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SOCIAL IMPACT ON PUBLIC ADMINISTRATION: TRAFFIC ACCIDENTS ON BRAZILIAN HIGHWAYS

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José Gracildo de Carvalho Junior[1], Angela Ayumi Doami Melo[2], Henrique Antônio Monteiro Lopes[3], Irlando Ricardo Monteiro Lopes[4].

ABSTRACT

The objective of this research was to evaluate statistical relationships between variables inherent to accidents and traffic occurrences on Brazilian federal highways, in the year 2020. This is an applied study, with a quantitative, exploratory, and descriptive approach. The data source was the *website* of the Federal Highway Police of Brazil and the locus was the entire Brazilian territory. Data analysis was inferential, given the application of statistical methods via hypothesis tests of significance. The Northeast and Southeast regions had the highest number of deaths due to traffic accidents (1,571 and 1,371), respectively. On weekends, most (21,087) of the occurrences were recorded, during the day shift (34,397), however, fatal accidents were predominantly recorded at night. The type of straight lane route had the most records (38,336), collision between vehicles was the most lethal type of accident (2,955), rural areas recorded twice as many deaths as urban areas. In 2020, the COVID-19 pandemic occurred, where restrictive measures for human displacement directly influenced the statistics of traffic accidents, especially in the period from March to April 2020, especially in the Southeast and South regions, impacting social relations and public administration due to traffic victimization.

Keywords: Public Security, COVID-19, Social relations, Victimization.

[1] Doctor in Electrical Engineering, Federal University of Pará, Belém, Pará, Brazil
Professor of the Graduate Program in Public Security at the Federal University of Pará
Email: gracildo@ufpa.br
ORCID: https://orcid.org/0000-0001-5794-2865
CV Lattes: http://lattes.cnpq.br/0833818950125120
[2] Bachelor of Statistics from the Federal University of Pará, Belém, Pará Brazil
Orcid: https://orcid.org/0000-0002-7433-4770
E-mail: angeelaayuumi@gmail.com
[3] Master's degree in Public Security from the Graduate Program in Public Security at the Federal University of Pará
Email: henrique.lopes@prf.gov.br
CV Lattes: http://lattes.cnpq.br/8480950030425787
[4] Master's degree in Public Security from the Graduate Program in Public Security at the Federal University of Pará
Email: irlando.lopes@prf.gov.br
CV Lattes: http://lattes.cnpq.br/8077941846256849

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INTRODUCTION

Death from traffic accidents is considered an important factor for public safety in Brazil and in the world, due to the fact that the number of victims has shown a growing trend over the years, as well as the severity of traffic accidents. In Brazil, approximately 45 thousand people die annually and 160 thousand have sequelae due to traffic accidents and most of these cases are concentrated on federal highways, where 8 thousand deaths and 26 thousand injuries were recorded during the year 2014, which caused a loss of R$ 12 billion to the country's economy (Ipea, 2015; PRF, 2015). The number of victims in traffic accidents is worrying and it has been difficult to determine a single cause for such fatality, so this study seeks to foster scientific investigations on traffic accidents that occur on Brazilian federal highways through data from Federal Highway Police records, evaluating the main risk factors along with the creation of a classification of these factors, to assist the responsible bodies in making more assertive decisions in preventing and combating accidents.

In order to mitigate the harmful effects of traffic accidents on society, it is necessary to investigate, how to identify or scientifically evaluate the factors that contribute to accidents on federal highways in Brazil, as it is believed that traffic accidents on federal highways do not occur due to a single factor, but rather due to an association of factors inherent to the context of drivers and the urban and rural traffic routes contained in the five Brazilian regions. Land transport accidents represent the eighth leading cause of death worldwide, especially among individuals aged 5 to 29 years (WHO, 2018), which has serious consequences for the public health of populations.

In this context, Andrade and Antunes (2019) cite that Land Transport Accidents (RTA) represent a "Public Health Problem", as they affect the health levels of populations. The WHO (2013) highlights deaths caused by traffic accidents as one of the most important issues to be solved. Death from traffic accidents may become the fifth leading cause of death in the world by the year 2030, since the consumer market for automobiles is constantly growing, but without due care in the creation and improvement of traffic education, technologies and pre-existing infrastructures (OECD, 2002).

