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ESTIMATE AND ANALYSIS OF ACCIDENTS ON HIGHWAYS IN THE SOUTHWEST REGION OF PARANÁ (2023): TRENDS AND CHALLENGES FOR ROAD SAFETY

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Abstract: This study addressed road safety on highways in southwestern Paraná, highlighting its importance for regional development, especially in the transport of goods and population mobility. However, heavy traffic on these highways has led to high accident risks, with direct impacts on safety, logistics flow, and the well-being of the population. Based on data from 2023, the study revealed an alarming scenario of accidents, injuries, and deaths on highways PRC-280, PR-182, and PR-180, pointing to the need for more effective public policies and improvements in traffic conditions. The 6th Highway Police Company, through preventive actions such as speed cameras, educational blitzes, and awareness campaigns, has contributed to the reduction of accidents by controlling speeding, one of the main factors in serious accidents. The study suggests that, despite the actions taken, a continuous effort is needed to improve road safety policies, improve highway infrastructure, and promote public awareness in order to further reduce accidents and their consequences. Therefore, the work of the 6th Company and the integration of enforcement, education, and structural improvements are essential to ensuring safer traffic in southwestern Paraná.

Keywords: road safety, highways, accidents, Military Highway Police.

INTRODUCTION

Road safety is one of the essential pillars for sustainable development and for ensuring quality of life in any region. In the context of southwestern Paraná, highways play a fundamental role in regional mobility and in the flow of agricultural produc-

tion, in addition to connecting various municipalities and communities.

However, this heavy traffic also implies high risks of accidents and traffic violations, which have direct repercussions on people's safety, logistics flow, and the well-being of the population. In 2023, the region saw a significant variation in accident and violation rates, raising questions about the effectiveness of public road safety policies and traffic conditions on major highways.

The objective of this study is to estimate the incidence of accidents and fines for traffic violations on the most important highways in the southwestern region of Paraná in 2023, in order to identify trends, patterns, and the main factors that influence the occurrence of these events. In addition, the study aims to provide an analysis of current road safety conditions, highlighting the challenges faced by local authorities and suggesting measures to mitigate risks on the region's highways.

The relevance of this research is justified by the strategic importance of highways for the economy of southwestern Paraná and the significant impact that accidents and violations can have on the safety of the population. Understanding the dynamics of accidents and fines in this territory allows for the formulation of more efficient public policies that meet not only infrastructure demands but also the needs for awareness, enforcement, and prevention, with a view to reducing accidents and strengthening road safety in the region.

DEFINITION OF ACCIDENTS

Traffic accidents, or commonly referred to as crashes, are events that often happen unexpectedly and unintentionally, in-

volving vehicles, people, or even animals on public roads. These incidents can result in physical and material damage and, in tragic cases, even death.

The Brazilian Traffic Code (BRASIL, 1997) defines traffic as the use of streets and roads by vehicles, pedestrians, and animals for the purpose of moving, stopping, or loading and unloading. It also establishes rules so that everyone can move safely. However, despite these rules, traffic is still an area fraught with risks and continues to have a serious impact on public health, being considered a global health problem by the World Health Organization (WHO, 2021).

Leal (2023) cites that, according to the National Traffic Department (DENATRAN, 1998), an accident is any unforeseen event involving at least one moving vehicle and causing damage or injury. These accidents vary in severity and can result in death, injury, or property damage. They are classified according to their severity: fatal, with injuries, or without victims. The causes of these accidents are complex and include factors such as human error, poor vehicle or road conditions, and the consumption of substances such as alcohol, which plays an important role in accidents (NUNES; NASCIMENTO, 2012).

Studies show that human error is responsible for most traffic accidents, accounting for 85% to 95% of cases, according to Okumura (1992). Recklessness, negligence, and driver inexperience are the main causes of these errors, which often result in serious accidents. Alcohol consumption, one of the most widely consumed substances in the world, is an aggravating factor. Its social acceptance, combined with ease of access and low cost, makes it more difficult to deal with

its negative impact on traffic (ARAÚJO; OLIVEIRA; SOUZA, 2015).

Leal (2023) also shows that research reveals that one in five accident victims treated in SUS emergency rooms was under the influence of alcohol (SUS, 2013). The great challenge for traffic authorities is to find effective ways to reduce the number of accidents, understanding their causes and seeking solutions to minimize the damage caused (SANTOS, 2006).

FACTORS AND STUDIES ON ACCIDENTS AND TRAFFIC VIOLATIONS IN SOUTHWEST PARANÁ

The Institute of Applied Economic Research (Ipea) has been studying the alarming numbers of traffic accidents in Brazil. In a recent analysis, IPEA revealed that between 2010 and 2019, traffic deaths increased by 13.5% compared to the previous decade. This was also reflected in an increase in the mortality rate, which rose by 2.3% per 100,000 inhabitants, showing a worrying scenario that needs to be addressed urgently.

