

RISK AND PROTECTIVE FACTORS FOR ROAD TRANSPORTATION ACCIDENTS AMONG BRAZILIAN ADOLESCENTS, PENSE 2015/2019

FATORES DE RISCO E PROTEÇÃO PARA ACIDENTES DE TRANSPORTE TERRESTRE ENTRE ADOLESCENTES BRASILEIROS, PENSE 2015/2019

FACTORES DE RIESGO Y PROTECCIÓN DE LOS ACCIDENTES DE TRANSPORTE POR CARRETERA ENTRE LOS ADOLESCENTES BRASILEÑOS, PENSE 2015/2019

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ABSTRACT

Objective: to describe the prevalence of risk and protection factors for road transportation accidents (RTAs) among Brazilian adolescents. **Methods:** data from the 2015 and 2019 National School Health Survey were analyzed, referring to the risk and/or protection risk indicators in terms of traffic. The prevalence values and respective 95% confidence intervals (95% CI) were estimated according to gender, age group and type of school. **Results:** of the students aged from 13 to 17 years old that were interviewed, 33.3% (95% CI: 32.1-33.7) reported having driven a motor vehicle or being a passenger in a vehicle driven by someone who had drunk alcohol, 38.1% (95% CI: 37.4-38.7) reported having been a passenger of someone who used a cell phone while driving, 17.5% (95% CI: 16.8-18.2) reported not wearing a seatbelt in the front seat and 30.2% (95% CI: 29.4-30.9) not doing so in the back seat, and 27.1% (95% CI: 26.5-27.7) of the students reported having been a passenger of a drunk driver. Between 2015 and 2019, back-seat seatbelt use dropped from 33.7% to 30.2%, and helmet use while riding a motorcycle increased from 84.6% to 88.9%. **Conclusion:** the prevalence of in-school adolescents who drove or were passengers in vehicles driven by motorists under the effect of alcohol or using cell phones while driving was high. In addition to that, back-seat seatbelt use was low. Between 2015 and 2019, back-seat seatbelt use was reduced and helmet use while riding a motorcycle increased. It is necessary to expand the traffic education strategies aimed at adolescents, their family members and guardians.

Keywords: Accidents; Traffic; Risk Factors; Adolescent; Health Surveys; Cross-Sectional Studies; Brazil.

RESUMO

Objetivo: descrever a prevalência de fatores de risco e proteção para acidentes de transporte terrestre (ATT) entre adolescentes brasileiros. **Métodos:** foram analisados dados da Pesquisa Nacional de Saúde do Escolar, de 2015 e 2019, referentes aos indicadores de risco e/ou proteção no trânsito. Foram estimadas as prevalências e respectivos intervalos de confiança de 95% (IC 95%), segundo sexo, faixa etária e tipo de escola. **Resultados:** dos escolares de 13 a 17 anos entrevistados, 33,3% (IC 95%:32,1;33,7) referiram ter dirigido veículo motorizado ou ter sido transportado em veículo conduzido por alguém que tinha consumido bebida alcoólica, 38,1% (IC 95%:37,4;38,7) afirmaram ter sido transportados por quem utilizava o celular enquanto dirigia, 17,5% (IC 95%:16,8;18,2) referiram não usar cinto de segurança no banco da frente e 30,2% (IC 95%:29,4;30,9) no banco de trás, e 27,1% (IC 95%:26,5;27,7) dos estudantes relataram ter sido transportado por condutor alcoolizado. Entre 2015 e 2019, o uso do cinto de segurança no banco de trás reduziu de 33,7% para 30,2%, e o uso de capacete ao andar de moto aumentou de 84,6% para 88,9%. **Conclusão:** a prevalência de escolares que dirigiam ou andavam com pessoas sob efeito do álcool ou que usavam o celular enquanto dirigiam foi elevada. Além disso, o uso de cinto de segurança no banco de trás foi baixo. Entre 2015 e 2019, o uso de cinto de segurança no banco de trás reduziu e o uso de capacete aumentou. É necessário ampliar as estratégias de educação no trânsito para os adolescentes, seus familiares e responsáveis.

Palavras-chave: Acidentes de Trânsito; Fatores de Risco; Adolescente; Inquéritos Epidemiológicos; Estudos Transversais; Brasil.

RESUMEN

Objetivo: describir la prevalencia de los factores de riesgo y protección de los accidentes de tráfico (ATT) entre los adolescentes brasileños. **Métodos:** se analizaron los datos de la Encuesta Nacional de Salud Escolar de 2015 y 2019, referidos a los indicadores de riesgo y/o protección en el tráfico. Se estimó la prevalencia y los respectivos intervalos de confianza del 95% (IC 95%), según el sexo, el grupo de edad y el tipo de escuela. **Resultados:** de los estudiantes de 13 a 17 años entrevistados, el 33,3% (IC 95%:32,1;33,7) declaró haber conducido un vehículo de motor o haber sido transportado en un vehículo conducido por alguien que había consumido bebidas alcohólicas, el 38,1% (IC 95%: 37,4;38,7) declararon haber sido transportados por alguien que utilizaba el teléfono móvil mientras conducía, el 17,5% (IC 95%:16,8;18,2) declararon no llevar el cinturón de seguridad en el asiento delantero y el 30,2% (IC 95%:29,4;30,9) en el asiento trasero, y el 27,1% (IC 95%:26,5;27,7) de los estudiantes declararon haber sido transportados por un conductor alcoolizado. Entre 2015 y 2019, el uso del cinturón de seguridad en el asiento trasero, se redujo del 33,7% al 30,2%, y el uso del casco cuando se