The main components for increasing safety on highways are specialized infrastructures for traffic, speed compatible with the type of vehicle, terrain and road, vehicles equipped with safety and accident prevention technologies, in addition to the need to be more resistant and safer, in addition to the safer conduct of the automotive driver

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(Booysen, 2002; Jameel, 2018). On the other hand, Menezes and Neder (2015) pointed out that in Brazil, despite improvements in road infrastructure, there was an increase in the number of accidents, and that the effect of the improvement in the roads led to an increase in the flow of vehicles, consequently favoring an increase in the average speed and, inevitably, a decrease in the driver's attention. According to ABNT (2020), the claim is defined as "any event that results in damage to the vehicle or its cargo and/or in injury to people and/or animals, and that may cause material damage or damage to traffic, the road or the environment, in which at least one of the parties is moving on land roads or in areas open to the public". While the incident is defined as "any event that does not result in a victim or material damage, and that brings damage to traffic, or to the road or to the environment".

The WHO (2013) considers that traffic accidents can be categorized as a collision or incident involving at least one motor vehicle moving on a public or private road. It is difficult to determine the cause of an accident due to the various factors involved in traffic accidents (Brasil, 2017; Hasegawa, 2017). Despite this, about 90% of accidents are caused by the driver, either by disrespecting traffic laws, or by errors while driving (Hoffmann, 2005; Vilas Boas; Silva, 2015). In 2015, the WHO (2015) categorized the five main risk points related to traffic, namely: driving a motor vehicle under the influence of narcotics, especially alcohol; speed above the allowed limit; inappropriate use of child protection; Failure to use helmet and seat belt.

Traffic accidents rank 8th in the cause of deaths among people of all ages, however, the age group from 5 to 29 years old ranks 1st among fatal victims. Another determining factor for traffic deaths is related to the purchasing power of the driver, as members of lower social classes are 3 times more likely to suffer a fatal traffic accident than drivers from higher classes (WHO, 2018). In 2020 in the United States, there was a 13.2% reduction in motor vehicle traffic, which is a possible reflection of the COVID-19 pandemic, on the other hand, it was the year with the highest number of deaths from accidents since 2007, with 38,680 deaths. This represented an approximate increase of 7.2%, compared to 2019 (36,096 deaths per accident), the main causes were related to speed above the allowed limit, sleep, inadequate use of safety equipment and the use of licit or illicit substances that impaired the driving of the motor vehicle, such as the use of cell phones (NHTSA'S, 2021).

Carvalho and Souza-Santos (2005) and Higgs Gould (2001) evidenced the evolution of the CTB in relation to the level of alcohol in the blood, aiming over the years to reduce

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the concentration per liter allowed until the point at which it was zeroed in 2012. The 1997 CTB established 0.6 g/L in the blood and 0.3 g/L in the breathalyzer; The 2008 CTB defined 0.2g/L in the blood and 0.1g/L in the breathalyzer; In the 2012 CTB, the New Dry Law was implemented, where any concentration of alcohol in the driver's blood is interpreted as a traffic violation. Silva, Menezes and Neder (2015) evaluated the number of accidents in relation to the quality of the road infrastructure and concluded that this is not a determining factor for the number of accidents, associating the quality of the road with the increase in drivers' inattention, along with the speed and average flow of vehicles. This study pointed out that the improvement would be in traffic signage and education campaigns, resulting in an increase in safety on Brazilian public roads.

Traffic accidents are pointed out by several government entities as a worldwide problem impacting several areas, such as: social, economic, environmental, physical and mental health. Deaths and injuries represent an average of 3% of GDP for countries, and can reach up to 5% in less developed countries. (BRAZIL, 2017; Read; Pinto and Santa Rita, 2019). The United Kingdom has developed the Smart Roads Program (PEI) with the objective of increasing the capacity of pre-existing roads in the country, offering greater safety without the need to create new roads for vehicle traffic. This program has cost billions of pounds to the British coffers in the last five years, resulting in improved traffic safety and increased travel capacity (Jallow; Renukappa and Alneyadi, 2019).

According to IPEA (2015), a total of 479,857 deaths were recorded in Brazilian traffic, in addition to the cost associated with these occurrences was approximately 1.58 trillion during the years 2007 and 2018. The causes related to these losses on Brazilian public roads are mainly linked to incompatible speed and disobedience to established traffic rules, which are in many cases ignored by drivers. The road network emphasizes that the available resources are limited, so it is not possible to invest in all stretches simultaneously, and it is therefore necessary to prioritize the most critical stretches, in such a way that the actions taken have a greater impact (Fancello; Carta e Fadda, 2019). In this context, the objective is to evaluate the statistical relationships between the variables inherent to traffic accidents and occurrences that were recorded on federal highways in Brazil, specifically in the initial period of the COVID-19 pandemic during the year 2020.

