

# Indicators of Health Behavior of Drivers and Riders in the Countryside of Northeastern Brazil

ORIGINAL

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## Abstract

**Objective:** To verify the habits and behaviors of drivers and their correlation to the usage of safety equipment.

**Method:** This is a cross-sectional study using a household survey of an explanatory nature. In its development community health workers conducted interviews with 3,482 people living in the city of Caraúbas, state of Rio Grande do Norte.

**Results:** There is a low adherence to wearing traffic safety equipment, specifically seatbelt and helmet, additionally the population does not understand the continuous usage as a healthy behavior. The association of this aspect with socioeconomic variables shows the evidence of some groups possibly more vulnerable to accidents than others. Stands out the low usage of safety equipment while moving around the city possibly due to the misunderstanding of the risks, the excuse of short distances driven and the lack of law enforcement in the streets.

**Conclusion:** It is possible to assume that the increase on the number of private transportations due to the improvement of the population's income, the low usage of the seatbelt and helmet and the ineffectiveness of the government oversight make this situation a serious public health problem.

## Introduction

Between 1998 and 2010 Brazilian car fleet increased in 118% and the numbers of motorcycles in 491.1%, from 29.5 million cars to

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## Keywords

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54 million and 14 million motorcycles, at the same time, the number of motorcyclist dead increased in 610% in the same period of time [1]. It is possible that in 2020 traffic accidents will be the third major cause of diseases in the world [2] and in 2030 the fifth cause of death. Approximately 1.2 million people die victims of traffic accidents in the world, 90% of this number happens in low and middle income countries [1]. In 2010, Brazil was the sixth in the world in the rate of deaths by traffic accidents, where 66.6% of the victims were pedestrians, cyclists and motorcyclists, with possible raise in the rate of the mortality of the motorcyclists based on the national upward trend of the last decades. Estimating the rate of mortality of the motorcyclists in the same period of time, Brazil reached the second place in the world rank. Between 2000 and 2010 the mortality rate increased in 244%. It is perceived that the massive use of motorbikes is a relatively recent phenomenon [3, 4]. As shown in the chart of the traffic accidents between 2000 and 2011 in Brazil, there was an increase in numbers of accidents involving bicycles, automobiles and motorcycles in a total of 53%, 50% and 275% respectively. In comparison to other 122 countries in the world, in the year of 2010, Brazil was in 13<sup>th</sup> of the greatest rates of traffic accidents involving motor vehicles of 2 and 3 wheels. The states of Rio Grande do Norte, Acre, Amapá, Paraíba and Piauí were the ones with the highest number of deaths of motorcyclists in the Country. There was an increase in the rate of deaths caused by traffic accidents in 25.6% between 2001 and 2010, also the deaths of motorcyclists represent more than half of all the traffic accidents in the Country [5].

The direct costs of traffic accidents around the world is estimated to be around US\$ 500 billion. 28 billion in Brazil only [1, 4]. Analyzing the number of hospitalizations due to traffic accidents in the Brazilian Unified Health System between 1998 and 2002, there was a decrease in medical care of pedestrians, cyclists and drivers, on the other hand there was an

increase of 366.1% in the number of motorcyclists hospitalized. In 2011, around R\$ 210.8 million were spent because of traffic accidents, almost half of it involving motorcyclists. It is worth noting that these numbers only bring about the more severe cases, the ones that call for hospitalization. If added the costs of the accidents to the highways and cities, the numbers go over R\$ 44 billion [5].

The injuries and deaths from traffic accidents made the human mobility a public health problem. All thanks to how easy has become to buy a motorized means of transportation, together with the lack of proper public transportation and the increase of access to motor vehicles, which have become a very common asset in Brazilian families, which in turn, started feeling encouraged by the low interest fees and the economic growth [6]. The frequency of accidents, most of them preventable, shows not only its growing tendency, but also the non-existence of effective measures and public policies, properly considering the economic and technological growing in modern society, in order to prevent those accidents to happen [4, 7].

There are many causes of accidents, among them there is the non-usage of safety equipment, for example, seatbelt and helmet. This presents the distorted view of the existing risks and adherence to safe behavior in traffic [8, 9]. In addition to the traffic laws, there are many social policies that were created aiming to prevent injuries and deaths in traffic, such as the obligatory usage of the helmet and seatbelt in all driving times, including warnings of punishment for the ones who do not obey the law. Although, all the advertisement and the reality about tragic traffic accidents presented daily on TV news, there is still no improvement in the usage of seatbelt and helmet. Similar situations are found in studies in Thailand, China, Kenya, South Africa, Nigeria, Russia and Argentina [10], countries with low HDI and literacy indicators. Data regarding the usage of safety equipment are rarely seen in the literature, including in the studies produced in Brazil, and there are no studies highlighting safe behavior,

especially in rural areas and/or small cities. Based on this context we decided to verify the safe human behavior and the adherence to the usage of the seatbelt and helmet in the population above 18 years old in Northeastern Brazil.