conduce una moto, aumentó del 84,6% al 88,9%. **Conclusión:** la prevalencia de escolares que conducían o viajaban con personas bajo los efectos del alcohol o que utilizaban el teléfono móvil mientras conducían era elevada. Además, el uso del cinturón de seguridad en el asiento trasero era escaso. Entre 2015 y 2019, se redujo el uso del cinturón de seguridad en el asiento trasero y aumentó el uso del casco. Es necesario ampliar las estrategias de educación vial para los adolescentes, sus familias y tutores.

Palabras clave: Accidentes de Tránsito; Factores de Riesgo; Adolescente; Encuestas Epidemiológicas; Estudios Transversales; Brasil.

INTRODUCTION

In the world, road transportation accidents (RTAs) are the main causes of death for children and young people between 5 and 29 years old.¹ Each year, nearly 1.35 million deaths occur on public roads, which represents more than 3,698 deaths a day and corresponds to nearly 12% of the total deaths on the planet.¹ In addition to deaths, RTAs account for 20 to 50 million people having some type of sequel, with more than half involving vulnerable users such as pedestrians, cyclists and motorcyclists. Thus, RTAs are considered a global public health problem, especially for low- and middle-income countries such as Brazil.² In this country there are around 49,000 annual deaths due to RTAs, with the highest morbidity and mortality burden among young males aged from 10 to 24 years old, which corresponds to the second cause of death among men (26.6 per 100,000 inhabitants) and the first among women (6.2 per 100,000 inhabitants) in 2019.^{3,4}

RTAs are a multifactorial phenomenon influenced by the social, cultural, commercial and environmental determinants of health. They also exert a high social and economic impact on individuals, families, governments and society, as they result in disabilities, early deaths and productivity losses. A study conducted in 166 countries projected that, between 2015 and 2030, traffic-related injuries will cost the world economy US\$ 1.8 trillion.⁵ In Brazil, an analysis of the data from the Hospital Information System regarding hospitalizations paid for by the Unified Health System (*Sistema Único de Saúde*, SUS) from 2000 to 2013 showed that hospitalizations with a diagnosis suggestive of physical sequelae due to traffic-related injuries represented nearly 26% of the population aged from 20 to 29 years old, in addition to mainly affecting young men and motorcycle riders.⁶

Gender differences in the burden of RTA-related injuries are well documented in the literature.

Worldwide, especially in Africa, Asia and the Arab world, men are more exposed to the RTA-related risks, such as death and injuries.⁷ Other characteristics of higher risk for these accidents are low cultural level and living in areas with greater socioeconomic vulnerability.⁷ This inequality in morbidity and mortality due to RTAs reflects more exposure to risk behaviors on the part of males, as well as it reiterates the importance of considering gender in the formulation of public policies aimed at coping with this phenomenon.⁸

Adolescents make up a strategic group for the implementation of health promotion and disease prevention policies, as investments in the health and well-being of this population group contribute benefits for the next decades and future generations.⁹ In addition to that, it is known that adolescence is permeated by multiple vulnerabilities and biopsychosocial changes, which exposes these individuals to health risk attitudes and is associated with an increased incidence of accidents and violence.¹⁰ Therefore, it is indispensable to act in sensitizing this population group.

The literature shows that the risk factors for the occurrence of injuries and deaths due to RTAs include the following: progressive increase in the number of motorcycles/cars on the roads; low investment in traffic education and awareness raising about safe traffic; risk behaviors such as use of alcohol and other drugs; excessive speed; disrespect for traffic laws; inspection failures; poor road conditions; lack of vehicle maintenance and unfavorable weather conditions.¹¹ Regarding the protection factors for injuries and deaths due to RTAs, we can mention application of laws referring to drinking and driving, the limit imposed on vehicular speed, use of safety devices (such as seatbelts, helmets, baby seats, airbags), non-use of cell phones associated with driving and adequate infrastructure (which includes safe and sustainable human and urban mobility), among others.¹¹

In this context, in February 2020, the 3rd Global Ministerial Conference on Road Safety¹² gathered governments and civil society from more than 140 countries and reasserted the Sustainable Development Goals (SDGs) target of reducing traffic-related deaths by 50% by 2030.¹³ Therefore, it becomes fundamental to carry out research studies that seek to analyze the evolution of morbidity and mortality due to RTAs and to investigate the risk and protective factors involved, in order to stop the burden of this problem in the country.

In this sense, the National School Health Survey (PeNSE), carried out since 2009, included questions related to traffic, enabling the monitoring of risk and protective factors for RTAs among Brazilian adolescents.¹⁴

Based on the above, the objective of the current study is to describe the prevalence of risk and protection factors for road transportation accidents among Brazilian adolescents.

