de las víctimas son hombres adultos jóvenes que pertenecen a la clase baja, de las regiones del noreste y norte y usuarios de motocicletas. Los accidentes ocurren con mayor frecuencia los fines de semana y por la noche, con la colisión frontal más frecuente. Entre las principales causas se encuentra el factor humano. Conclusión: con base en estos resultados, es posible afirmar la necesidad de mejoras en la legislación y la aplicación de la ley de tránsito de Brasil.
DESCRIPTORES: Salud Pública; Heridas y lesiones; Accidente de tránsito.

RESUMO
Objetivou-se caracterizar o perfil sociodemográfico e epidemiológico das vítimas de acidentes de trânsito no Brasil. Método: Revisão Integrativa, realizada nas estratégias de busca SciELO Brasil – (Scientific Electronic Library Online), LILACS (Centro Latino-Americano de Informação em Saúde) e nas universidades brasileiras. Critérios de inclusão: artigos que apresentavam especificidade com o tema, que contivessem os descritores selecionados, publicados entre 2011 e 2019. E os de exclusão: artigos que não contemplavam os objetivos e anteriores a 2011. Resultados: De 52 artigos, restaram 20 como amostra final. Identificou-se que a maioria das vítimas são homens adultos jovens pertencentes a classe baixa, das regiões Nordeste e Norte e usuários de motocicleta. Os acidentes ocorrem mais comumente nos finais de semana e no período noturno, sendo a colisão frontal mais recorrente. Entre as principais causas está o fator humano. Conclusão: mediante esses resultados, pode-se afirmar a necessidade de melhorias na legislação e fiscalização do trânsito brasileiro.
DESCRITORES: Saúde Pública; Ferimentos e lesões; Acidente de trânsito.

RECEBIDO EM: 06/30/2020 **APROVADO EM:** 07/27/2020

Ana Beatriz Nakayama Albertini
Medical student at the University Center of Maringá (UniCesumar), Maringá, Paraná, Brazil.
ORCID: 0000-0003-0158-221X

Taísa Vieira Garcia
Medical student at the University Center of Maringá (UniCesumar), Maringá, Paraná, Brazil.
ORCID: 0000-0002-2641-7475

Luiz Gustavo de Paulo
Master's Student in Professional Management, Technology and Innovation in Urgency and Emergency from the State University of Maringá (UEM), Professor of the Medical Course at the University Center of Maringá (UniCesumar), Maringá, Paraná, Brazil.
ORCID: 0000-0001-9090-7420

Erika Rodrigues da Silva Toledo
Master's Student in Professional Management, Technology and Innovation in Urgency and Emergency from the State University of Maringá (UEM), Professor of the Medical Course at the University Center of Maringá (UniCesumar), Maringá, Paraná, Brazil.
ORCID: 0000-0002-4605-2426

Patrícia Bossolani Charlo
PhD student in Nursing at the State University of Maringá (UEM), Professor of the Medical Course at the University Center of Maringá (UniCesumar), Maringá, Paraná, Brazil.
ORCID: 0000-0002-8262-2086

Marcelo da Silva
PhD student in Nursing at the State University of Maringá (UEM), Professor of the Medical Course at the University Center of Maringá (UniCesumar), Maringá, Paraná, Brazil.
ORCID: 0000-0002-0376-0430

INTRODUCTION

Trauma in physics is defined as a harmful phenomenon resulting from a certain energy that has exceeded the limit that the body can bear. [1] Knowing how to qualify and classify the severity of a trauma in pre-hospital support is crucial for the follow-up in hospital support, as it allows better results in its treatment. [2] In everyday life, it is possible to observe that injuries are related to certain types of trauma, which helps in treating the victim. [3]

In recent decades, several institutions such as the United Nations (UN) and the World Health Organization (WHO) have identified traffic accidents as a worldwide public health problem, due to the number of victims with temporary and permanent sequelae, as well as the number of deaths. The number of deaths due to this reason, in the world, annually, exceeds one million, with more emphasis on developing countries. Nine out of ten deaths occur in the poorest countries, and Brazil occupies a worrying position in this scenario, since it is among the top positions. [4]

The epidemiological profile of victims of traffic accidents is mostly composed of men, young adults, motorcyclists, blacks and with a low level of education. According to the WHO, this group (more than any other analyzed) has a higher risk of suffering a land transport accident (LTA) and, consequently, of death. [4]

In addition, traffic accidents have other consequences than physical, such as emotional, financial, social, mental problems, both for the victim and for their family members. [5]

The rate of years of life lost to deaths or disability due to LTA in Brazil, compared to other countries in South America, places the country in second place (1.230/ 100 thousand inhabitants), ahead of Bolivia and Ecuador, countries with a development index below that of Brazil, and behind Paraguay (1.270/ 100 thousand inhabitants). [6] The high number of traffic accidents in the urban perimeter in Brazil reveals a cultural factor, since the Brazilian has little appreciation for traffic laws. Thus, he believes that he owns the streets and highways, does not need to obey the laws and disregards the existence of other citizens who also use the roads. Linked to this behavior is the attribution of power that was established to the use of the motor vehicle. [4]