## Method

This cross-sectional study used an explanatory household survey conducted in the city of Caraúbas, located in the center-west of the state of Rio Grande do Norte. This city is in the semiarid region of Northeastern Brazil. The biome of the region is the *caatinga* (specific biome of the region characterized by xeric shrubland and usually thorn forests). The economy based on the extraction of oil in inland deposits and climate-based agriculture, the latter being the primary source the economy. The total population of the city is 19,576 inhabitants. It has a low level of employment, and government agencies are the major employers all under the cover of the City Health Plan. The sample included 3,482 adults living in the rural zones of the city who were interviewed in their own households by community health workers, applying one questionnaire per household. The questionnaire was formulated with multiple choices in Likert format.

As inclusion criteria, the participants needed to be at least 18 years old, live in the city and agree to collaborate freely in the research. They could not have any cognitive or physical impairments that might limit their expression, their home should not be closed during the application and they had to show interest in participating in the research. This project was approved by the Ethics in Research Committee of the Federal University of Rio Grande do Norte (UFRN) under protocol number 07857612.8.0000.5292, approval date on February 28, 2013.

We analyzed the frequency of usage of both the seatbelt and helmet. The possible answers were: often, sometimes, hardly ever or never. In order to facilitate the analysis, the answers were divided

into two groups: 1 – adequate usage of seatbelt or helmet (often); 2 – inadequate usage (sometimes, hardly ever or never). The results were treated statistically with significance level  $p < 0.05$ .

## Results

Verifying the outcome regarding the adequate usage of seatbelt in travels to neighbor cities or other places, it is observed a greater correlation with male residents of the urban zone in a productive age group, with a higher education and higher income, who have a vehicle at home and participate of social groups at least once a month. It is pointed out that people who have the habit of wearing seatbelt in trips to other settlements or cities have a greater adherence to its usage getting around town and wearing the helmet properly. (Table 1).

**Table 1.** Adequate and inadequate endpoint of the usage of the seatbelt, sociodemographic variables and safety habits in traffic. Caraúbas, RN. 2013.

	Inadequate		Adequate		$\chi^2$	P-value
	N	%	N	%		
Zone of residence						
Urban	468	26.3	1310	73.7	58.47	< 0.001
Rural	575	38.9	904	61.1		
Sex						
Male	148	29.0	363	71.0	2.65	0.056
Female	894	32.6	1846	67.4		
Marital status						
Married	550	32.9	1120	67.1	2.42	0.490
Single	342	31.5	743	68.5		
Divorced	71	32.9	145	67.1		
Widowed	65	28.1	166	71.9		
Age group						
18 - 19 years old	50	39.4	77	60.6	16.97	0.005
20-29 years old	217	36.7	375	63.6		
30-39 years old	202	28.5	506	71.5		
40-49 years old	177	29.5	424	70.5		
50-59 years old	119	28.3	301	71.7		
60 and over	164	31.1	364	68.9		

	Inadequate		Adequate		$\chi^2$	P-value
	N	%	N	%		
Literacy in years						
None	93	40.3	138	59.7	28.16	< 0.001
1 to 4 years	393	34.0	764	66.0		
5 to 9 years	259	30.6	587	69.4		
10 to 12 years	208	29.5	496	70.5		
13 and over	43	19.4	179	80.6		
Monthly income (in Reais)						
Up to 677,00	543	36.1	961	63.9	29.76	< 0.001
678,00 – 1.350,00	282	28.0	725	72.0		
1.356,00 and over	100	24.4	309	75.6		
Means of transportation						
Motor vehicle	555	29.7	1311	70.3	23.08	< 0.001
Non-motorized vehicle	175	41.9	243	58.1		
Participant in a social activities						
Less than once a month	574	35.4	1046	64.6	19.74	< 0.001
One or more times a month	434	28.1	1112	71.9		
Usage of seatbelt while in the city.						
2	966	37.1	1638	62.9	228.1	< 0.001
1	13	2.6	481	97.4		
Usage of helmet while out of the city						
2	306	63.9	173	36.1	261.0	< 0.001
1	544	25.6	1583	74.4		
Fasten the helmet while is out of the city						
2	330	55.6	263	44.4	196.7	< 0.001
1	495	25.0	1485	75.0		
Usage of helmet while in the city						
2	612	40.1	916	59.9	105.4	< 0.001
1	311	22.4	1080	77.6		
Fasten the helmet while in the city						
2	464	41.0	667	59.0	92.81	< 0.001
1	315	23.1	1050	76.9		

Similarly to the findings about the usage of seatbelt, analyzing the outcome of the usage of the helmet to trips to neighbor cities or other settlements, it is possible to observe a greater correlation to residents of the urban zone, who are in a productive age group, with a higher education and higher income, who have a motor vehicle at home and participate of social groups at least once a month (Table 2).