METHODS

Study design and population

This is a cross-sectional study based on the PeNSE data, conducted by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE) in partnership with the Ministry of Health and with the support of the Ministry of Education, referring to the 2015 and 2019 editions.^{14,15} The data analyzed corresponded to Brazilian adolescents attending public and private schools and aged from 13 to 17 years old.^{16,17}

Sampling and data collection procedure

The PeNSE sampling plan was conducted by clustering in two stages, where the schools corresponded to the first stage and the classes of enrolled students, to the second. All the students in the classes selected were invited to answer the survey questionnaire.¹⁸

In 2015, two different sampling plans were used: Sample 1, which represents students who attend 9th grade of Elementary School; and Sample 2, with students aged from 13 to 17 years old, attending the stages from 6th to 9th grade of Elementary School and from 1st to 3rd year of High School. In Sample 2 from 2015, 10,926 Brazilian students enrolled and attending 371 schools and 653 classes were investigated in the five main geographic regions of the country, both in public and in private schools.^{15,16}

In 2019, the IBGE used a single sample of students aged from 13 to 17 years old attending public and private schools for the following geographical strata: Brazil, major regions, Federation Units (FUs), municipalities of the capital cities, and *Distrito Federal*. A total of 4,242 schools, 6,612 classes and 159,245 students participated.¹⁴ Sample weights were employed considering the weights of the schools, classes and

students, adjusted based on the data from the School Census. Further details about the sample are provided in other publications.¹⁴

In both editions of PeNSE, the students answered the structured and self-applied questionnaire using smartphones, contemplating diverse information on socioeconomic status, family context, experimentation and use of cigarettes, alcohol and other drugs, violence, safety, accidents and other life conditions of these in-school adolescents.¹⁴⁻¹⁶

Variables

The indicators studied in 2015 and 2019 referring to the traffic situations were the following:

- Prevalence of students aged from 13 to 17 years old who never or rarely used front-seat seat belts in the 30 days prior to the survey, by passenger seat location;
- Prevalence of students aged from 13 to 17 years old who never or rarely used back-seat seat belts in the 30 days prior to the survey, by passenger seat location;
- Percentage of students aged from 13 to 17 years old who used helmets among those who rode a motorcycle in the 30 days prior to the survey;
- Percentage of students aged from 13 to 17 years old who drove a motor vehicle in the 30 days prior to the survey;
- Prevalence of students aged from 13 to 17 years old who were passengers in a motor vehicle driven by a motorist that had drunk alcohol in the 30 days prior to the survey.

For 2019, these same indicators were studied, plus the indicator of the prevalence of students aged from 13 to 17 years old who rode in a motor vehicle driven by someone that used a cell phone in the 30 days prior to the survey.

- In addition, the following indicators were assessed according to the FUs:
- Prevalence of students aged from 13 to 17 years old who drove a motor vehicle in the 30 days prior to the survey;
- Prevalence of students aged from 13 to 17 years old who were passengers in a motor vehicle driven by someone that had drunk alcohol in the 30 days prior to the survey;

Data analysis

The prevalence values and respective 95% confidence intervals (95% CI) were estimated by comparing the indicators collected in 2015 and 2019 referring to the traffic situations. Regarding the indicators from 2019, the prevalence values and 95 CIs according to gender, age group and type of school were described. In addition to that, the prevalence and 95% CI of the students who drove or rode with a driver under the effect of alcohol or using a cell phone while driving a motor vehicle were calculated, according to the FUs.

The sampling structure and the post-stratification weights were considered for all the analyses. The SAS statistical package was employed and the data are available on the IBGE website: <https://www.ibge.gov.br>.

Ethical aspects

Secondary, public and non-identifiable data of the students were used; therefore, approval by any Research Ethics Committee was waived. Furthermore, the editions of PeNSE are in accordance with the Regulatory Guidelines and Norms for Research Involving Human Beings and were approved by the National Research Ethics Commission belonging to the Ministry of Health (*Comissão Nacional de Ética em Pesquisa do Ministério da Saúde*, CONEP/MS) under opinion No. 1,006,487 of 03/30/2015 (PeNSE 2015) and No. 3,249,268 of 04/08/2019 (PeNSE 2019).

RESULTS

In 2015, 50.3% of the in-school adolescents were male, 49.7% were female, 87.1% studied in public schools and 12.9% did so in private institutions. In 2019, 49.3% of the in-school adolescents were male, 50.7% were female, 85.5% studied in public schools and 14.5% did so in private institutions.

Table 1 presents the prevalence of the risk and protection factors for traffic-related injuries among adolescents aged from 13 to 17 years old in 2019. Driving a motor vehicle in the 30 days prior to the survey reached 33.0% (95% CI: 32.1-33.7), with 45.1% (95% CI: 44.2-46.1) in boys and 21.2% (95% CI: 20.4-22.0) in girls, being higher in adolescents aged 16 and 17 years old (36.4%; 95% CI: 35.3-37.6) and in students attending public schools (34.6%; 95% CI: 33.8-35.4). Not wearing a front-seat seatbelt reached 17.5% (95% CI: 16.8-18.2), being higher in girls (19.2%; 95% CI: 18.4-20.1) and in students attending public school (18.9%; 95% CI: 18.0-19.7).