According to the Institute of Applied Economic Research (IPEA), since 1998, with the implementation of the new Brazilian traffic code and the creation of more stringent complementary federal laws, such as the Prohibition Law, Brazil occupies a much more comfortable situation in the legal scope in other countries, in terms of containing infractions. This is because there are numerous laws regarding the use of safety devices, the use of substances associated with driving, the speed limits imposed on highways, however the lack of punishment for offending drivers is something that is recurrent in the country. [4]

To prevent LTA, it is necessary to know the epidemiological profile of the victims, the transport involved, the types of injuries related to the types of accidents, the areas susceptible to accidents. [7]

Among the main causes of traffic accidents are incompatible speed, undue overtaking, mechanical defect in the vehicle, defect in the road, disobedience to signs, drowsiness, lack of attention, animals on the road, alcohol ingestion, failure to maintain the safety distance,

among others. Causes that can be solved with traffic education campaigns and strict inspection. These campaigns must know their target audience well and find the best means to reach them, in a constant and satisfactory manner, and must be constantly disseminated so that results can be observed. [8]

Traffic accidents need to be seen as occurrences capable of being avoided and not as fatalities commonly present. Thus, reaching citizens for the adoption of protective and safe measures is an arduous task, which requires effort, persistence and a change in behavior as well as in mentality on the part of not only the population but also from the government. [7]

In this sense, this study has the following question: What evidence is available on the epidemiological, socioeconomic and demographic aspects of land transport accidents in Brazil? With this work, it is intended to identify, in the existing scientific production, the causes associated with traffic accidents, involving land accidents; verify epidemiological and clinical characteristics of trauma victims, as well as the resulting impacts; identify the socioeconomic, demographic and psychosocial profile of trauma victims.

METHOD

To achieve the objective, we opted for the method of reviewing the scientific literature as this modality makes it possible to summarize the research already completed and to draw conclusions from a topic of interest.

Data collection was carried out from August 13th to October 22nd, 2019. Electronic research was carried out in the search strategies SciELO Brasil - (Scientific Electronic Library Online), LILACS (Latin American Center for Health Information) and in Brazilian universities. As an inclusion criterion, articles that contemplated the problem under study, containing the selected descriptors, published between 2011 and 2019 were adopted. Articles that were not published in full were excluded. The descriptors used based on the DeCS were Public Health; Wounds and injuries; Traffic-accidents. And the revision was adapted to the PRISMA model.

Initially, from the reading of titles and abstracts, 52 works were selected, which were read in full to verify the eligibility criteria and the proximity to the theme, leaving 20 articles as a final sample, of which 18 were published in Portuguese (Brazil), 1 in English and 1 in Portuguese (Portugal). After selecting and reading the articles, an electronic form was filled out, specifically built for this research, with the following data: authors, title, journal and year of publication.

After selecting the articles according to the inclusion criteria previously determined, in the period from November 4th, 2019 to May 22nd, 2020, the following steps were taken: exploratory reading; selection of material that understands the objectives and theme of this study; detailed analysis of the texts; interpretative reading of the selected texts; writing of the article.

The results have been discussed with the literature. As this is a study developed based on public domain data, it was not necessary to undergo an ethical assessment.

The integrative review was validated twice by two researchers, Ana Beatriz Nakayama Albertini and Taísa Vieira Garcia in order to ensure data reliability.

RESULTS

The study included 20 articles, of which 18 were published in Portuguese (Brazil) and 1 in Portuguese (Portugal). Of the 20 works, 16 were developed in Brazil, 2 in Switzerland, 1 in Portugal and 1 article was published in English, developed in Switzerland. Of the selected works, 90% (n = 18) are quantitative and 10% (n = 2) qualitative, as shown in Table 1.

From the selected articles, it was possible to observe that traffic accidents are res-

Tabela 1. Caracterização dos artigos selecionados para esta revisão integrativa, no período de 2011 a 2019. Brasil.