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METHODS

This research will consider a numerical analysis of the data, through which both qualitative and quantitative variables will be interpreted and evaluated in its scope, based on data on traffic incidents recorded on federal highways in Brazil in the year 2020. For Teixeira (2013), quantitative research raises the role of statistics in establishing a relationship between the theoretical model studied and the data observed in the real world. In this way, it is possible to collect, analyze and interpret the data, in addition to producing statistical inferences about the characteristics of interest inherent to the context of the research problem to be elucidated. The physical geographic space comprised in this research is equivalent to the entire Brazilian federal road network, which corresponds to the federal highways and, under the competence of inspection, and the action of the Federal Highway Police of Brazil. Data acquisition was carried out in the public domain by accessing the https://www.gov.br/prf/pt-br/ website owned by the Federal Highway Police of Brazil, referring to traffic incidents recorded on Brazilian federal highways, in the year 2020, extracted in August 2021.

The data used in this study represent qualitative and quantitative characteristics related to traffic incidents recorded on federal highways in Brazil, in the year 2020, such as the Municipality where the accident occurred, Type and Amount of Injuries, Type of Lane, Phase of the Day, Day of the Week, Cause of the Accident, Classification of the Accident, Meteorological Condition, Type of Soil, Type of Route, etc., and also, Number of Claims by State, Number of Occupants, Victims: Fatal; Wounds; Unharmed, Number of Vehicles Involved in the Accident, etc. The quantitative approach to the data will initially be carried out through descriptive statistics, which, according to Gil (2008), aims to provide an overview of a given fact. The data will be treated and divided according to the type of variable (qualitative and quantitative), based on the assumption that the type of accident is influenced according to the conditions that act directly or indirectly on drivers over the months in 2020.

Therefore, fostering the aspect of statistical analysis proposed in this research, a quantitative analysis considered an inferential statistical analysis will also be possible to use, since the use of this technique allows a remarkable contribution not only to the characterization and summary of the data, but also to the study of the possible relationships between the variables and to verify to what extent the conclusions can extend beyond the considered sample (Gil, 2008). The interesting point is that data obtained from records of

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traffic occurrences on Brazilian highways can be grouped in a contingency table with n rows and m columns, favoring a robust and consistent statistical analysis of the significant influence of one variable (factor that contributed to the traffic accident) in relation to another factor(s). Therefore, the variables under study can be coded, allowing correlations and inferential statistical procedures to be obtained, helping in decision making.

a) Exploratory Data Analysis

Exploratory analysis of the data is most used to represent statistical series, also known as tables, which aim to summarize, in frequency distribution, a set of observations, managing to synthetically expose the results of the analyzed data in relation to characteristics such as: the observed instant of time; local; phenomenon and specification (Bussab; Morettin, 2024).

b) Chi-square test of association

The Chi-square statistical test can be used for different purposes, such as: to evaluate the homogeneity of the data between the categories of a random variable; the adherence of a data set to a specific probability distribution, statistical association between the categories of random variables of interest. To this end, a scientific conjecture needs to be established in the form of statistical hypotheses, as for example in Equation (1), where it is desired to test the association or statistical dependence between two numerical characteristics (variables), and the non-rejection of H0 indicates independence between the variables (Bussab; Morettin, 2024).

$$\begin{cases} \textit{H0:}\ \text{Variable 1 is not associated with variable 2 (Variables independent of each other);} \\ \textit{H1:}\ \text{Variable 1 is associated with variable 2 (Variables related to each other).} \end{cases} \quad (1)$$

However, in order to be able to test the hypotheses in Equation (1), it is necessary to have a test statistic that takes into account the observed values of the variable, in relation to the expected values in terms of probability for each of the categories or levels of this random variable. Therefore, variables 1 and 2 will have a valid association at the α level of significance (e.g., alpha = 0.05), if the calculated value of the test statistic given by Equation (2) is greater than the tabulated value of the chi-square distribution, otherwise, the hypothesis of independence between the variables should not be rejected (Figure 2),

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through a value of α pre-established by the researcher or specialist (Bussab; Morettin, 2024).

