

Analysis of Car Occupant Mortality Due to Traffic Accidents

Análise da Mortalidade de Ocupantes de Automóveis por Sinistro de Trânsito
Análisis de la Mortalidad de Ocupantes de Vehículos por Accidentes de Tráfico

RESUMO

Objetivo: Analisar a mortalidade de ocupante de um automóvel decorrente aos sinistros de trânsito ocorridos no perímetro urbano de Maringá. **Método:** Trata-se de um estudo descritivo e ecológico, com dados provenientes de Boletins de Ocorrência da Polícia Militar de Maringá, entre janeiro de 2015 e agosto de 2020. Foram analisadas as variáveis: sexo, faixa etária, categoria da vítima (CID-10), dia da semana e clima. **Resultados:** Foram registrados 231 passageiros fatais em sinistro de trânsito. Dos ocupantes de automóvel, 82,61% eram do sexo masculino, e faixa etária com mais óbitos entre 18 e 19 anos com 30,43%. Quanto à distribuição semanal, 69,57% das mortes ocorreram de segunda à sexta-feira. **Conclusão:** O estudo evidenciou o impacto da mortalidade por sinistros de trânsito no Perímetro Urbano de Maringá, destacando a necessidade de medidas preventivas. Ressalta-se a importância do planejamento, de políticas públicas, da educação permanente e do fortalecimento da fiscalização para a redução desses índices.

DESCRIPTORIOS: Sinistro de Trânsito; Mortalidade; Causas Externas

ABSTRACT

Objective: To analyze the mortality of automobile occupants resulting from traffic accidents in the urban perimeter of Maringá. **Method:** This is a descriptive and ecological study using data from Maringá Military Police Police Reports between January 2015 and August 2020. The following variables were analyzed: sex, age group, victim category (ICD-10), day of the week, and weather. **Results:** A total of 231 fatalities were recorded in traffic accidents. Of the automobile occupants, 82.61% were male, and the age group with the most deaths was 18 to 19 years old, accounting for 30.43%. Regarding the weekly distribution, 69.57% of deaths occurred from Monday to Friday. **Conclusion:** The study highlighted the impact of mortality from traffic accidents in the urban perimeter of Maringá, highlighting the need for preventive measures. The importance of planning, public policies, continuing education and strengthening oversight to reduce these rates is highlighted.

DESCRIPTORS: Traffic Accidents; Mortality; External Causes

RESUMEN

Objetivo: Analizar la mortalidad de ocupantes de automóviles como consecuencia de accidentes de tránsito en el perímetro urbano de Maringá. **Método:** Se trata de un estudio descriptivo y ecológico con datos de los Informes Policiales de la Policía Militar de Maringá entre enero de 2015 y agosto de 2020. Se analizaron las siguientes variables: sexo, grupo de edad, categoría de la víctima (CIE-10), día de la semana y clima. **Resultados:** Se registraron 231 muertes en accidentes de tránsito. De los ocupantes de automóviles, el 82,61% eran hombres y el grupo de edad con más muertes fue el de 18 a 19 años, representando el 30,43%. En cuanto a la distribución semanal, el 69,57% de las muertes ocurrieron de lunes a viernes. **Conclusión:** El estudio destacó el impacto de la mortalidad por accidentes de tránsito en el perímetro urbano de Maringá, destacando la necesidad de medidas preventivas. Se destaca la importancia de la planificación, las políticas públicas, la educación continua y el fortalecimiento de la fiscalización para reducir estas tasas.

DESCRIPTORIOS: Accidentes de tráfico; Mortalidad; Causas externas

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INTRODUCTION

Approximately 1.19 million deaths worldwide continue to occur in low- and middle-income countries, which, despite having about 60% of the world's vehicle fleet, face substantial challenges in terms of road safety⁽¹⁾. In Brazil, traffic accident mortality affects thousands of people daily and is considered a serious public health problem.

Considering data from 178 countries, it appears that 90% of traffic-related morbidity and mortality occurs in low- and middle-income countries, which account for only 48% of the world's vehicles. Although preventable, these premature deaths reach alarming levels in these countries.

For a long time, the term "traffic accident" was used, suggesting something inevitable or unpredictable. However, the Brazilian Traffic Code (CTB) has adopted the term "traffic accident," recognizing that most of these unintentional events are often preventable and occur on public roads, usually involving the collision of vehicles with other vehicles, pedestrians, or stationary objects. These incidents can result in physical injuries, emotional trauma, and significant economic burdens on society. The

World Health Organization recognizes traffic accidents as a major public health problem, with varying fatality rates in different regions⁽³⁾.