ID	Título	Título do periódico	Ano	País	Idioma
A01	A letalidade dos acidentes de trânsito nas rodovias federais brasileiras em 2016*.	Revista Brasileira de Estudos de População	2019	Brasil	Português
A02	Motociclistas acidentados: caracterização, perfil comportamental e sintomas de transtornos mentais.	Arquivos de Ciências da Saúde	2019	Brasil	Português
A03	Maio amarelo: Contextualizando as estatísticas de acidentes de trânsito no Brasil.	DATASUS	2018	Brasil	Português
A04	Impacto do Código de Trânsito Brasileiro e da Lei Seca na mortalidade por acidentes de trânsito.	Cadernos de Saúde Pública	2018	Brasil	Português
A05	Global status report on road safety	World Health Organization (WHO).	2018	Suíça	Inglês
A06	Níveis de gravidade do trauma predição de sobrevida em vítimas de acidente de trânsito.	Dissertação (Mestrado)	2017	Brasil	Português

A07	Acidentes de transporte terrestre: estudo Carga Global de Doenças, Brasil e unidades federadas, 1990 e 2015.	Revista Brasileira de Epidemiologia	2017	Brasil	Português
A08	Relação entre o mecanismo de trauma e lesões diagnosticadas em vítimas de trauma fechado.	Revista do Colégio Brasileiro de Cirurgiões	2017	Brasil	Português
A09	Acidentes de transporte terrestre, não fatais, no Brasil: fatores associados e efeitos sobre a percepção do estado de saúde das vítimas.	Tese (Doutorado)	2017	Brasil	Português
A10	Análise espacial dos acidentes de trânsito urbano atendidos pelo Serviço de Atendimento Móvel de Urgência: um recorte no espaço e no tempo.	Revista Brasileira de Epidemiologia	2017	Brasil	Português
A11	Estimativa de sequelas físicas em vítimas de acidentes de transporte terrestre internadas em hospitais do Sistema Único de Saúde.	Revista Brasileira de Epidemiologia	2016	Brasil	Português
A12	Padrão de vítimas e lesões no trauma com motocicletas.	Revista da Faculdade de Ciências Médicas de Sorocaba	2016	Brasil	Português
A13	Prevalência e fatores associados a acidentes de trânsito com mototaxistas.	Revista Brasileira de Enfermagem	2016	Brasil	Português
A14	Óbitos no trânsito urbano: qualificação da informação e caracterização de grupos vulneráveis.	Cadernos de Saúde Pública	2015	Brasil	Português
A15	Interpretação das lesões ortopédicas dos ocupantes dos veículos na reconstrução forense dos acidentes de viação.	Revista Portuguesa de Ortopedia e Traumatologia	2015	Portugal	Português
A16	Acidentes de trânsito nas rodovias federais brasileiras.	IPEA	2015	Brasil	Português
A17	Fatores associados, gravidade do trauma e sequelas de acidentes de transporte terrestre: um estudo a partir de egressos hospitalares.	Tese (Doutorado)	2015	Brasil	Português
A18	Guia de Implantação e execução do PVT.	Ministério da Saúde	2015	Brasil	Português
A19	Relatório global sobre o estado da segurança viária.	OMS	2015	Suíça	Português
A20	Prevenção de lesões causadas pelo trânsito. Manual de treinamento.	Organização Mundial da Saúde (OMS)	2011	Suíça	Português

ponsible for a significant portion of morbidity and mortality worldwide. Injuries, sequelae and deaths from land transport accidents have been widespread throughout the world, making trauma and its consequences a target of great concern.

Land transport accidents are a public health problem, and Brazil is one of the leaders in the ranking with the highest number of victims. LTAs are the main cause of death for young adults between 20 and 29 years old, especially males. In addition to deaths, they are responsible for causing temporary and permanent sequelae, countless psychological and financial damages, suffering to the victim and family, an immense cost to the public coffers and the overload of the health system.

In addition, the increase in accidents involving motorcycles stands out as an obstacle that needs due government attention. The growth of the motorcycle fleet, the most accessible value for purchasing and maintaining the vehicle, the fact that it is widely used as a source of income, greater body exposure and the profile of drivers (the vast majority, young, single and with low income and education) are factors that contribute to the great increase in accidents and deaths involving this category of transport.

Another relevant factor found in accidents involving motorcycles is the influence of the driver's emotional state. Associations with some disorders were identified, such as high levels of irritability, antisocial inclinations, behaviors involving lack of responsibility, anxiety disorders and depression, among others.

Regarding the lethality of LTAs, frontal collision and pedestrian accidents stand out with the highest mortality rate. And among the most vulnerable victims are pedestrians, cyclists and motorcyclists (the latter have become the most threatened, and the motorcycle occupies the most fatal transport category).

Furthermore, it is important to highlight that the Northeast is the region with the highest occurrence of death due to LTA, followed by North, Midwest and South. The Southeast represents the region with the lowest mortality due to LTA. As for the days and times, weekends and early nights are responsible for the most lethal circumstances.

Regarding the characteristics of injuries, in ATTs involving motorcycles, the victims most commonly suffer injuries with involvement in extremities, whereas in the victims of being run over, traumas are frequently observed in different body segments, finally, in the victims of car acci-

dents, the injury in the thoracic segment is the most common.

It should be noted that among the main causes of these accidents is the negligence of drivers, who are often reckless and violate traffic laws, as they drive at high speed, make inappropriate use of safety equipment and associate alcohol or drugs with driving.