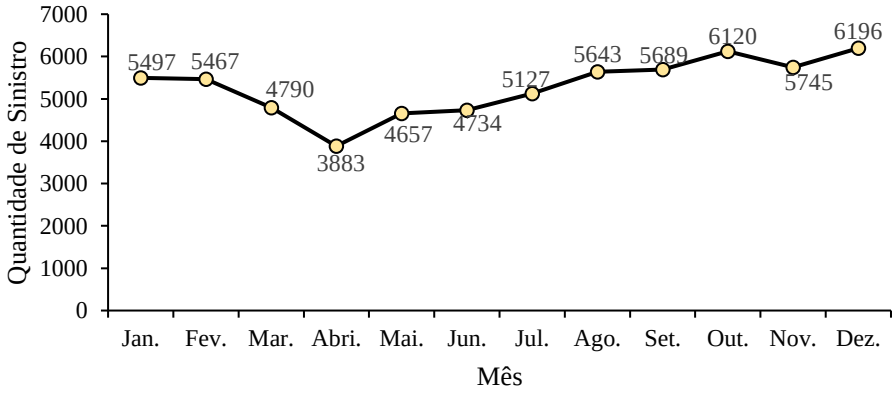
$$\chi^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i}, \quad (2)$$

where, *Oi* and *Ei* represent the observed and expected value for the random variable of interest, at level *i* = 1; 2; 3; ...; *n*, such that, *n* represents the sample size of each variable used.

RESULTS

The confinement during the COVID-19 pandemic fosters the understanding of the decrease in accidents on federal roads in the months of February to April in the year 2020, as can be seen in Figure 1, where the only ways out of confinement possibly accessing Brazilian federal highways aimed to seek essential services and, as a direct consequence, reducing the flow of vehicles in trafficable beds.

Figure 1: Time series of traffic accident records, Brazilian federal highways, by month, in 2020.



Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

Reproducing the time series of monthly claims for each region of Brazil, in January 2020, the Southeast region was the one with the most occurrences (Figure 2), but in the month from February to June the South region led the frequency of accidents on federal highways and, from July onwards, the Southeast region recorded more traffic accidents. As for the region with the lowest number of accidents on federal public roads, the North region

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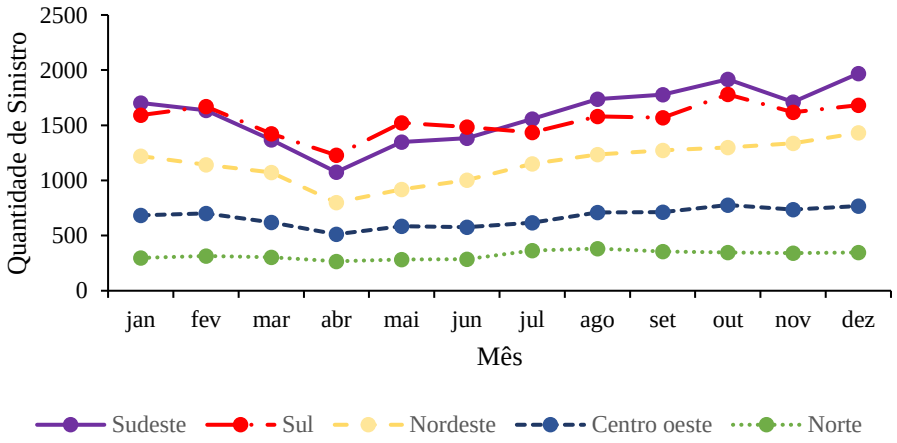
stood out in all months of 2020, something possible to infer due to its road network not being equivalent to the other regions.