Regarding those that did not wear back-seat seatbelts, the value was 30.2% (95% CI: 29.4-30.9), being higher in girls (33.5%; 95% CI: 32.5-34.5) and in adolescents aged 16 and 17 years old (34.8%; 95% CI: 33.5-36.0). Helmet use while riding a motorcycle reached a higher percentage among boys, with 90.5% (95% CI: 89.6-91.4) and in students from private schools (90.4%; 95% CI: 89.4-91.3). In relation to being a passenger in a vehicle driven by someone that had drunk alcohol, the prevalence was 27.1% (95% CI: 26.5-27.7), being higher in the adolescents aged 16 and 17 years old (28.5%; 95% CI: 27.5-29.5). Referring to being a passenger in a vehicle driven by someone that used a cell phone while driving, the prevalence was 38.1% (95% CI: 37.4-38.7), being higher in the adolescents aged 16 and 17 years old (39.9%; 95% CI: 38.8-41.0) and in the students attending private schools (57.5%; 95% CI: 56.6-58.4).

Figure 1 shows the prevalence values of the risk and protection factors for road transportation accidents in relation to adolescents aged from 13 to 17 years old in 2015 and 2019. Driving a motor vehicle in the 30 days prior to the survey reached 31.3% (95% CI: 29.6-33.0) in 2015 and 33.0% (95% CI: 32.3-33.7) in 2019. It was observed that the prevalence of not wearing front-seat seatbelts was 19.3% (95% CI: 17.2-21.4) in 2015 and 17.5% (95% CI: 16.8-18.2) in 2019. Non-use of back-seat seatbelts dropped from 33.7% (95% CI: 31.7-35.6) in 2015 to 30.2% (95% CI: 29.4-30.9) in 2019. Helmet use while riding a motorcycle rose from 84.6% (95% CI: 82.3-86.9) in 2015 to 88.9% (95% CI: 87.8-89.9) in 2019. Referring to the prevalence of students that were passengers in a motor vehicle driven by someone that had drunk alcohol, the prevalence was 25.4% (95% CI: 24.0-26.8) in 2015 and 27.1% (95% CI: 26.5-27.7) in 2019.

Figure 2 shows the prevalence of adolescents that drove a motor vehicle in the 30 days prior to the survey. It was observed that the prevalence was higher in states such as Maranhão (49.5%; 95% CI: 46.2-52.8), Tocantins (48.6%; 95% CI: 44.5-52.6), Piauí (45.1%; 95% CI: 42.7-47.4), Mato Grosso (44.9%; 95% CI: 41.9-47.9) and Rondônia (43.9%; 95% CI: 40.8-47.0), respectively (Figure 2).

Figure 3 describes the prevalence of in-school adolescents who were passengers in a motor vehicle driven by someone that had drunk alcohol in the 30 days prior to the survey. The prevalence values were higher in Tocantins (34.2%; 95% CI: 30.8-37.6), Goiás (32.5%; 95% CI: 30.9-34.0), Mato Grosso (32.4%; 95% CI: 29.2-35.5), Mato Grosso do Sul (32.1%; 95% CI: 29.9-34.2) and Santa Catarina (30.0%; 95% CI: 26.8-33.1), respectively (Figure 3).

Table 1 - Prevalence and confidence intervals of the risk and protection factors for road transportation accidents among adolescents aged from 13 to 17 years old. Brazil, 2019

Indicators	13-17 years old					Age group	
	Total	Gender		Type of school			
		Male	Female	Public	Private	13-15 years old	16-17 years old
	% (95% CI)	% (95% CI)		% (95% CI)		% (95% CI)	
Driving a motor vehicle	33.0 (32.1;33.7)	45.1 (44.2;46.1)	21.2 (20.4;22.0)	34.6 (33.8;35.4)	23.5 (22.8;24.2)	31.1 (30.3;32.0)	36.4 (35.3;37.6)
Not wearing a front-seat seatbelt (passenger)	17.5 (16.8;18.2)	15.8 (15.1;16.6)	19.2 (18.4;20.1)	18.9 (18.0;19.7)	10.9 (22.8;24.2)	17.0 (16.3;17.8)	18.4 (17.3;19.5)
Not wearing a back-seat seatbelt	30.2 (29.4;30.9)	26.8 (25.9;27.6)	33.5 (32.7;34.5)	32.0 (31.0;32.9)	32.6 (31.6;33.6)	27.7 (26.9;28.6)	34.8 (33.5;36.0)
Helmet use while riding a motorcycle	88.9 (87.8;89.9)	90.5 (89.6;91.4)	87.1 (85.6;88.6)	88.7 (87.6;89.8)	90.4 (89.4;91.3)	88.7 (87.6;89.7)	89.2 (33.5;36.0)
Being a passenger in a vehicle driven by someone that had drunk alcohol	27.1 (26.5;27.7)	27.1 (26.3;28.0)	27.2 (26.3;28.0)	26.9 (26.3;27.6)	28.1 (27.3;28.9)	26.4 (27.5;29.5)	28.5 (33.5;36.0)
Motorist using a cell phone while driving	38.1 (37.4;38.7)	37.2 (36.3;38.0)	38.9 (38.0;39.8)	34.8 (38.8;41.0)	57.5 (56.6;58.4)	37.1 (38.8;41.0)	39.9 (38.8;41.0)