In addition, it was possible to identify a relationship between the highest rate of accidents involving the male sex and a sociocultural factor, in this case, the macho culture impregnated in Brazilian society. This is because man, many times, finds himself in a position of power, superiority and invincibility, in this way, he puts himself in risk situations.

Undeniably, after the implementation of the Traffic Code in 1998, deaths from traffic accidents decreased considerably. And with the advent of Prohibition, which came into force in 2008, the number of accidents caused by drunk drivers has been reduced, however, it remains high considering the seriousness of the fact.

Therefore, it is necessary to consider the formulation and adherence of existing public policies to reduce LTA. To illustrate, there is the 2030 Agenda, created by the General Assembly of the United Nations, which aims at a 50% reduction in deaths and injuries caused by traffic until this year 2020, through strict intervention in the main risk factors for accidents of traffic. And Brazil counts on the Life in Traffic Project, which aims to improve information systems and, like the 2030 Agenda, also aims to interfere in the most relevant causal factors of LTA.

However, even with such actions underway, the numbers of these tragic outcomes need a more significant reduction. For this reason, public categories need to pay special attention to this obstacle, improving rigor in the application of laws, in inspection, in the education of drivers and also in road safety.

DISCUSSION

Conceptually, according to the Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada - IPEA) [8], traffic accidents are defined as collisions between vehicles or with objects and fixed locations, run overs, falls of pedestrians and cyclists and overturns, with physical, psychological and material damages. This episode must occur on a public road, where vehicles and pedestrians flow. The International Classification of Diseases (ICD-10) considers vehicle accidents that occur on public roads, which can be on the road, street or sidewalk, with circulation allowed for people or goods.

In recent decades, traffic accidents have gained prominence around the world due to the high number of deaths, injuries and disabilities, in addition to the emotional, financial and social consequences, which has brought attention to these numbers. Brazil occupies the fifth place in the ranking among the countries with the highest number of traffic accident victims, behind only China, India, Russia and the United States, that is, countries with a population greater than that of Brazil. [7]

According to Rocha [2], the number of victims of land transport accidents (LTA), whether fatal or with temporary or permanent sequelae, is significant and has been spreading worldwide, regardless of the financial situation of each country. Consequently, it presents itself as one of the main health problems of this century to be faced.

According to DATASUS, approximately 43 thousand people die each year in Brazil as a result of traffic. 2015 data from the Health Ministry (HM) indicate the occurrence of 38,651 deaths. Andrade; Jorge [5] states that after the implementation of the Traffic Code in 1998, the number of deaths from traffic accidents decreased. In the last decade, this index has grown again, but it is still lower compared to the numbers of the early 90s. According to Ladeira et al.[6], observing each group individually, it is noted that the fall in the number of deaths did not occur homogeneously, because while the number of deaths among pedestrians and vehicle occupants decreased, the number of fatalities among motorcyclists and cyclists increased.

The main causes identified for this tragic outcome are: traffic disorganization; precarious roads and vehicles; drivers' behavior, which includes recklessness, violation of laws, inappropriate use of safety equipment (helmet, seat belt), use of alcohol and other psychoactive substances associated with weak penalties. A demonstration of this is a 2017 data from WHO, which points out that one in three traffic deaths that happen in the world is due to speeding. All of these motivations are even more evident in developing countries, such as Brazil. Paixão et. al.[7] reveals that the increase in the vehicle fleet, seen in many countries that had an improvement in the living conditions of the population, not followed by road planning to support this increase contributed to the increase in accidents.

Brazil presents, as responsible for the accidents, factors such as deficient urban planning, the lack of inspection of roads and vehicles, the neglect with the maintenance of highways and the impatience of the citizen in traffic. [9] Another reason to be considered is the non-use of safety equipment correctly, such as the helmet with buckles and the visor closed, and the neglect with the seat belts of cars, both by the front and rear passengers, and with children's devices (according to age) installed incorrectly. [2]

Following this reasoning, Medeiros [9] states that:

> *In the literature, the human factor has been the main element in the occurrences of ATT, as the others influence it and it exercises dominance only over the vehicle. However, the human has been the most evident, in view of driving, at a time, under the influence of alcohol, with inexperience in driving, tired in noncompliance with traffic laws and excessive speed. However, the factors related to the road cover the problems of preservation of the streets and roads, the lack of signage and insufficient lighting, and those related to the vehicle include the lack of preventive maintenance*

and the type of vehicle.

Attached to this idea, accidents are more frequent in single lane compared to the double, and many roads do not have some kind of physical barrier separating the lanes. And among the types of accidents, frontal collisions prevail. [10]

Despite the problems faced in Brazil, in the WHO report on the global road safety status, 2015, cited by Ladeira et al. [6], in relation to legislation on the use of safety equipment, such as a belt, use of helmets, equipment for transporting minors, Brazil occupies a superior position compared to other populous countries. Brazilian laws related to the association of alcohol consumption and driving are also strict when compared to other countries.