Traffic accidents in Brazil cause approximately 35,000 deaths per year, representing one of the leading causes of death in the country. This situation tends to worsen even further due to the increase in the number of vehicles on the roads. When analyzing the main causes of traffic accidents, it can be seen that they are attributed to human factors such as recklessness, improper overtaking, lack of attention, use of cell phones, speeding, and alcohol consumption.

Law No. 12,760 is currently in force in Brazil, amending Law No. 9,503, which establishes: zero tolerance for drivers who have consumed alcohol; increased fines, suspension of driving privileges for 12 months subject to the surrender of the driver's license and impoundment of the vehicle upon admission of use of video, witness testimony, or other means of proof of intoxication. This regulation considers tolerance limits to be a concentration equal to or greater than 6 decigrams of alcohol per liter of blood or equal to or greater than 0.3 milligrams of alcohol per liter of alveolar air⁽⁶⁾.

When analyzing the situation in the municipality of Maringá, the external causes of traffic deaths are surpassed in statistical terms only by respiratory diseases and neoplasms. In a study of the epidemiological profile and risk factors for hospitalization and deaths due to traffic accidents in Maringá, the aforementioned author found that in 2000, external causes accounted for 9.7% of all deaths in the city, of which traffic accidents were the leading cause of death, accounting for 45.6%, followed by homicides (16.8%), falls (12.8%), suicides (7.2%), and drownings (4.0%)⁽⁷⁾.

Therefore, due to the increase in mortality from traffic accidents, considered one of the leading causes of death worldwide, studies are needed to assist in mortality rates and contribute to the development of public prevention policies. Considering that, to date, we have not found any studies on passengers/occupants of cars killed in traffic accidents in the city of Maringá, the objective of this study was to analyze mortality from traffic accidents in the urban perimeter of Maringá from 2015 to 2020.

METHODOLOGY

This is a descriptive and ecological

study, in accordance with the recommendations of the Consolidated Criteria for Reporting Qualitative Research (COREQ), using data on fatal occupants involved in traffic accidents that occurred within the limits of the municipality of Maringá-PR, from January 1, 2015, to August 31, 2020.

Ecological studies are a type of epidemiological research that aims to analyze the distribution of diseases or health events in different populations in a given space and time. They are considered descriptive studies, i.e., they focus on characterizing differences in the occurrence of a disease between population groups without necessarily investigating the causes at the individual level⁽⁸⁾.

Among the various types of traffic accidents are those with fatalities, which are those in which one or more people involved die as a result of the accident. According to national and international traffic registration and statistics standards, a fatal victim is considered to be someone who dies at the scene of the accident or within 30 days after the event, provided that the death is directly related to injuries sustained in the accident. This period is used to standardize records and statistics, since it is considered a direct consequence of injuries attributed to the accident⁽⁹⁾.

Deaths from traffic accidents are classified in the International Classification of Diseases (ICD-10) in the group of unnatural or violent causes of death, referred to as external causes. Among the components of these causes are unintentional occurrences or "accidents" (transportation accidents, work accidents, falls, poisonings, drownings, and other types of accidents) and intentional occurrences (homicides, suicides, and legal interventions)⁽¹⁰⁾.

The population of this study consisted of all fatal victims of traffic accidents, coded according to ICD-10 (Table 1).

Table 1 – Traffic accidents according to ICD-10 groupings.

V01 to V09	Pedestrian injured in a transport accident
V10 to V19	Cyclist injured in a transport accident
V20 to V29	Motorcyclist injured in a transport accident
V30 to V39	Tricycle occupant injured in a transport accident
V40 to V49	Passenger in a car injured in a transport accident
V50 to V59	Pickup truck occupant injured in a transport accident
V60 to V69	Occupant of a heavy transport vehicle
V70 to V79	Bus occupant injured in a transport accident
V80 to V89	Other land transport accidents

Maringá was planned in the late 1940s and currently has 97.3% of households located in the urban area. It has an estimated population of 430,157 inhabitants and a territorial unit of 487.012 km²⁽¹¹⁾. According to data from the National Traffic Department, the municipality has a fleet of 333,556 vehicles, of which 179,190 are automobiles⁽¹²⁾. Currently, Maringá is the hub of a macroeconomic region that covers 25 municipalities⁽¹³⁾, borders 8 municipalities, and consists of 3 districts, including Maringá, Floriano, and Iguatemi⁽¹⁴⁾.

Information related to fatal passengers was obtained from Traffic Accident Reports (BOAT) provided by the Maringá Military Police (PM). BOATs are official documents used to record traffic accidents and are a rich source of information regarding the circumstances of accidents, as they contain information about the accident and also about the victim and the circumstances of the accident. In the context of traffic, the PM is responsible for covering all traffic accident records in the municipality (arterial, collector, and local roads). These records are also essential for monitoring traffic behavior.