**Table 2.** Adequate and inadequate endpoint of the usage of the helmet in trips related to sociodemographic variables and safety habits in traffic. Caraúbas, RN. 2013.

	Inadequate		Adequate		$\chi^2$	P-value
	N	%	N	%		
Zone of residence						
Urban	248	17.6	1163	82.4	3.972	0.046
Rural	265	20.6	1022	79.4		
Sex						
Urban	248	17.6	1163	82.4	3.972	0.046
Rural	265	20.6	1022	79.4		
Marital status						
Married	255	18	1165	82	5.473	0.140
Single	175	19.3	732	80.7		
Divorced	37	21.1	138	78.9		
Widowed	38	25.3	112	74.7		
Age group						
18 - 19 years old	30	25.2	89	74.8	52.81	<0.001
20-29 years old	81	15.2	452	84.8		
30-39 years old	100	15.9	527	84.1		
40-49 years old	74	14.6	434	85.4		
50-59 years old	60	18	274	82		
60 and over	104	31.5	226	68.5		
Literacy in years						
None	58	36.7	100	63.3	69.18	<0.001
1 to 4 years	194	20.5	754	79.5		
5 to 9 years	136	18.7	592	81.3		
10 to 12 years	88	14.5	519	85.5		
13 and over	8	4.3	180	95.7		
Monthly income (in Reais)						
Up to 677,00	263	19.9	1060	80.1	4.249	0.119
678,00 – 1.350,00	147	18.3	658	81.7		
1.356,00 and over	42	14.7	249	85.3		
Means of transportation						
Motor vehicle	252	15.4	1383	84.6	23.62	<0.001
Non-motorized vehicle	89	26.4	248	73.6		
Participant in a social activities						
Less than once a month	272	20.2	1077	79.8	3.93	0.47
One or more times a month	220	17.1	1063	82.9		

	Inadequate		Adequate		$\chi^2$	P-value
	N	%	N	%		
Fasten the helmet while is travelling						
Sometimes, hardly ever and never	364	61.7	226	38.3	1082.1	<0.001
Often	81	4	1954	96		
Usage of helmet while in the city						
Sometimes, hardly ever and never	420	30.3	968	69.7	285.3	<0.001
Often	58	4.7	1173	95.3		
Fasten the helmet while in the city						
Sometimes, hardly ever and never	323	32	686	68	271.0	<0.001
Often	67	5.5	1160	94.5		

**Table 3.** Frequencies,  $\chi^2$  test, P value of the end-point of living in urban or rural zone and the usage of safety equipment in traffic. Caraúbas, RN. 2013.

	Inadequate		Adequate		$\chi^2$	P-value
	N	%	N	%		
Usage of seatbelt while travelling						
Sometimes, hardly ever and never	468	44.9	575	55.1	58.47	<0.001
Always	1310	59.2	904	40.8		
Usage of seatbelt while in the city						
Sometimes, hardly ever and never	1400	52.6	1263	47.4	0.289	0.591
Always	279	53.9	239	46.1		
Usage of helmet while travelling						
Sometimes, hardly ever and never	248	48.3	265	51.7	3.972	0.046
Always	1163	53.2	1022	46.8		
Usage of helmet while in the city						
Sometimes, hardly ever and never	792	49.3	816	50.7	50.45	<0.001
Always	909	62.0	557	38.0		

It is observed that the residents of the rural zone are correlated to a lower adherence to the usage of the seatbelt while travelling, the same happens to the habit of wearing helmet. (Table 3)

## Discussion

In a political division of Brazil, it is possible to observe that 85% of its total land is covered by small cities, the same happens in its Northeastern Region. In the state of Rio Grande do Norte the number goes up to 95% [11]. The population resident in the semi-arid area was a total of 22,598,318 inhabitants in 2010, this represented 11.85% of the whole population of the Country and 42.57% of the Northeastern Region. Considering only the population resident in the Brazilian semi-arid zone, in the states of Ceará, Paraíba and Rio Grande do Norte, 55% of their inhabitants reside in their semi-arid region. Population data highlight that of 1,135 cities of the Brazilian semi-arid zone, most (93.39%), are considered small towns, in which live 65.23% of the total population living in the semi-arid region. Of a total of 1,060 small cities in the semi-arid zone, 827 have less than 20,000 inhabitants [12]. It is possible to believe that the reality researched is not different of the socioeconomic and demographic profiles of the other cities of Rio Grande do Norte, or even Brazil, which may allow us the generalization of the results acquired, inasmuch as data regarding the same theme and methodology have not yet been researched in the Country.