In addition to being responsible for a high rate of deaths in the country, the LTA have a great impact on the life of the victims and their family, as this victims often becomes financially dependent and unable to perform activities of daily living, needing help. According to Andrade; Jorge [5], transport accidents cause invaluable emotional, mental and socioeconomic damage, which include absences from work, suffering to the victim and family due to lost productivity or lost years of life, in addition, it can cause post-traumatic stress disorder, a condition serious illness that generates disability.

Paixão et al. [7] reaffirms the immeasurable psychological, physical, social and material losses to those involved, in addition to social security expenses. A study carried out in Bangladesh showed that poor families are more likely to lose their family provider in traffic accidents than families in better life situations. The absence of the head of the family has devastating implications for the family's financial life, involving loss of income, medical, funeral and legal expenses. Most families portrayed a reduction in quality of life, income and expenses with food. [11]

Data from the report published by Ipea [8] demonstrate that accidents on Brazilian highways have serious consequences for the health system and the economy. In 2014, there were around 170 thousand accidents on Brazilian federal highways, which generated an expense of 12,3 billion reais: 64,7% of these expenses were associated with the victim, including health care and loss of production due to injury or death, and 34,7% were associated with vehicles, material damage and loss of cargo.

Considering the entire road network, the estimated annual costs in the country are approximately 40 billion reais, and in urban areas, 10 billion. Thus, they overburden the urgency and emergency services, since about a quarter of the calls for external causes are due to traffic accidents, they also overload the services of specialties and rehabilitation of sequelae and social assistance. [7]

When analyzing the epidemiological characteristics and the profile of the victims of traffic accidents, it is possible to recognize a pattern: according to DATASUS, 82,38% of victims of fatal accidents are men and 17,62% are women; most of these victims are young adults, aged between 20 and 49 years and motorcycle owners. According to Simoneti et al. [12], "The profile of 49,6% of the victims is of a predominant age range between 20 and 29 years old, with the male gender representing approximately 80% of this age group".

To Mendonça; Silva; Castro [4], the portrayal of victims of ATT is due to inappropriate conduct taken mainly by young male individuals linked to cultural and social aspects. These attitudes lead this portion of the population to expose themselves to risky situations, making them more likely to suffer some type of accident. Corroborating this idea, in recent years, this has been the profile of ATT victims, men, young adults (between 20 and 40 years old). [10]

Beceiro et al. [13] demonstrates, in his study that analyzed accidents involving motorcycles, the highest incidence in men, youth, singles, workers, with lower levels of education and low family income. In addition, half of the victims who reported using alcoholic beverages claimed to associate it with management.

"Sociocultural factors (sexism, power relations, competitiveness, aggressiveness, among others) that establish male behavior in society may be related to greater exposure to situations of damage to health." [5] "LTA mortality rates were 4 times higher in men, with this risk being higher in all types of victims - 7,5 times in motorcycle occupants and 3,4 times in motor vehicle occupants (data not shown). " [6]

Regarding behavioral factors, Beceiro et al.[13], asserts that the emotional state of drivers has a relevant influence on accidents and can be demonstrated with antisocial inclinations, personal and social maladjustment, dependency personality, irritability, negative thoughts, diminished self-confidence, lack of responsibility, attributing it to third parties and external sources . In his study, he verified the existence of mental disorders in motorcyclists victims of accidents, among the main ones found are depressive, anxiety, antisocial personality, dependence, somatic, attention deficit, hyperactivity disorders.

Rocha [2] exposes, in the characterization of the profile of the victims, the level of education: with longer study time [9-11], there are motorcyclists, followed by cyclists and users of other types of motor vehicles, with 5 to 8 years of study , and finally, with 1 to 4 years of study, are the pedestrians. Rocha also points out that more than half of the victims have an income between 1 and 2 minimum wages, and cyclists and motorcyclists are mostly responsible for covering the costs of their families' expenses.

IPEA epidemiological analyzes [8] explain the mortality rate of the most fatal accident mechanisms, including the frontal collision, which represented 33.7% of deaths, and pedestrian accidents, which were responsible for 14.6% of deaths. These two types of accidents accounted for 6.5% of the total, and although less frequent, they were the most lethal. Accidents resulting from frontal collisions are more lethal when compared to rear collisions. [10]

Reiterating this idea, Simoneti[12] attests that "The group of collisions represented the largest portion of the occurrences, among which involvement

with cars occurred in 52,4% of the cases, followed by collision with other motorcycles. The motorcycle crash was the second main trauma mechanism, corresponding to 15,4%". "Another result found was the higher risk of death for pedestrians, followed by cyclists and motorcycle occupants, compared to car occupants." [10] Between 2000-2007, the highest number of deaths belonged to pedestrians, however, in recent years, deaths resulting from motorcycle accidents have become the main cause of traffic mortality. [9]

Regarding the transport category, automobiles cause the highest number of accidents, and also deaths, on the highways due to being the largest circulating fleet. Second in the number of accidents are motorcycles, but in terms of lethality they take first place. Demonstrating in data, in automobiles, death or serious injury occurs every 8.3 accidents, and on motorcycles, that number drops to 2.9. The explanation is the lesser protection offered in this means of transport which leaves the user exposed. [8]

According to Simoneti et al. [12], about a quarter of the vehicle fleet in Brazil is made up of motorcycles. This number is a consequence of the price considered more accessible and practicality provided by its use, however it only has the helmet as protection, leaving the rest of the body subject to injuries. As a result, the user of this type of vehicle has a higher number of injuries and death.

