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TRAUMA HOSPITALIZATIONS IN THE SINGLE HEALTH SYSTEM (SUS): THE IMPACT OF THE GROWTH OF MOTORCYCLE COURIERS AFTER THE COVID-19 PANDEMIC

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Abstract: This study analyzes the impact of the growth of motorcycle couriers after the COVID-19 pandemic on hospitalizations for trauma recorded in the Unified Health System (SUS). A quantitative and descriptive methodology was used based on data from DATASUS (2020-2024), as well as a literature review to assess socioeconomic and behavioral factors. The results show a significant increase in hospitalizations due to motorcycle accidents, with a predominance of young males of working age. Hospitalizations represented a cost of more than 900 million reais to the SUS, reflecting a public health problem. The conclusion is that the precarious working conditions of motorcycle couriers intensify the risk of accidents, highlighting the need for labor regulations, traffic education campaigns and safer infrastructure.

Keywords: Motofrete; Motorcycle accidents; Pandemic; SUS; Hospital admissions.

INTRODUCTION

The World Health Organization (WHO) defines a “traffic accident as a vehicular accident that occurs on a public road, understood as the total width between two property boundaries and any land or road open to the public for the movement of people or goods from one place to another”. This concept is important and up-to-date, given that the WHO has stated that there are more than 1 million deaths in traffic every year, with motorcycles playing a major role in these accidents.

This panorama is a plangent reality, given that death and trauma from traffic accidents are preventable. According to Lima (2020), despite being a daily occurrence, such incidents can be prevented, representing a public health problem that can be mitigated. Thus, there is a need to change this reality, given that accidents involving motorcycles cause injuries that prevent people from performing their duties for a long period of time or make them

permanently disabled. Both cases highlight the social and economic impact of these accidents, which result in significant costs for both the health system and social security, especially due to expensive hospitalizations, which often last for a long time. This burdens not only the family budget of those who are injured, but also the social security system (Fidelis; Araújo; Martins Filho, 2022).

Since the end of the last century, there has been a significant increase in the motorcycle fleet. This expansion, according to Pordeus et al. (2010), is due to the low commercial cost of motorcycles - when compared to cars - the ease of acquisition through long-term payment plans and their capacity for agile mobility at a time when metropolises are becoming progressively congested. In this scenario, the motorcycle has become an accessible and practical means of transportation for young adults, being used both for leisure and daily commuting, and as a work tool, in the case of motorcycle couriers and motorcycle taxi drivers

However, this expansion has brought with it a series of risks, mainly due to the fact that motorcycles are less unstable vehicles, due to their smaller, two-wheeled structure, which offers the rider less protection and more difficulty in balancing. At the same time, there is a strong negligence of traffic rules by many Brazilians, the result of a culture of recklessness, which also normalizes the lack of personal protective equipment, a factor that increases the risk of serious injury in accidents. In this sense, the motorcyclist's vulnerability in a collision is noticeable, since all the energy from the impact is absorbed by the driver's body (Aires et al., 2022).

Worryingly, during the COVID-19 pandemic, there has been an even greater increase in the number of motorcyclists, as the demand for home deliveries and the need for social isolation have made motorcycle couriers an indispensable service. This growth has exposed

more workers to the risks of traffic, increasing the incidence of accidents involving motorcycles and, consequently, hospitalizations due to injuries resulting from these accidents, which are quite costly, especially for the Unified Health System (Ministry of Health, 2023). It is therefore interesting to observe the impact of this scenario, given that the main victims are men of working age, which is detrimental to families and the Social Security system.

METHODOLOGY

This research used a quantitative and descriptive approach to analyze the impact of the increase in motorcycle transport, during and after the Covid-19 pandemic, on hospitalizations for trauma in the Unified Health System (SUS). For the quantitative analysis, secondary data made available by the Hospital Information System (SIH) of the SUS and the Department of Informatics of the SUS (DATASUS) were used and examined, referring to the period from March 2020 to August 2024, with a search carried out in October 2024. The focus of the work were cases of hospitalizations involving motorcyclists, identified by International Classification of Diseases (ICD10) codes, specifically V20 to V29. The data collected was analyzed using descriptive statistics in order to identify trends in the growth of hospitalization rates and the profile of hospitalized patients.

For the qualitative analysis, socioeconomic and behavioral factors were explored through a literature review and critical analysis of the literature. This inspection included articles on motorcycle accidents and the relationship with motorcycle courier work, as well as studies focused on the relationship between epidemiological factors and the increase in such collisions, in order to support the discussion of the results observed. These publications were searched for in online databases such as Scielo, PubMed, MedLine and Google Scholar,

using the following keywords: “Accidents involving motorcyclists”; “Motorcycle courier”; “Pandemic”, “Hospitalizations in the SUS”.