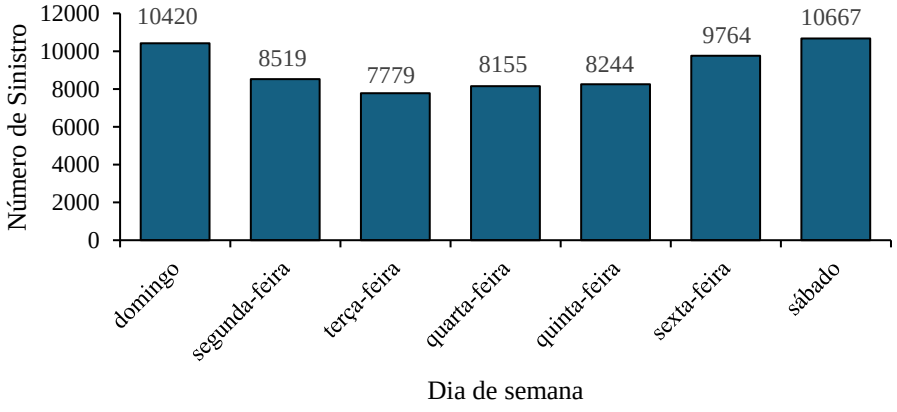
Figure 2: Time Series of the region of the traffic accident, Brazilian federal highways, by month and region, in the year 2020.



Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

According to Pereira and Silva (2006), in addition to Barroso Junior; Bertho and Veiga (2019), traffic accidents vary according to the day of the week, with weekends usually registering the highest occurrences, something that can be confirmed by Figure 3. Therefore, the results of this research corroborate the scenario described in the scientific literature, as traffic accidents on federal highways in Brazil, in relation to the days of the week with the highest frequency of occurrences recorded, were on weekends in 2020.

Figure 3: Number of traffic accident records on Brazilian federal highways, by day of the week, in 2020.



Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

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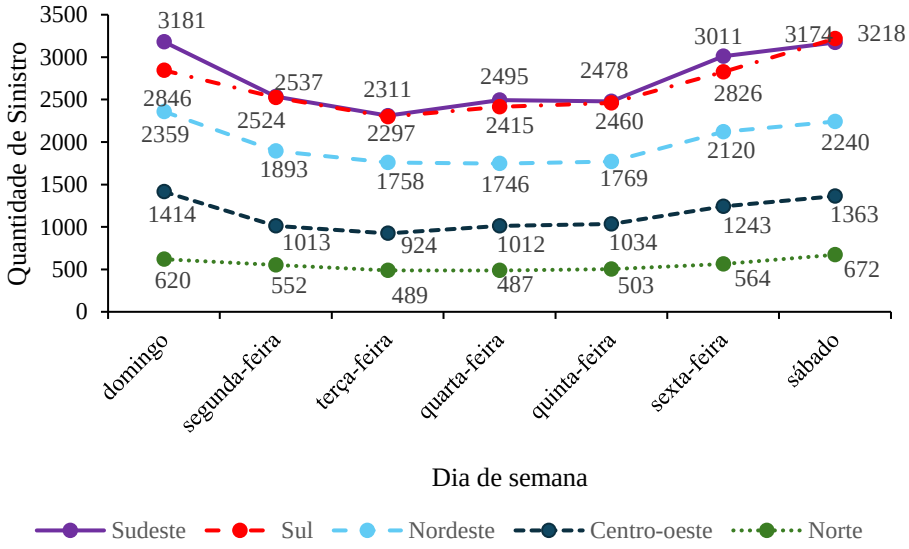
Evaluating the number of traffic accidents per day of the week, in the regions of Brazil, by Figure 4, it is possible to see that the Southeast region on all days of the week registered the highest number of road accidents, closely followed by the South region of the country, this is explained by the fact that the largest road network is in these regions.

Figure 4: Number of claims on Brazilian federal highways, by region and day of the week, in 2020.



Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

The other regions of Brazil, even though they recorded a lower frequency of traffic accidents; in the Northeast region there are high values compared to the Midwest and North regions. For example, traffic reports from the National Department of Transport Infrastructure (DNIT) showed in the State of Bahia, in 2019, a higher incidence of accidents concentrated in the time range between 6 and 7 pm. The results obtained in this study are in line with this scenario (Figure 5), since 4,989 traffic incidents were recorded in the aforementioned time slot. It is necessary to pay attention to the time ranges from 17 to 18 hours, and the interval from 19 to 20 hours, in relation to the period with the highest frequency of claims (18 to 19 hours), because in these the second (4,273) and third (4,226) highest frequency of claims were registered, respectively, in relation to the time ranges evaluated, This suggests an implementation of effective actions in these periods by the responsible agencies, especially so that the guarantee of human life prevails on these highways.