Corroborating this reasoning, Carrapateira [1], states that "Brazil has a high number of accidents caused by motorcycles, caused by the high production of vehicles of this type, which are more economically accessible, and by the mobility that is provided". According to Medeiros(9), the increase in accidents involving this category is due to a number of factors, including: the most affordable price for this type of vehicle, the use of the motorcycle as a source of income, the mobility it offers, lower expenses with the preservation of the vehicle compared to other types of vehicles.

Reaffirming this idea, Ladeira et al. [6] explains that the increase in motorcycle-related accidents in Brazil is due to the growth of the fleet of this type of vehicle in recent years due to the improvement in the financial condition of the Brazilian population. This provided the chance for this part of the population to acquire their own vehicle, and the motorcycle, due to the lower cost, is the choice.

According to the Health Ministry, motorcycle accidents are the first specific cause of death due to LTA in Brazil since 2010, and the Northeast region stands out at the national level, due to the significant increase in mortality rates and hospitalization of motorcyclists.

Regarding the lethality of land transport accidents, it was possible to observe that the type of transport, the region, the type of road, the victim's age, the time and the day of the week influence the number of deaths. According to Carrapateira [1], due to the lack of a physical structure that provides adequate protection, motorcycles occupy the first place among vehicles involved in traffic accidents, and because they leave their drivers more exposed, serious injuries are common.

According to the Health Ministry, motorcycle accidents are the first specific cause of death due to LTA in Brazil since 2010, and the Northeast region stands out at the national level, due to the significant increase in mortality rates and hospitalization of motorcyclists. [9]. Andrade; Jorge [5] points out that, in the last decades, motorcycles have caused the highest mortality rate due to an increase in the fleet.

Regarding closed vehicles, according to Rocha [2], these have a higher number of victims than other types of vehicles as well as a higher number of deaths in the location where the accident occurred. This is due to the fact that closed vehicles have a higher number of seats together with the carelessness of drivers and the non-use of safety devices.

The chances of an accident ending up in death are greater in the Northeast, followed by the North, Midwest and South, and in the Southeast it is less likely. In relation to the days of the week, lethality is higher on weekends compared to days of the week. As for the schedule, the early hours show greater lethality in relation to accidents that occur at night and during the day. With regard to the type of soil, the rural is more lethal than the urban, and with regard to the type of track, the

fatality is lower in the straight line compared to the curves, just as, in the double lanes, it is also lower in relation to the simple tracks. As for the type of collision, the frontal is more lethal than the rear. [10]

Weekends showed higher numbers compared to days of the week due to the use of alcohol and other substances. [1] On the issue of lethality, Paixão et al. [7], states that:

> *In the three main categories of "road users", it was observed that among the 45 car occupants, 82% died in the first 24 hours, 60% at the accident site, that is, on the public road. Of the 95 deaths of motorcycle occupants, 74% occurred in the first 24 hours after traffic accidents, and almost half (48%) occurred on public roads. Although 60% of pedestrians died within the first 24 hours, in this group, about a third of deaths occurred between one and 29 days (31%). More than half (53%) of bicycle and heavy vehicle occupants died during hospitalization.*

In relation to the daily practice of traffic accidents in health care, the mechanism of trauma is an important point to be analyzed, as this information can assist in the screening, diagnosis and treatment of the patient, since many serious injuries may not present yourself in a serious way instantly.

Since it is possible to observe a pattern of injury according to the type of trauma, in a generalized way, the victims of accidents occupying automobiles frequently present injury in the chest, due to the direct shock in that segment. In individuals who are run over, polytrauma is common in several regions of the body, highlighting the traumatic brain injury. In motorcyclists, the extremities are more affected. [3]

Beceiro et al. [13] it also demonstrates that, in its analysis of motorcycle accidents, the body segments most affected were the extremities and the abdomen, highlighting the injuries on the extremities as more constant and severe than injuries to the head and face.