In addition, the institute launched a more in-depth study focused on the introduction of new technologies in vehicles and how these innovations can help reduce accidents. The research analyzed accidents on Brazilian federal highways in 2020 and 2021, taking into account the model, make, and year of manufacture of the vehicles involved. The conclusion is clear: technology plays a key role in improving traffic safety and reducing tragic numbers.

In 2024, Paraná faced an alarming increase in the number of traffic accidents, especially on federal highways. The Federal

Highway Police (PRF) recorded 7,302 incidents, resulting in 605 deaths, representing an increase of 8.2% over the previous year (BRAZIL, 2024).

Head-on collisions and pedestrian accidents were the main causes of fatalities, accounting for almost half of all deaths (46%). In addition, pile-ups, accidents involving three or more vehicles, saw a staggering 300% increase, from 6 to 18 deaths compared to 2023 (BRAZIL, 2024).

Many factors influence these figures. Carvalho (2016) points out that the quality of transport and traffic infrastructure has a direct impact on the number and severity of accidents, as do factors such as culture, educational level, and population income.

Malta *et al.* (2012) also indicate that alcohol and other substances are one of the main causes of the high incidence of traffic accidents globally, with this factor accounting for 70% of the causes of fatal accidents in Brazil (MALTA *et al.*, 2012).

In the southwestern region of Paraná, the rates have remained alarming. The study by Giarretta *et al.* (2024) reveals some relevant data on the occurrences and demand for emergency services. Men account for the majority of calls to SAMU (Mobile Emergency Care Service) due to their greater exposure to risk factors such as alcohol consumption, reckless driving, and high-risk activities such as manual labor. This population, in addition to seeking less preventive medical care, is the main user of emergency services (BRAZIL, 2024).

Among the age groups, there is a higher prevalence of incidents among people aged 20 to 59, totaling 53% of cases. This is mainly due to the increase in chronic diseases and, especially, traffic accidents and vio-

lence. However, an increase in calls is also recorded among young people, mainly due to traffic-related trauma, illicit substance use, and armed violence (BRAZIL, 2024).

The study also points out that traffic accidents are one of the main causes of trauma, with SAMU responding to cases related to falls and accidents involving vehicles. The research emphasizes the need for preventive measures and educational campaigns on traffic safety, such as the use of seat belts and the mandatory use of child seats. In addition, it highlights the urgency of combating the problem of prank calls, which increase response times and affect the efficiency of responding to real emergencies (BRAZIL, 2024).

Thus, it is essential to establish the number of accidents and notifications in the southwestern region of Paraná for the period of 2023.

DATA COLLECTION

The methodology for data collection consisted of obtaining official information on accidents and traffic fines recorded by the Paraná Highway Patrol and the Paraná Department of Roads and Highways (DER/PR) for the period of 2023. The focus was on the main highways in the southwestern region, including PRC-280, PR-182, and PR-180, which account for most of the accidents in the area. The data analysis involved classifying the incidents by number of accidents, number of uninjured individuals, number of injured individuals, and number of deaths.

Traffic accidents in the southwestern region of Paraná were handled by the 6th Company of the Paraná Highway Patrol,

responsible for enforcement and emergency response on the region's main highways, such as PRC-280, PR-182, and PR-180. This company plays a key role in coordinating rescue operations and maintaining road safety, ensuring that incidents are responded to quickly and efficiently, minimizing damage and assisting victims. The work of the 6th Company contributes significantly to reducing the consequences of accidents and implementing public safety strategies on state and federal highways in the area.

RESULTS AND DISCUSSION

Highways in southwestern Paraná play a crucial role in the region's development, facilitating the transport of goods and the mobility of populations. However, this importance is accompanied by high accident risks, especially on highways PR-280, PR-182, and PR-180, which are fundamental to local traffic. According to data from the 2023 yearbook of the Department of Highways (DER), these highways recorded alarming numbers of accidents, uninjured, injured, and fatalities, reflecting the consequences of high traffic and road infrastructure in the region. Table 01 presents data by highway, number of accidents, uninjured, injured, and fatalities on these main highways in the southwestern region of Paraná.

PRC-280 has a considerable number of accidents, with a total of 165 occurrences. Although the number of uninjured people (234) is higher, the number of injuries (102) and deaths (20) shows that, even on highways with heavy traffic, the severity of accidents can be significant.

PR-182 is a highway with an even higher number of accidents, totaling 174. Although the number of uninjured people is higher (255), the number of injured (148) is also notable. The severity is comparable to that of PRC-280, with 21 deaths, which points to a concern for safety and the need for more effective preventive measures.

PR-180 has a lower number of accidents (132), but even so, 148 injuries and 11 deaths are a worrying reality. The number of uninjured people is high (216), suggesting that many incidents did not result in serious physical harm, but the injuries and deaths indicate that preventive measures remain necessary, especially considering the number of injuries.