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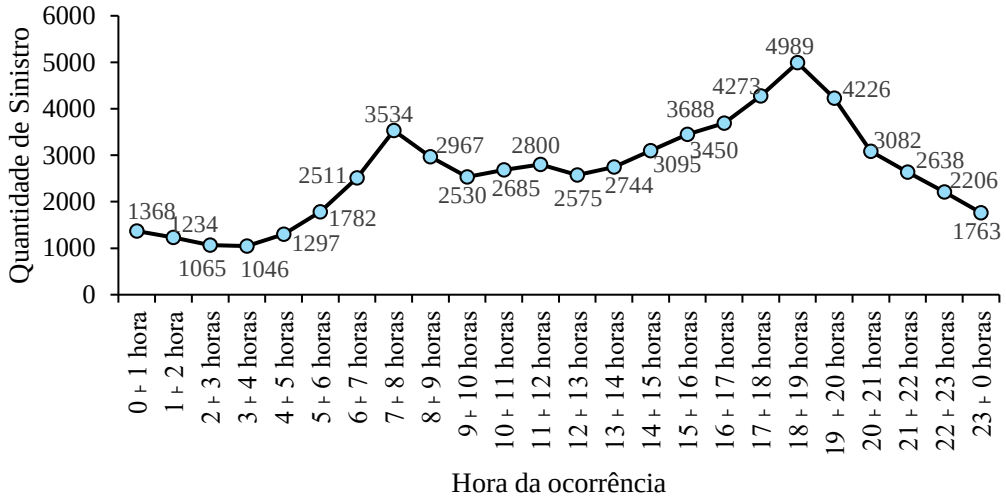
Figure 5: Number of traffic accident records on Brazilian federal highways, by time slot, in 2020.



Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

According to DATASUS (2017), in 2016, 38.02 thousand deaths due to traffic accidents were recorded in Brazil. The most impacted regions were the Northeast (11,200) and Southeast (10,900). This same proportion was also observed by Andrade and Ferreira Antunes (2019), the total period from 2007 to 2017. During the sampling period, 5,291 deaths were observed (Table 1), where the same regions mentioned above occupied the same positions with the highest death rates, where in the Northeast region there were 1,571 (29.69%), followed by the Southeast region with 1,371 (25.91%). In this context, it is possible to note that even over the years, the critical points continue to be concentrated in the same geographical areas.

Table 1: Number of victims of traffic accidents on federal highways by region and type of injury, Brazil, year 2020.

Region	Type of feriment				Total
	Death	Seriously injured	Slightly injured	Unhurt	
Southeast	1.371 (25,91%)	4.931 (28,83%)	17.391 (31,98%)	17.879 (29,38%)	41.572 (30,21%)
On	1.145 (21,64%)	4.559 (26,65%)	15.943 (29,32%)	18.198 (29,90%)	39.845 (28,85%)
Northeast	1.571 (29,69%)	3.986 (23,30%)	10.123 (18,62%)	11.733 (19,28%)	27.413 (19,92%)
Central-West	681 (12,87%)	1.973 (11,54%)	6.895 (12,68%)	8.084 (13,28%)	17.633 (12,81%)
North	523 (9,89%)	1.655 (9,68%)	4.024 (7,40%)	4.964 (8,16%)	11.166 (8,11%)
Total	5.291 (100,00%)	17.104 (100,00%)	54.376 (100,00%)	60.858 (100,00%)	137.629 (100,00%)

Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

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Attention in traffic is a determining factor for safety on public roads and this includes both drivers and pedestrians. It was observed by Kaesemodel (2021) that the mortality rate and the degree of severity increase according to speed, the accidents observed in this study involving pedestrians have a greater share of the occurrence in the middle of the night.

Table 2: Number of traffic accidents on Brazilian federal highways, by phase of the day and, by accident classification, in 2020.

Phase of the day	Claim classification			Total
	With fatalities	With injured victims	Without Victims	
Dawn	301 (6,65%)	1.990 (4,20%)	626 (5,40%)	2.917 (4,59%)
Full day	1.688 (37,32%)	27.117 (57,17%)	5.592 (48,24%)	34.397 (54,13%)
Nightfall	223 (4,94%)	2.729 (5,75%)	557 (4,80%)	3.509 (5,52%)
Late Night	2.311 (51,09%)	15.596 (32,88%)	4.818 (41,56%)	22.725 (35,76%)
Total	4.523 (100,00%)	47.432 (100,00%)	11.593 (100,00%)	63.548 (100,00%)

Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

In this context, Table 2 shows that the majority of incidents (54.13%) occur in broad daylight, resulting in 1,688 accidents with deaths and 27,117 accidents with injured victims. Accidents in the middle of the night represent 35.76% of the total records, where 15,596 of these accidents resulted in injured victims and 2,311 fatal victims, that is, in the middle of the night there were mostly fatal accidents (51.09%), among the four phases of the day analyzed.