The variables selected in this study were: gender (male and female); age group (0 to 17; 18 to 29; 30 to 39; 40 to 49; 50 to 59; 60 and over; not reported); victim category at the time of the accident: Occupant of a car injured

in a transport accident (V-40 to V-49); day of the week: Monday to Friday; Saturday and Sunday; Weather (good; rain; cloudy; not reported).

The data collected from BOAT were transcribed into a Microsoft Office Excel 2016 spreadsheet, tabulated using descriptive statistics, and the frequencies of all variables were distributed using R 3.2.3 software.

It is important to note that, prior to data collection, the instrument used was evaluated by experts in the field. It was subsequently approved by the Standing Committee on Ethics in Research Involving Human Subjects (COPEP) of the State University of Maringá, under opinion No. 1,329,069/08 and CAEE 49723115.8.0000.0104, in accordance with Resolution No. 466/2012 of the National Research Council (Brazil, 2012b).

RESULTS

During the period analyzed, from 2015 to 2020, 231 fatal passengers were identified as a result of traffic accidents in the municipality of Maringá (Table 1), with 82.25% being male and only 17.75% female. In terms of age group, the highest percentage of deaths was among those aged 18-29, with 32.9%, and the lowest number of deaths was among those aged 0-17, with 4.76%.

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Table 1 - Fatal passengers in traffic accidents in urban areas according to the location of death. Maringá, PR, Brazil, 2015 to 2020.

Variables	Death at the Scene		Subsequent Death		Total	
	n	%	n	%	n	%
Gender						
Female	13	13,83	28	20,44	41	17,75
Male	81	86,17	109	79,56	190	82,25
Age group (years)						
0-17	4	4,26	7	5,11	11	4,76
18-29	33	35,11	43	31,39	76	32,9
30-39	26	27,66	18	13,14	44	19,05
40-49	10	10,64	14	10,22	24	10,39
50-59	9	9,57	20	14,6	29	12,56
60 and over	11	11,7	35	25,54	46	19,91
Not reported	1	1,06	0	0	1	0,43
Victim category						
Automobile	10	10,64	13	9,49	23	9,96
Motorcyclist	61	64,89	72	52,55	133	57,57
Pedestrian	15	15,96	36	26,28	51	22,08
Others	8	8,51	16	11,68	24	10,39
Day of the week						
Monday to Friday	61	64,89	87	63,5	148	64,07
Saturday to Sunday	33	35,11	50	36,5	83	35,93
Climate						
Good	84	89,36	111	81,02	195	84,42
Rain	6	6,38	9	6,57	15	6,49
Cloudy	2	2,13	8	5,84	10	4,33
Not reported	2	2,13	9	6,57	11	4,76

Source: Traffic Accident Reports (BOAT) provided by the Maringá Military Police (PM).

The study showed that motorcyclists (V20 to V29) had the highest number of passenger deaths due to traffic accidents, with 57.57%, followed by pedestrians (V01 to V09) with 22.08%. The category with the fewest deaths was cars (V40 to V49) with 9.96%.

When referring to weekdays, it was observed that Monday to Friday had the highest number of deaths with 64.07%, and Saturdays and Sundays were the days with the lowest number of deaths with 35.93%. It was found that most traffic accidents with fatalities occurred in good weather, with 84.42%, followed by the lowest number of deaths in cloudy weather, with

4.33%.

Table 2 shows deaths from traffic accidents, according to car occupants in the urban perimeter of Maringá-PR during the period from 2015 to 2020. In the period analyzed, 23 fatal passengers were identified, with the majority of victims being male (82.61%) and only 17.39% female.

Table 2 - Distribution of deaths due to traffic accidents, according to car occupants at the time of death. Maringá-PR, 2015-2020.

	Death at the Scene		Subsequent Death		Total	
	n	%	n	%	n	%
Gender						
Female	1	10	3	23,08	4	17,39
Male	9	90	10	76,92	19	82,61
Age group (years)						
0-17	0	0	1	7,69	1	4,35
18-29	3	30	4	30,77	7	30,43
30-39	5	50	0	0	5	21,74
40-49	1	10	1	7,69	2	8,7
50-59	1	10	4	30,77	5	21,74
60 and over	0	0	23,08	23,08	3	13,04
Day of the week						
Monday to Friday	8	80	61,54	61,54	16	69,57
Saturday to Sunday	2	20	38,46	38,46	7	30,43

Source: Traffic Accident Reports (BOAT) provided by the Maringá Military Police (PM). Category* according to ICD 10.

In terms of age group, the highest percentage of occupant deaths was among those aged 18-29 (30.43%), and the age group with the lowest number of deaths was 0-17 (4.35%). In relation to days of the week, the highest percentage was Monday to Friday with 69.57%, and the lowest number of deaths was Saturday to Sunday with 30.43%.