In this sense, it is worth considering that PR-182 is the highway with the highest number of accidents (174), which may reflect greater vehicle traffic or greater challenges in terms of infrastructure and traffic conditions. Despite a higher number of uninjured people, the severity of the accidents should not be underestimated, with 148 injuries and 21 deaths.

HIGHWAY	ACCIDENTS	UNINJURED	INJURED	DEATHS
PRC 280	165	234	102	20
PR 182	174	255	148	21
PR 180	132	216	148	11

TABLE 01 – INDICES BY HIGHWAY IN 2023

Source: Adapted from Paraná Highway Department, (2023).

Given this scenario, the 6th Highway Police Company, located in Pato Branco, plays an essential role in road safety in the region. Responsible for patrolling 1,432.014 kilometers of state highways, the company adopts a series of preventive actions to reduce accidents and improve traffic conditions.

One of the main strategies adopted by the 6th Company is the use of mobile speed cameras, which directly monitor and control vehicle speed. The presence of speed cameras on state highways allows officers to monitor drivers and take preventive action, avoiding serious accidents such as head-on collisions and pedestrian accidents.

- PRC-280: It has 17 mobile radar enforcement points passing through the municipalities of General Carneiro, Palmas Clevelândia, Mariópolis, Pato Branco, Vitorino Renascença, and Marmeleiro, with speed limits ranging from 60 to 100 km/h. It operates on one of the busiest highways in the region, which is essential for controlling speed in an area with heavy vehicle traffic.
- PR-180: The highway has three radar points on sections between the municipalities of Francisco Beltrão and Marmeleiro (kilometers 481 to 502), in addition to Cascavel, where there are radars at various points. Speed limits in these areas vary between 80 km/h and 100 km/h.
- PR-182: In Ampere and Francisco Beltrão, speed enforcement occurs between kilometers 502 and 527, with a limit of 100/80 km/h. This aims to ensure that drivers

maintain a safe speed, preventing accidents, especially in areas with heavy traffic.

In addition to these points, highways such as PRC-158, PR-281, and PR-449, PR-475, PR-483, PR-493, PR-562, PR-566, and PR-880 are also monitored by mobile radars, with speed limits ranging from 60 km/h to 100 km/h, especially in critical areas of cities such as Pato Branco, Francisco Beltrão, and Palmas.

The preventive action of the 6th Company is not limited to speed enforcement. In addition to mobile radars, the company conducts educational blitzes, awareness campaigns, and alcohol enforcement operations to reinforce road safety. These actions not only control vehicle speed but also serve as an educational tool, reminding drivers of the importance of respecting speed limits and adopting safer driving practices.

The expected results of these preventive actions are clear: a reduction in the number of accidents, especially the most serious ones, and greater awareness among drivers of the importance of road safety. The constant presence of the Military Highway Police is also a way to discourage risky behavior, promoting a safer environment for everyone.

Thus, it can be observed that in this time frame, the strategies of the 6th Highway Police Company, with the use of radars and strict enforcement on the highways of southwestern Paraná, are fundamental to improving traffic safety. These actions have proven effective in reducing accidents and raising awareness about the importance of respecting traffic rules, directly contributing to the safety and well-being of the population.

CONCLUSION

This study highlighted the importance of highways in southwestern Paraná for regional development, especially with regard to the transport of goods and the mobility of the population. However, as was also pointed out, heavy traffic on these roads brings with it high risks of accidents and traffic violations, the repercussions of which directly impact the safety of people and the logistics flow in the region.

Analysis of the 2023 data reveals a worrying scenario, with a significant number of accidents, injuries, and deaths on major highways, such as PRC-280, PR-182, and PR-180, suggesting that public road safety policies still need to be improved to deal more effectively with traffic conditions and challenges in the region.

The 6th Highway Patrol Company, with its preventive and rigorous actions, has played a key role in reducing accident rates. The use of speed cameras, together with educational blitzes and awareness campaigns, has proven to be an effective strategy for controlling speeding, one of the main causes of serious accidents. In addition, the constant presence of the Military Highway Police has helped to discourage risky behavior, promoting a safer environment on the region's highways.

However, the data also suggest that, despite preventive actions, there is still a need for continuous evolution of public traffic safety policies. The region requires a joint effort by local authorities and the population to improve highway infrastructure and implement more effective measures, with the aim of reducing not only the number of accidents, but also their consequences, such as injuries and deaths.

Thus, this study highlights the relevance of the actions of the 6th Highway Police Company and the importance of an integrated approach that combines enforcement, traffic education, and infrastructure improvements to ensure safety on the highways of southwestern Paraná. Strengthening these actions is essential for reducing accidents and building safer traffic for everyone.

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