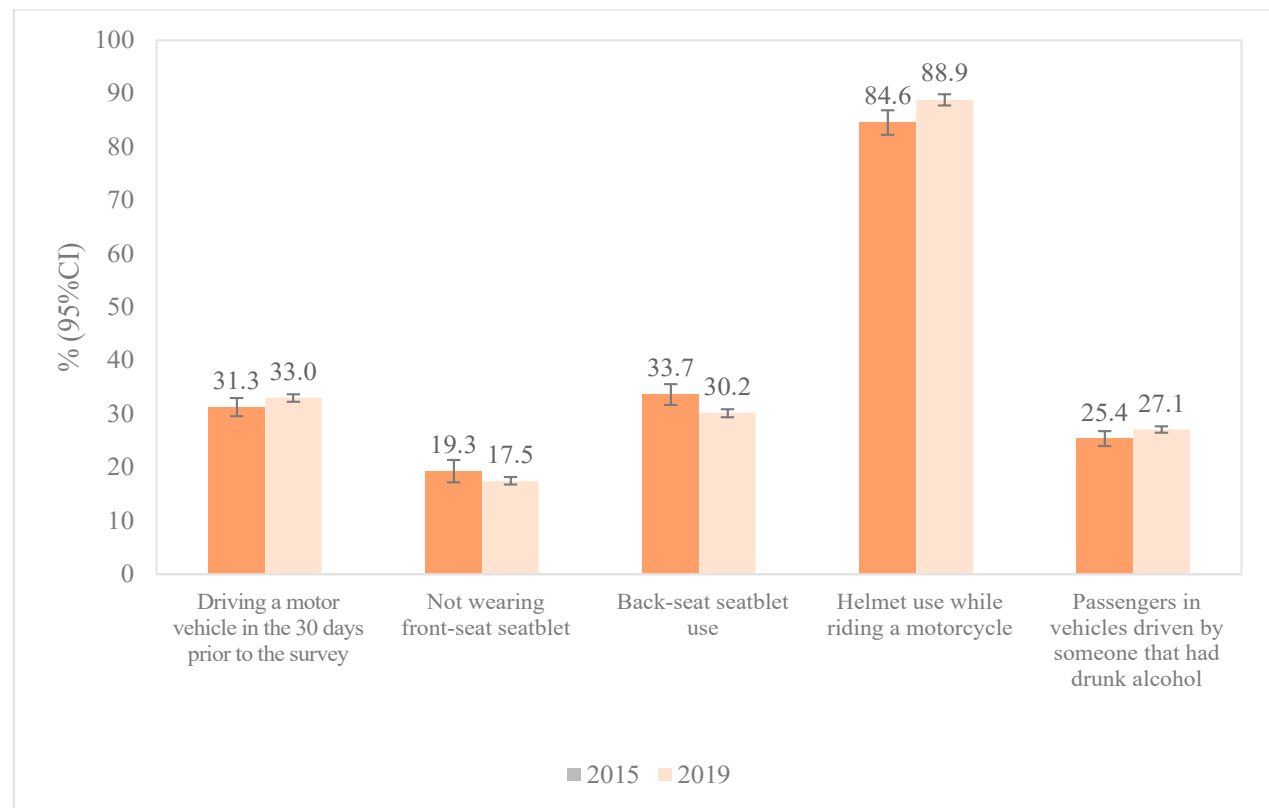


Figure 1 - Prevalence and confidence intervals of the risk and protection factors for road transportation accidents among adolescents aged from 13 to 17 years old. Brazil, 2015 and 2019.

Figure 4 shows the prevalence of in-school adolescents who were passengers in a motor vehicle driven by someone that used a cell phone in the 30 days prior to the survey. It was observed that the prevalence was higher in *Distrito Federal* (48.6%;

95% CI: 45.5-51.6), São Paulo (44.5%; 95% CI: 42.3-46.8), Rio de Janeiro (44.5%; 95% CI: 42.5-46.4), Mato Grosso do Sul (43.5%; 95% CI: 40.8-46.1) and Goiás (43.0%; 95% CI: 41.1-45.0), respectively (Figure 4).