DISCUSSION

The analysis of mortality from traffic accidents among car occupants reveals an important overview of the factors that contribute to deaths in this group. The data indicate a reduction in deaths from traffic accidents in the urban perimeter of Maringá, from January 2015 to August 2020, due to legislation and enforcement in accordance with the CTB.

The study showed that the majority of fatalities in traffic accidents are

male. This predominance is associated with social and cultural factors that favor greater exposure to risk, such as speeding, higher alcohol consumption, and aggressive behavior in traffic. Thus, males are more vulnerable to accidents due to their greater tendency to engage in risky behavior⁽¹⁵⁾.

Furthermore, it should be emphasized that alcohol is one of the main factors contributing to the high mortality rate from traffic accidents, accounting for approximately 70% of violent accidents with fatalities. In Brazil, it is worrying to note that almost 40% of the population reports having driven at least once after drinking. Alcohol, depending on the concentration ingested, can cause neurofunctional changes in the brain, sufficient to cause behavioral changes that facilitate violence and other consequences, such as motor disturbance and slow reaction, which, when combined with driving, can lead to a traffic accident. It is clear that the situation is even more alarm-

ing among young people, with 13.5% of all deaths of people aged 20 to 29 in 2016 related to alcohol consumption⁽¹⁶⁾.

With regard to age, the 18-29 age group stands out. This group has the highest frequency of deaths and serious injuries, which can be explained by a number of factors. Young people are at a stage in their lives marked by intense social, professional, and academic activity, which exposes them more to traffic. In addition, people in this age group tend to take more risks, whether due to overconfidence, a search for adrenaline, or a lower perception of danger. Behaviors such as speeding, risky overtaking, and inattentiveness at the wheel are more common among young drivers, significantly increasing this group's vulnerability to serious accidents⁽¹⁷⁾.

When referring to weekdays, accidents were more prevalent from Monday to Friday, accounting for 69.57% of the total, followed by a lower number of deaths from Saturday to Sunday, accounting for 30.43%. The

higher frequency of accidents on weekdays, compared to weekends, is possibly related to the pattern of concentration of work activities during this period.

“ During weekdays, vehicle traffic is significantly heavier, especially during rush hour, when workers commute between their homes and workplaces. This increase in traffic volume, combined with factors such as rushing, stress, fatigue, and the need to meet schedules, increases the likelihood of accidents.

”

In addition, urban traffic becomes more competitive and tense, encouraging risky behavior such as dangerous overtaking, speeding, and inattention, contributing to a higher incidence of fatal accidents during this period of the week⁽¹⁸⁾.

Another relevant factor is the inadequate use of safety devices. Although the use of seat belts significantly reduces the risk of death in collisions, there is still resistance to their use, especially in the back seat, which contributes to an increase in the severity of injuries and the number of deaths. In addition, road conditions, vehicle maintenance, and driver fatigue are also aggravating factors.

The analysis of traffic accidents from a nursing perspective reveals the breadth of the role of these professionals, which goes beyond emergency care. Data collection, prevention, health education, and support for the rehabilitation of victims demonstrate the importance of nursing in addressing the consequences of accidents. In addition, their contribution to scientific research and public policy reinforces the need to invest in the continuing education of these professionals. Thus, nursing is consolidated as a strategic area for reducing traffic morbidity and mortality rates and promoting a safer society.

The limitations presented in this study refer to the data source used due to inadequate completion of important risk factors for serious and fatal accidents. Thus, there may be underreporting of information on the underlying cause of death or deaths classified as death by undetermined intent, leading to changes in mortality rates from external causes.

Despite its limitations, this study makes a significant contribution by offering a spatiotemporal analysis of mortality from traffic accidents among car occupants in Maringá, allowing the identification of relevant patterns in terms of gender, age, days

of the week, and associated factors. The study also highlights the importance of nursing not only in care, but also in prevention and in the formulation of educational strategies and public policies aimed at reducing morbidity and mortality in traffic.

CONCLUSION

The study identified the impact of traffic accident mortality in the urban perimeter of Maringá for the implementation of preventive measures. There has been a significant increase in deaths among males of reproductive age due to risky behavior, including alcohol consumption, speeding, inexperience, and failure to use the necessary personal protective equipment, which contributes to increased morbidity and mortality in the population.

The relevance of this study is evident, as it highlights the need for specific interventions that address the needs of this population. It is important to reinforce planning for the prevention of traffic accidents through public policies and continuing education. In addition, increased enforcement is a means of control to reduce the mortality rate. Thus, nurses play an important role in understanding and adhering to the laws that are implemented.

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