Since injuries sustained in traffic accidents generally follow standards according to the vehicle category and the collision mode, accidents involving automobiles can be grouped in a generalized way by the type of impact, however, there are several variables that can influence and modify these patterns. In frontal shock accidents (the most common), victims are thrown forward. The absence of the seat belt causes a first impact of the knees against the panel, which can cause injuries and fractures in the knees, feet and ankles. A second impact against the steering wheel is capable of causing injury to the thumb while holding the steering wheel, abdominal and thoracic injuries, which include fractures of the ribs, sternum and damage to vital organs such as lung, heart, liver. Finally, a third shock to the windshield can lead to the victim's ejection, fractures and ligament injuries to the cervical spine, and trauma to the head against the windshield usually causes blunt injuries to the scalp and face. When it comes to a side impact (second most common), passengers generally suffer lacerations caused by splinters of the side windows, rib fractures are very frequent, damage or rupture of the liver, spleen and kidneys may occur according to the side the beat. In accidents involving rollovers, there is no characteristic pattern, in the absence of the use of seat belts, most of the time there are numerous injuries and traumas in various body segments, in addition, ejections may occur. Finally, in rear impact shocks, the most common injuries are ligament and disc injuries from a hyperextension of the neck. [14]

Considered a public health problem, TAA correspond to one of the main causes of death, being the main one among young people aged 15 to 29, in addition to the serious repercussions for victims, family members, the health system and the economy. Aiming to reduce these numbers, at the 2015 United Nations General Assembly, the 2030 Agenda was launched, and a 50% reduction in traffic deaths and injuries by 2020 was included as a goal of the Sustainable Development Goals. For this goal to be achieved, strict enforcement of traffic laws is essential, especially those that refer to the main risk factors for accidents, which are excessive speed, driving associated with the use of alcohol and other drugs, absence of use protective equipment, such as helmets, seat belts and child safety devices. Furthermore, since most countries do not respect the minimum safety standards in vehicles, it is essential to provide a safe model for new cars manufactured, as they are able to avoid shocks and reduce the chances of serious injuries. [15]

In Brazil, the Ministry of Health assists states and municipalities in the implementation of surveillance and prevention interventions for deaths and traumas caused by traffic. An example of this is the "Project Life in Traffic" program. Among the purposes of the project are the optimization of information systems, care for victims and, like WHO, it aims to intervene in a targeted manner on the main risk factors, such as inadequate speed, alcohol and drug consumption and the misuse of safety devices. safety. This proposal started in 2011 in five capitals in each region and was subsequently extended to the entire country. [16]

CONCLUSION

From the results of this study, the main epidemiological, socioeconomic, demographic and psychosocial characteristics involved in land transport accidents can be identified. The victims most susceptible to LTA are young men. It is also possible to verify an association with lower economic and educational levels and disturbances in the driver's emotional state.

It was also found that motorcycles are the most lethal transport category in recent years. This fact can be attributed, mainly, to the increase in the fleet, to the more accessible value, to the use as a source of income and to the profile of the users, who are usually young men, a profile generally related to greater involvement in risk situations.

In terms of lethality, the region with the highest number of deaths from LTA

is the Northeast. And the period of greatest incidence is on weekends and during the early hours, factors that establish a close association with the use of alcohol and other drugs. The consequences of these LTAs are devastating. For the victim, there is death, and when it does not occur, individuals who survive can manifest severe physical and psychological sequelae. In addition, there are family members, who suffer from affective and often economic losses. Public health and the economy, in turn, suffer from an overload and high annual costs, respectively. ■

REFERENCES

1. Carrapateira LC. Níveis de gravidade do trauma e predição de sobrevida em vítimas de acidente de trânsito. 2017. 56 f. Dissertação (Mestrado) - Curso de Saúde e Desenvolvimento na Região Centro-Oeste, Universidade Federal do Mato Grosso do Sul, Campo Grande, 2017.

2. Rocha GS. Fatores associados, gravidade do trauma e sequelas de acidentes de transporte terrestre: um estudo a partir de egressos hospitalares. 2015. 288 f. Tese (Doutorado) - Curso de Saúde Pública, Universidade de São Paulo Faculdade de Saúde Pública, São Paulo, 2015.

3. Parreira JG, Rondini GZ, Below C, TANAKA GO, Pelluchi JN, Arantes-Perlingeiro J, Soldá SC, Assef JC. Relação entre o mecanismo de trauma e lesões diagnosticadas em vítimas de trauma fechado. Revista do Colégio Brasileiro de Cirurgiões, [s.l.], v. 44, n. 4, p. 340-347, ago. 2017. FapUNIFESP (SciELO). http://dx.doi.org/10.1590/0100-69912017004007.

4. Mendonça MFS, Silva APSC, Castro CCL. Análise espacial dos acidentes de trânsito urbano atendidos pelo Serviço de Atendimento Móvel de Urgência: um recorte no espaço e no tempo. Revista Brasileira de Epidemiologia, [s.l.], v. 20, n. 4, p.727-741, dez. 2017. FapUNIFESP (SciELO). http://dx.doi.org/10.1590/1980-5497201700040014.