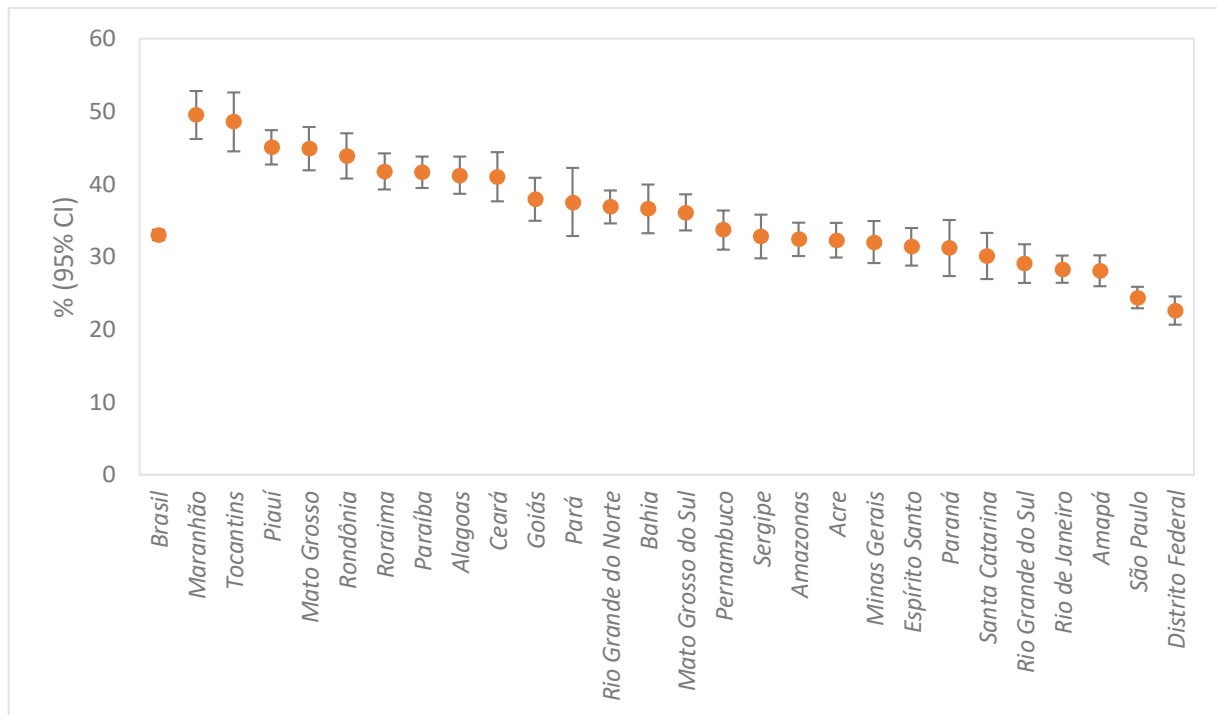


Figure 2 - Prevalence and confidence intervals of in-school adolescents aged from 13 to 17 years old who drove a motor vehicle in the 30 days prior to the survey, according to the Federation Units. Brazil, 2019

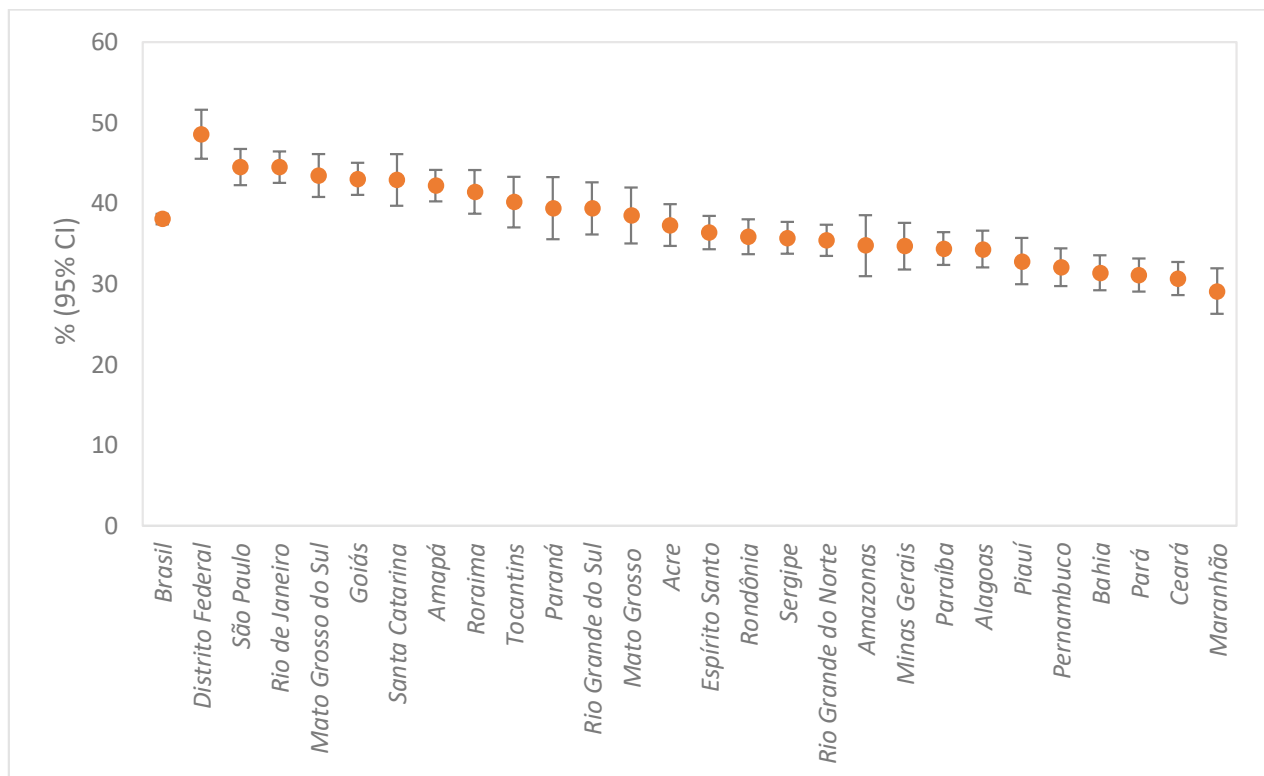


Figure 3 - Prevalence of students aged from 13 to 17 years old who were passengers in a motor vehicle driven by someone that had drunk alcohol in the 30 days prior to the survey, according to the Federation Units. Brazil, 2019