Table 3: Number of traffic accidents on Brazilian federal highways, by phase of the day and type of injury of the victim, in the year 2020.

Phase of the day	Type of feriment				Total
	Dead	Serious injury	Lever injury	Unharmed	
Dawn	353 (0,26%)	2.367 (1,72%)	769 (0,56%)	2.339 (1,70%)	5.828 (4,24%)
Full day	2.012 (1,46%)	31.704 (23,04%)	8.632 (6,27%)	34.867 (25,33%)	77.215 (56,10%)
Nightfall	257 (0,19%)	3.059 (2,22%)	1.057 (0,77%)	3.581 (2,60%)	7.954 (5,78%)
Late Night	2.669 (1,94%)	17.246 (12,53%)	6.646 (4,83%)	20.071 (14,58%)	46.632 (33,88%)
Total	5.291 (3,85%)	54.376 (39,51%)	17.104 (12,43%)	60.858 (44,21%)	137.629 (100,00%)

Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

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In the middle of the night there was a higher record of fatalities, with 2,669 deaths, which is consistent with the study carried out by (Barroso Junior; Bertho and Veiga, 2019), in which during the night shift there are more fatal accidents compared to the morning (Table 3). The shift that added the highest number of serious and minor injuries in traffic accidents was Pleno Dia, which totaled 40,336 victims. It is important to note that in 34,867 (25.33%) of the total traffic accidents on federal highways in 2020, the victims were unharmed by the accident, when the accident occurred in broad daylight, this fact can possibly be justified by the use of vehicle safety items such as seat belts, etc.

Table 4: Number of types of traffic accidents on Brazilian federal highways, by phase of the day, in 2020.

Type of accident	Phase of the day				Total
	Dawn	Full day	Nightfall	Late Night	
Collision between vehicles	1.065 (1,68%)	18.579 (29,24%)	2.040 (3,21%)	10.383 (16,34%)	32.067 (50,47%)
Carriage bed outlet	707 (1,11%)	5.625 (8,85%)	444 (0,70%)	3.714 (5,84%)	10.490 (16,50%)
Tipping	300 (0,47%)	3.249 (5,11%)	273 (0,43%)	1.740 (2,74%)	5.562 (8,75%)
Collision with object	316 (0,50%)	2.406 (0,18%)	191 (0,30%)	2.254 (3,55%)	5.167 (8,14%)
Pedestrian Collision	113 (0,18%)	929 (1,46%)	184 (0,29%)	1.612 (2,54%)	2.838 (4,47%)
Vehicle occupant remains	112 (0,18%)	1.599 (2,52%)	152 (0,24%)	935 (1,47%)	2.798 (4,41%)
Rollover	118 (0,19%)	973 (1,53%)	84 (0,13%)	683 (1,07%)	1.858 (2,92%)
Fire	63 (0,10%)	592 (0,93%)	52 (0,08%)	470 (0,74%)	1.177 (1,85%)
Animal Collision	95 (0,15%)	191 (0,30%)	59 (0,09%)	811 (1,28%)	1.156 (1,82%)
Possible damages	12 (0,01%)	134 (0,21%)	19 (0,03%)	69 (0,11%)	234 (0,36%)
Cargo spillage	16 (0,03%)	120 (0,19%)	11 (0,01%)	54 (0,08%)	201 (0,31%)
Total	2.917 (4,60%)	34.397 (54,13%)	3.509 (5,51%)	22.725 (35,76%)	63.548 (100,00%)

Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/

Accidents resulting from collisions between vehicles occur, above all, due to the driver's lack of attention or disobedience to traffic rules (appendix), this is even more evident when the number of accidents in broad daylight (18,579) is higher than in any other phase of the day. However, collisions between vehicles accounted for more than half (50.47%) of all types of traffic accidents recorded in all phases of the day in 2020 (Table 4). The same scenario was observed by Carvalho (2018) and Strozi (2021), with an increase in

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the number of accidents due to the driver's recklessness, even in favorable visibility conditions.

Table 5: Chi-square Test of Association for Claims on Brazilian Federal Highways, in 2020.