5. Andrade SSCA, Jorge MHPM. Estimativa de sequelas físicas em vítimas de acidentes de transporte terrestre internadas em hospitais do Sistema Único de Saúde. Revista Brasileira de Epidemiologia, [s.l.], v. 19, n. 1, p. 100-111, mar. 2016. FapUNIFESP (SciELO). http://dx.doi.org/10.1590/1980-5497201600010009

6. Ladeira RM, Malta DC, Morais Neto OL, Montenegro MMS, Soares Filho AM, Vasconcelos CH, Mooney M, Naghavi M. Acidentes de transporte terrestre: estudo carga global de doenças, brasil e unidades federadas, 1990 e 2015. Estudo Carga Global de Doenças, Brasil e unidades federadas, 1990 e 2015. Revista Brasileira de Epidemiologia, [s.l.], v. 20, n. 1, p. 157-170, maio 2017. FapUNIFESP (SciELO). http://dx.doi.org/10.1590/1980-5497201700050013.

7. Paixão LMMM, Gontijo ED, Mingoti SA, Costa DAS, Friche AAL, Caiaffa WT. Óbitos no trânsito urbano: qualificação da informação e caracterização de grupos vulneráveis. Cadernos de Saúde Pública, v. 31, sup., p. S1-S15, 2015. Disponível em: <https://www.scielosp.org/article/ssm/content/raw/?resource_ssm_path=/media/assets/csp/v31s1/pt_0102-311X-csp-31-s1-0092.pdf>. Acesso em: 10 dez. 2018.

8. Instituto de pesquisa econômica avançada (IPEA). Impactos sociais e econômicos dos acidentes de trânsito nas aglomerações urbanas brasileiras. Relatório executivo, Brasília, 2003. JESUS VF, Siqueira LG. Causas associadas aos acidentes de trânsito envolvendo motociclistas: revisão integrativa. Revista de Enfermagem do Centro-Oeste Mineiro. 2017;7:e1514. https://doi.org/10.19175/recom.v7i0.1514

9. Medeiros WMC. Acidentes de transporte terrestre, não fatais, no Brasil: fatores associados e efeitos sobre a percepção do estado de saúde das vítimas. 2017. 68 f. Tese (Doutorado) - Curso de Ciências da Saúde, Universidade Federal no Rio Grande do Norte, Natal, 2017.

10.Barroso Junior GT, Bertho ACS, Veiga AC. A letalidade dos acidentes de trânsito nas rodovias federais brasileiras. Revista Brasileira de Estudos de População, [s.l.], v. 36, p. 1-22, 16 jul. 2019. Associação Brasileira de Estudos Populacionais. http://dx.doi.org/10.20947/s0102-3098a0074

11.Mohan D, Tiwari G, Khayesi M, Nafukho FM. Organização Mundial da Saúde. Prevenção de lesões causadas pelo trânsito. Manual de treinamento, 2011. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/prevencao_lesao_causadas_transito.pdf. Acesso em: 22 mar. 2020.

12.Simoneti FS, Cunha LO, Gurfinkel Y, Mancilha TS, Campioni FC, Cabral AH, Portella DL, Rodrigues JMS, Novo NF. Padrão de vítimas e lesões no trauma com motocicletas. Revista da Faculdade de Ciências Médicas de Sorocaba, [s.l.], v. 18, n. 1, p. 36-40, 1 mar. 2016. Portal de Revistas PUC SP. http://dx.doi.org/10.5327/z1984-4840201624711.

13.Beceiro MF et al. Motociclistas acidentados: caracterização, perfil comportamental e sintomas de transtornos mentais: caracterização, perfil comportamental e sintomas de transtornos mentais. Arquivos de Ciências da Saúde, [s.l.], v. 26, n. 2, p. 125, 15 nov. 2019. Faculdade de Medicina de Sao Jose do Rio Preto - FAMERP. http://dx.doi.org/10.17696/2318-3691.26.2.2019.1443.

14.Durão CH, Lucas FM. Interpretação das lesões ortopédicas dos ocupantes dos veículos na reconstrução forense dos acidentes de viação. Revista Portuguesa de Ortopedia e Traumatologia, Lisboa, v. 23, n. 4, p. 298-309, abr. 2014.

15.Organização Mundial de Saúde (OMS). Relatório global sobre o estado da segurança viária, 2015. Genebra. Disponível em: https://www.who.int/violence_injury_prevention/road_safety_status/2015/Summary_GSRRS2015_POR.pdf. Acesso em: 21.nov 2019.

16.Ministério da Saúde (BR). Guia de Implantação e execução do PVT (2015). Brasília: Ministério da Saúde; 2015. Disponível em: https://www.saude.gov.br/vigilancia-em-saude/vigilancia-de-violencias-e-acidentes-viva/vigilancia-de-acidentes/transito. Acesso em: 15 jan. 2020.