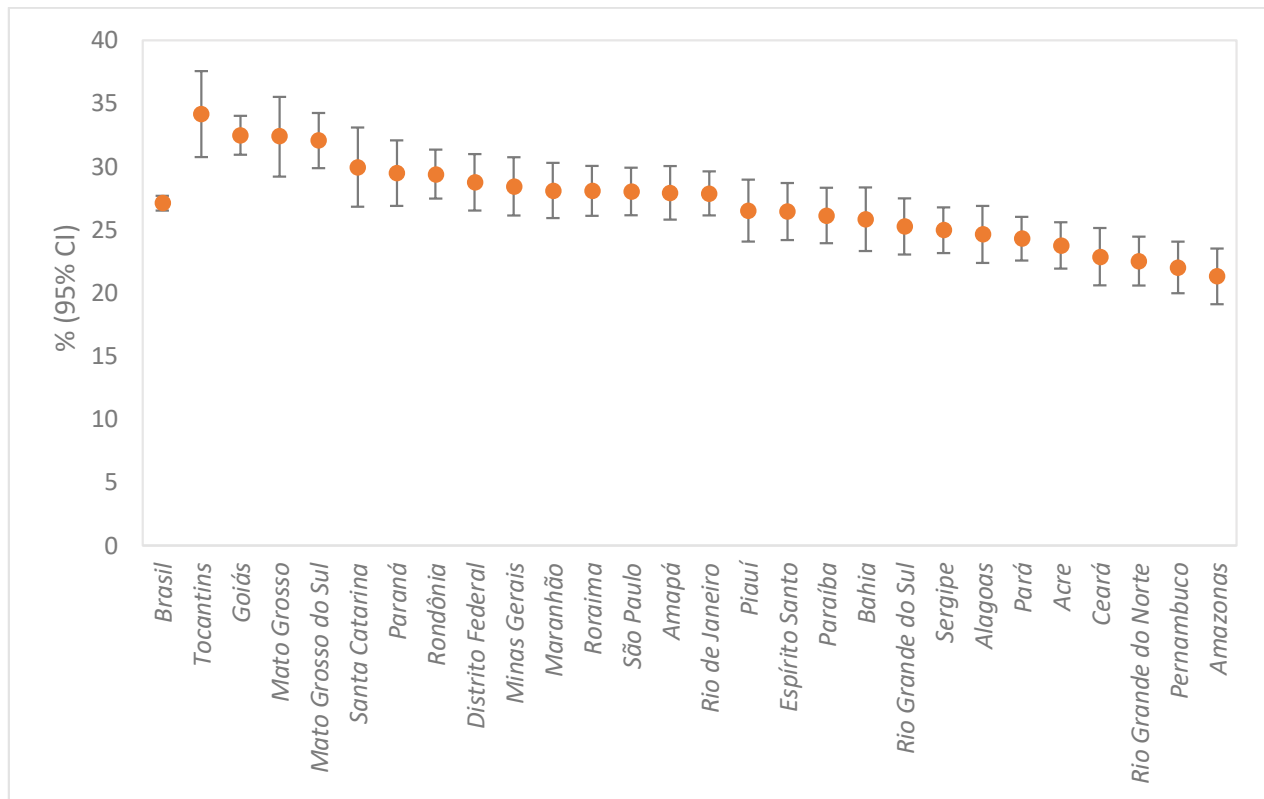


Figure 4 - Prevalence of students aged from 13 to 17 years old who were passengers in a motor vehicle driven by someone that used a cell phone in the 30 days prior to the survey, according to the Federation Units. Brazil, 2019

DISCUSSION

The findings show the superlative frequency of risk behaviors for the occurrence of RTAs among young Brazilian individuals. Nearly one third of the students aged from 13 to 17 years old reported having driven a motor vehicle or being a passenger in a vehicle driven by someone who had drunk alcohol, and 4 out of 10 students stated that they had been passengers of someone who used a cell phone. The frequency of not using back-seat seatbelts was high, nearly one third, and one fifth of the participants reported not having used them in the front seat; in addition, approximately one tenth did not wear a helmet when riding a motorcycle. In the comparison between the 2015 and 2019 editions there was a reduction in back-seat seatbelt use and an increase in helmet use while riding a motorcycle. In general, older adolescents are more exposed to the risk factors.

Driving a motor vehicle by individuals under 18 years of age constitutes a risk practice prohibited by law in Brazil. However, it was verified that this habit grew in relation to the first edition of PeNSE, carried out in 2009, in which 18.5% of the Brazilian students

aged from 13 to 15 years old reported having driven a vehicle in the previous 30 days,^{11,17} with an increase of nearly 68% among adolescents belonging to the same age group in 2019. Normalization of this traffic offense is dangerous, as younger adolescents are more exposed to RTAs for being less experienced and skillful.¹²

The practice of driving by minors was more frequent among boys, among students aged between 16 and 17 years old, and in the Northeast, North and Midwest states. These findings are consistent with previous studies carried out with Brazilian adolescents and have been attributed to less official control in these regions.^{12,17} Adolescence is a period of major psychological, bodily, family and community transformations, representing a period of great vulnerability for the occurrence of some problems, including RTAs.¹⁸

Consequently, the relevance of expanding the supervision actions is reiterated, aiming at inhibiting this behavior that exposes young people and society to countless risks to health and well-being. On the other hand, there is an evident need to investigate if there is complicity by the parents and guardians in facilitating access to such practice.