Variable Considered in Line	Variable Considered in the Column				
	Type of Cause of Claim	Type of Injury	Claim Classification	Type of Injury in Urban Area	Type of Injury in a Rural Area
Region Left	No statistical significance	$\chi^2_{(Calculated)} = 7.305^*$	No statistical significance	No statistical significance	No statistical significance
Phase of the Day During the Claim	$\chi^2_{(Calculated)} = 12.271^*$	$\chi^2_{(Calculated)} = 2.118^*$	$\chi^2_{(Calculated)} = 1.001^*$	$\chi^2_{(Calculated)} = 546^*$	$\chi^2_{(Calculated)} = 495^*$
Accident Type	$\chi^2_{(Calculated)} = 13.193^*$	No statistical significance	$\chi^2_{(Calculated)} = 9.412^*$	No statistical significance	No statistical significance
Track Layout	No statistical significance	No statistical significance	$\chi^2_{(Calculated)} = 262.00^*$	No statistical significance	No statistical significance

Source: Prepared by the authors (2024), data available at https://www.gov.br/prf/pt-br/
Note: * p-Value < 0.001 (statistically significant association at the level of 0.05).

Table 5 shows possible associations between the variables considered in this study, based on the data presented in Tables 1 to 4. Among the nine chi-square hypothesis tests of association that were performed, all showed statistical significance at the level of 5%. This means, for example, that the type of injury (Fatal, Serious, Light, No Injury) caused by accidents on federal highways in Brazil is associated with the region of the accident (North, Northeast, Midwest, Southeast and South) where the motor vehicle was being driven. Therefore, as most of the fatal victims were recorded in the Northeast (1,571) and Southeast (1,371), it is possible to infer that these places contributed in some way, either by the condition of pavement, signage or inspection of the roads, or the frequencies of fatalities resulting from traffic accidents occurring in public traffic areas.

CONCLUSIONS

Additionally, it is possible to infer analogously to the variable Type of Injury versus Region of the Claim, that the variables Phase of the Day During the Accident versus (Type of Injury; Type of Cause of Claim; Classification of the Claim; Type of Injury in Urban Area; Type of Injury in Rural Area); Type of Claim versus (Type of Cause of Claim; Classification of the Claim); Lane Layout versus Claim Classification also showed statistical significance (p-Value < 0.001: < α = 0.05), corroborating the association between the variables involved in traffic accidents on Brazilian federal highways during 2020.

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The conclusions obtained by the results of Table 5 demonstrate that traffic accidents on federal highways do not occur motivated by a single factor, but rather by an association of factors that include recklessness, malpractice, lack of common sense, to name just a few factors related to the driver, but without neglecting the conditions of trafficability and minimally safe driving on federal public roads, whether in urban or rural perimeters. Therefore, the active presence of the highway inspection and planning bodies is essential so that traffic in these spaces can flow efficiently and safely for everyone.

Reflecting the effects of the COVID-19 pandemic, the number of accidents involving pedestrians was lower when compared to previous years. Measures to reduce the number of accidents on federal highways in Brazil must be adopted quickly, thinking in the short term with increased inspection and, in the medium and long term, with educational campaigns on rules, traffic legislation and awareness of life, since most of the accidents registered occurred due to human factors, such as lack of attention, disobedience to traffic rules, incompatible speed and alcohol intake, making the driver responsible for accidents.

The human factor is decisive for the origin of traffic accidents, in view of the disobedience to traffic rules such as: incompatible speed; alcohol intake; Not keeping a safe distance, either because of the driver's lack of attention when using the cell phone behind the wheel of a motor vehicle, or because of driving under the influence of some medication that reduces attention. In this context, the hypothesis of this work was ratified, since the traffic accidents recorded during the year 2020 on Brazilian federal highways occurred due to factors associated with the driver and other physical and/or climatic aspects inherent to the context of federal public roads in Brazil.

Some measures can and should be taken in order to mitigate the damage caused to the lives of drivers and users of federal highways in Brazil, due to traffic accidents, such as carrying out national campaigns with teaching of traffic legislation along with awareness of prevention and maintenance of human life, without distinction to the age groups of the public involved, making these actions a medium and long-term strategy, becoming a constant and effective practice. However, an emergency measure, but no less important to reduce accidents, is to increase inspections and punishments for transgressions of traffic rules.

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