RESULTS

During the period surveyed, between March 2020 and August 2024, there was a progressive increase in hospitalizations due to motorcycle accidents. According to Table 1, between 2020 and 2023 there was an increase of approximately 35% in these claims, and in 2024, even though the research only reached half of the year, the figures are already similar to the total number of accidents in the time period investigated in 2020.

YEAR OF HOSPITALIZATION	NUMBER OF HOSPITALIZATIONS
March/2020 - Dec/2020	93.557
2021	112.901
2022	114.918
2023	126.943
Jan/2024 - Aug/2024	80.562
TOTAL	528.881

Table 1 - Total number of hospitalizations under ICD V20-V29 between March 2020 and August 2024.

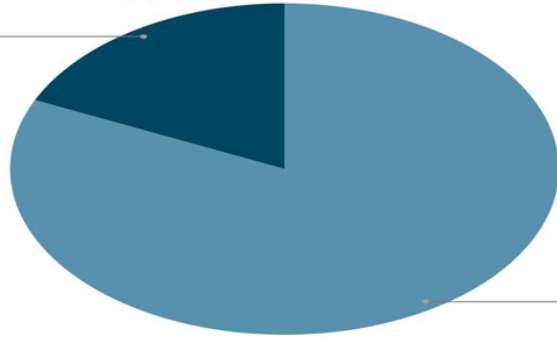
Source: TabNet Win32 3.0: SUS Hospital Morbidity from External Causes - by place hospitalization, 2024.

Given this increase, it is important to understand the epidemiological indices behind it. In this sense, Graph 1 compares the genders, with males accounting for 492,069 cases (81.8%) compared to females with 109,298 cases (18.2%).

In terms of color/race, during this same period, inpatients declared themselves: brown (341,859), white (151,857), no information (74,343), black (22,539), yellow (9,867) and indigenous (902). Graph 2 shows this data in percentage form.

Number of motorcycle accidents divided by gender

Women
18,2%



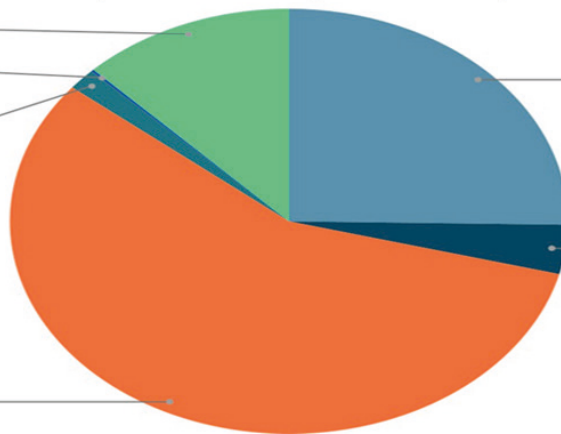
Men
81,8%

Graph 1 - Number of hospitalizations under ICD V20-V29, divided by gender, between March 2020 and August 2024:

Source: TabNet Win32 3.0: SUS Hospital Morbidity from External Causes - by place of hospitalization, 2024.

Number of hospitalizations due to motorcycle accidents divided by color/race

No information
12,4%
Indigenous
0,1%
Yellow
1,6%



White
25,3%

Black
3,7%

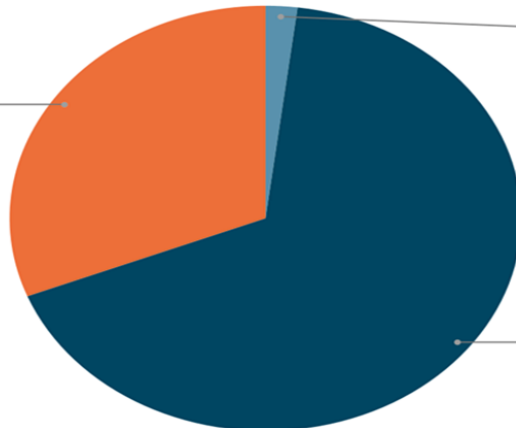
Brown
56,8%

Graph 2 - Number of hospitalizations under ICD V20-V29, divided by color/race, between March 2020 and August 2024:

Source: TabNet Win32 3.0: SUS Hospital Morbidity from External Causes - by place hospitalization, 2024.

Number of hospitalizations due to motorcycle accidents divided by age group

over 40 years old
31,0%



0 - 14 years old
2,0%

15 - 39 years old
67,0%

Graph 3 - Number of hospitalizations under ICD V20-V29, divided by age group, between March 2020 and August 2024:

Source: TabNet Win32 3.0: SUS Hospital Morbidity from External Causes - by place of hospitalization, 2024.