Some studies showed that adolescents learn to drive with their own family members, and it has also been verified that there is little awareness among parents about the danger to which they are exposing their children.¹⁸

The reports about being passengers in a vehicle driven by someone that had drunk alcohol were frequent among Brazilian adolescents, thus exposing them to preventable risks to health. Drinking and driving is well documented in the literature as one of the main risk for violence and RTAs. It has been considered that one of the most important items for improving the countries' legislation is to include laws referring to ban drinking and driving.^{1,2,19} Riding in a vehicle with a drunk driver is intrinsically unsafe and is also associated with drunk-driving among adolescents.²⁰ There is evidence that adolescent passengers exposed to drunk-driving are more likely to drink and drive as they age.²¹ It is noted that having been a passenger of an intoxicated person was more frequent among the students from states in the North and Midwest regions of the country, a fact similar to the results found in PeNSE 2009.¹²

In the United States, in 2018, approximately one fifth of the drivers aged from 16 to 20 years old killed in accidents had high blood alcohol concentrations, i.e., $\geq 0.08\%$.²¹ Driving after drinking alcohol is risky and unacceptable at any age; however, the risk is even higher among drivers aged from 16 to 20 years old, even with low BAC.²² Some factors affect adolescence early in time and influence early consumption of alcoholic beverages, such as the family environment with parents who have a routine marked by alcohol consumption, low prices of drinks, physical availability in bars and restaurants, and influence of groups and advertisements. Adolescents' non-perception of the risk in relation to drinking and driving and normalization of this behavior by family members and society, together with the deficiency or absence of traffic inspections, contribute to this reality in the country, with alcohol as one of the main risk factors for accidentality and severity of RTAs.²³

Adherence to wearing seatbelts among the young individuals interviewed was low: 3 out of every 10 adolescents reported not wearing back-seat seatbelts. Seatbelts are known to be effective in preventing accidents, even reducing the severity of alcohol-related accidents among underage drivers.²³ Consequently, measures to increase seatbelts use, such as control and fines, should be adopted and can be beneficial to prevent collisions or injuries involving accidents.²⁴

Furthermore, messages about the benefits of these devices should be addressed to the entire family, as seatbelt use by parents increases their use by children and adolescents.²⁵ It is noted that parental involvement can be especially important to reduce RTA risk behaviors among adolescents.

The Brazilian Traffic Code (*Código de Trânsito Brasileiro*, CTB) determines that motorcycle drivers must wear a helmet; however, this measure was still not complied with by almost one tenth of the adolescents in 2019. Wearing a helmet while riding a motorcycle protects against injuries and sequelae and can reduce mortality by up to 40% and serious accidents by up to 70%.²⁵ Therefore, it becomes urgent to intensify inspection actions and expand traffic education initiatives, with emphasis on the use of this important prevention device.

It is noted that, according to the CTB, there is a set of rules that must be followed by any person who wishes to drive a vehicle, with the obligation to respond for their traffic-related acts. In Brazil, imputability begins at age 18 according to Article 228 of the Federal Constitution (1988) and to Article 26 of the Brazilian Penal Code (1940). Thus, the special legislation that contemplates the so-called non-imputable is the Statute of Children and Adolescents (*Estatuto da Criança e do Adolescente*, ECA) established in 1990, which, in its Article 6, reveals the need to take into account the specific condition of children and adolescents as developing individuals. Therefore, based on the CTB, for a person to have access to a driver's license, they need to be 18 years old and be able to be responsible for their actions, that is, criminally imputable. This fact is not only due to deficiency or absence of supervision; adolescents often drive with the consent of their parents or guardians.

In view of the above, it is necessary to implement public policies to protect children and adolescents in accordance with the ECA and that are focused on traffic safety and education, with actions to raise awareness in parents and guardians and continuous and systematic inspections in the country, as well as surveillance, prevention and health promotion actions.

Among the study limitations, it is noted that PeNSE was conducted with in-school adolescents, with the possibility that there are differences in relation to those outside the school setting. In addition to that, the questionnaire is self-reported; therefore, it may include imprecise data for being subjected to information bias. Furthermore, the changes implemented in the questionnaire and in the sample can impair the comparisons between the indicators measures between the survey editions.

CONCLUSION

The findings reveal that the prevalence of in-school adolescents who drove or were passengers in vehicles driven by motorists under the effect of alcohol or using cell phones while driving was high. In addition to that, back-seat seatbelt use among the adolescents was low. It is noted that the worst indicators were observed among the older adolescents, aged from 15 to 17 years old. Between 2015 and 2019 there was a reduction in back-seat seatbelt use and an increase in helmet use while riding a motorcycle. These results indicate the need to expand the traffic education strategies for adolescents, their family members and guardians, in addition to requiring new research studies that can contribute to understanding the individual, contextual and cultural determinants involved in these behaviors in the national scenario.

In this sense, various strategies can contribute to reducing these risk factors and, consequently, to advances in relation to the 2030 agenda in the country. Therefore, educational strategies for adolescents, parents and guardians stand out, as well as the implementation and improvement of the traffic legislation, effective inspection, improvement of roads, reinforcement of mobility and accessibility policies, and investment in collective, sustainable transport and safe and research studies on this theme. In addition, multisectoral articulation between the actors of public security, traffic, transportation, health, education and urban planning, among others, is imperative, as well as non-flexibilization of the traffic laws, which are known to be safe, protective and based on scientific evidence.

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