REGION	2020	2021	2022	2023	2024	TOTAL
Midwest	9.725	10.982	11.457	12.267	8.360	52.791
North East	34.884	41.250	41.701	49.069	29.747	196.651
North	10.686	12.651	14.011	14.821	8.566	60.735
South East	41.212	51.482	50.636	55.109	37.392	235.831
South	10.328	11.680	11.992	12.462	8.050	54.512
TOTAL	106.835	128.045	129.797	143.728	92.115	600.520

Table 2 - Number of hospitalizations under ICD V20-V29 between March 2020 and August 2024, divided by region:

Source: TabNet Win32 3.0: SUS Hospital Morbidity from External Causes - by place of hospitalization, 2024.

With regard to age group, Graph 3 shows that there is a concentration of accidents leading to hospitalization in the 15 to 39 age group, with 403,057 cases, which is in line with the most active working-age population in Brazil. The age groups least affected were 0 to 14 years old, with 12,043 cases, and 40 to 80 years old, with 186,267 cases.

With regard to the Brazilian regions, Table 2 shows that there is a higher incidence of motorcycle accidents resulting in hospitalizations in the Southeast (39.2%), followed by the Northeast (32.8%), North (10.1%), South (9.1%) and Midwest (8.8%), respectively.

The high number of hospitalizations under ICD V20-V29 is a harbinger of the amounts spent by the Unified Health System (SUS) on these treatments, which are considered avoidable. Table 3 shows the financial impact that motorcycle accidents have had on the SUS, by year, since the beginning of the COVID-19 pandemic.

YEAR	VALUE
2020	162.876.952,12
2021	190.128.963,30
2022	203.117.709,51
2023	224.927.600,03
2024	136.437.757,90
Total	917.488.982,86

Table 3 - Spending on hospitalizations under ICD V20-V29 between March 2020 and August 2024:

Source: TabNet Win32 3.0: SUS Hospital Morbidity from External Causes - by place hospitalization, 2024.

DISCUSSION

The COVID-19 pandemic has caused profound changes in society, affecting the economic and social sectors and, in particular, the health system. Among the most significant changes has been the exponential increase in app-based delivery services. This adaptation was a necessary measure to guarantee access to essential goods and services during social isolation. In this scenario, motorcycle couriers have come to play a crucial role, with a growing presence in the job market. Recent research shows that the high demand for motorcycle courier services, especially in large cities, reflects current economic dynamics and the fast pace of urban areas, as pointed out by Diniz et al. (2005).

With the increased dependence on motorcycle couriers, new challenges have arisen, including the growth in hospitalizations due to trauma caused by traffic accidents involving motorcycles. The pressure for productivity and precarious working conditions expose these professionals to significant risks, often without the due protection of formal labor rights, which increases the dangers of this activity. Motorcycle couriers face a work routine characterized by long hours and high pressure for productivity. According to Manzano and Kren (2021), the requirement to make multiple deliveries in short intervals creates a working environment in which stress and fatigue are constant. This scenario has been intensified by the precariousness of labor rela-

tions, particularly for those who work on app-based delivery platforms, whose pay is based on the number of deliveries made, promoting a logic of intensive and exhausting work.

Remir's research (2020) reveals that many of these workers operate informally, without specific labor protections. The lack of formal employment ties accentuates the vulnerability of *motofretistas*, exposing them to risks without the necessary social guarantees, such as health insurance and social security benefits. In addition, social invisibility and lack of respect in traffic are issues frequently reported by these professionals, as documented in previous studies (Diniz et al., 2005; Lacerda et al., 2014), which analyze the reality of these workers in urban centers. The pressure for productivity is also directly related to risky behavior, such as speeding, which is frequently observed in accidents involving motorcycle couriers. The quest for speed in deliveries can result in disrespect for traffic regulations, including excessive speed and dangerous maneuvers. A study by Silva et al. (2008) observed that *mototaxi* drivers in medium-sized cities face similar risks, in which the quest for speed compromises safety.

In addition, the profile of motorcyclists involved in accidents deserves to be highlighted. Research indicates that young males are among the most affected by traffic accidents, and are often responsible for risky behavior, such as excessive self-confidence and lack of experience behind the wheel (Aguar et al., 2019). Alcohol consumption also aggravates the situation, with a higher incidence of accidents at night and on weekends, reinforcing the need for awareness campaigns about the risks associated with these attitudes. The use of helmets is essential to protect motorcycle couriers, especially in high-impact collisions, which can result in serious head trauma. Studies show that the proper use of helmets significantly reduces the severity of injuries in

accidents involving motorcycles (Cavalcante et al., 2021; Albuquerque, 2012). However, adherence to the correct use of helmets still faces challenges, whether due to a lack of awareness or inadequate maintenance of the equipment.

Studies on hospital admissions show that fractures to the upper and lower limbs, as well as head and neck injuries, are common among motorcyclists in accidents. Coutinho et al (2019) analyzes these injury patterns, emphasizing the importance of helmets in mitigating the severity of trauma. Hospitalizations for trauma related to motorcycle accidents represent a significant cost for the Unified Health System (SUS). These costs include emergency care, surgery, medication, prolonged hospitalization and rehabilitation care for those with permanent sequelae. Data from DATASUS' TabNet highlights the financial weight of hospitalizations due to external causes, such as motorcycle accidents, and underscores the impact on the public health budget. In addition to the direct costs, the social and economic consequences are equally alarming. The loss of young workers of working age, whether due to fatalities or permanent disabilities, generates a considerable economic burden for society, affecting families and reducing the active workforce. This impact is even more severe among workers who are largely uninsured due to their informal ties to delivery companies.

In order to mitigate the impact of accidents involving motorcycle couriers, it is essential to implement health education policies that promote safer and more aware traffic. Educational campaigns could make these professionals aware of the risks of unsafe behavior, such as speeding and improper use of helmets. In addition, strict enforcement of traffic laws would contribute to creating a safer environment. Regulating the working conditions of app-based delivery workers is an essential measure

to protect these workers. Through specific legislation, it would be possible to guarantee labor rights, such as accident insurance and more balanced working hours, which would reduce the exposure of motorcycle couriers to extreme risk situations. Such measures could not only reduce accident rates, but also mitigate the financial and social impacts of these events.

CONCLUSION

The significant increase in hospitalizations due to trauma related to motorcycle accidents since the beginning of the COVID-19 pandemic reflects a public health problem with multiple layers of complexity, involving economic, social and epidemiological aspects. The quantitative and qualitative analysis carried out shows the substantial impact of motorcycle courier activities on the health system, especially on the Unified Health System (SUS), which absorbs the high hospital costs of these hospitalizations. In addition to the significant increase in demand for hospital care, which overloads the public system, motorcycle accidents have economic consequences that extend to the families of injured workers and to the social security system. The high SUS expenditure on hospitalizations, estimated at more than 900 million reais since the beginning of the pandemic, illustrates the financial dimension of the problem, highlighting the need for intervention in both the public and private spheres.

The rapid growth in the number of motorcycle couriers has been driven by the increased demand for fast deliveries, the result of mobility restrictions during social isolation. As a low-cost, highly mobile vehicle, the motorcycle quickly established itself as an indispensable resource for meeting the demands of the urban market. However, informal employment and a lack of regulation and safety in this emerging sector have resulted in pre-

carious working conditions for these professionals. Many motorcycle couriers face a combination of long working hours, pressure for high productivity and low incomes, which leads them to adopt risky behaviors, such as disregarding speed limits and inadequate use of personal protective equipment. These conditions aggravate the vulnerability of these workers, especially young people of working age, who make up the largest age group of accident victims.

In addition to working conditions, the profile of the victims highlights racial and regional inequalities. Most motorcyclists are hospitalized in the Southeast and Northeast regions, where the flow of motorcycle couriers is more intense. This profile reveals that, although the problem is nationwide, it takes on specific contours in certain areas and groups, reflecting economic and social disparities that directly impact the risks to which these workers are exposed.

In terms of preventive measures, there is an urgent need to develop strategies that reduce both the incidence of accidents and subsequent hospitalizations. Regulating working conditions for motorcycle couriers is essential in order to offer a safer working environment, with guaranteed rights such as health insurance and social security. In addition, traffic education policies that emphasize the importance of using safety equipment and respecting traffic regulations are fundamental. These policies must be complemented by rigorous inspections and actions to raise awareness about the impact of risky behavior. Investing in adequate and safe infrastructure for the circulation of motorcycles in congested urban centers can also contribute to reducing the vulnerability of motorcyclists in traffic.

We therefore conclude that the increase in hospitalizations due to accidents involving motorcycles, especially among motorcycle couriers, represents a complex and multidimensional

mensional challenge for the SUS and Brazilian society. The health crisis of the COVID-19 pandemic has only accelerated the trends and brought to light the fragility of the working conditions of these professionals. Tackling this issue requires a coordinated approach be-

tween the government, the private sector and civil society to create a safer working environment, reduce the number of accidents and minimize the social and economic impacts of this phenomenon.

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