Understanding the reality where these people live with their specific social and cultural backgrounds, which is often different of what is seen in big cities, drive us to visualize the traffic habits of these cities. Ten years ago, in 2004, the World Health Organization (WHO) dedicated the World Health Day to traffic safety, intending to show that the tracking and control of traffic accidents are problems of public health [13]. Brazil stands in the world scenario due to its promising economic development, but the morbimortality in traffic brings high numbers of deaths and sequels in the population. This phenomenon became more severe, complex and of great magnitude since it followed the technologic and economic development of modern societies [4, 14].



Traffic safe behavior in Brazil is not studied properly, most of the information produced come from studies in Brazilian capitals or in other countries [6]. Even with all the evidence of morbimortality by traffic accidents yet there is no adherence by all the population to using the seatbelt every time an automobile is used. In the national survey by household sample in Brazil, it was reported that 73.2% of the front passengers use the seatbelt properly, while the passengers in the back seat use it in 37.2% of the cases. These numbers grow according to the age and literacy levels and it is higher in Southeast, Southwest and South Regions [4], this data is reason for concern because today there is still a low adherence for seatbelt usage.

The morbimortality of accidents led by motorcycles is proportionally higher, due to the vulnerability of the motorcyclist, violation of traffic laws and to the dangerous behaviors adopted [15, 16]. Riders are the main group in warning programs due to their higher risk of death and injuries, since their mortality number increased 700% from 1998 to 2008 [1, 16]. In the past few years, millions of Brazilians raised socially, getting out of the poverty line and wishing to own their first vehicle, a great percentage of these vehicles are motorcycles for their low cost of purchase and maintenance [17]. Comparing motorcyclist who wear helmets to the ones who do not, the ones who do not apply this safety measure have four times more chances of having head injuries and ten times more chances of cerebral damage. In addition, the riders who wear their helmets tight, comparing to the ones who wear it slightly loose, they are four times more susceptible of having cerebral injuries than the others.

In general, our findings show a low adherence to the usage of safety equipment in traffic, both seatbelt and helmet. The population do not see its continuous usage as a healthy behavior. The correlation to socioeconomic variables contributes to the perception of more vulnerable groups, highlighting the higher use by people with a higher income and literacy level. Moreover, it is possible to notice that

the people who wear seatbelt are more willing to wearing a helmet as well. It is important to point out the significant lower use of safety equipment while moving around the city, possibly due to the misunderstanding of the risks, since the distances are short and the lack of law enforcement in the city.

Even with the progress noticed in the researches in using seatbelt and helmet and with the existence of a national set of laws directing speed limits and the mandatory use of the safety equipment, there is still a low adherence of the use of seatbelts and helmets or their use in their appropriate fasten. This allow us deduce that the non-use may have cognitive aspects of personality, considering that the user know the risks, but even so decide to take them nonetheless [18].

Many countries lower their rates of dangerous driving behavior through a combination of laws and penalties created to deal traffic misbehavior together with educational campaigns [19]. Although, in Brazil, even with a program created by the Health Ministry, it was not yet possible to reach the actions idealized [1].

The access to the purchase of motor vehicles triggered a significant raise in the traffic of all sizes in Brazil, carelessly of the possible consequences. A problem not dealt with by the public authorities yet [20]. This attitude shows a lack of investments in traffic safety and inefficiency in education toward traffic, although there is a policy of economic development focused on the automobile industry [14].

The increase in the number of motor vehicles in Brazil is the result of its economic growth, which led to more access to these means of transportation. Consequently, increasing the fleet and, at the same rate, the low use of seatbelts and helmets. This makes this situation a real problem of public health in small cities of Northeastern Brazil. Add to this to the low number of police enforcement in the streets and its inexistence in outer routes.

It is necessary to broaden the incentive of the usage of safety traffic equipment, for example,

systems of remembering installed in the vehicles, either car or motorcycles, increase in the number of police enforcement monitoring the streets with a non-punishing idea, mainly focused on educating.

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## Contributions of the authors

EGCN, MAFC, JMPJ, NCSF, RTSS, RMCS and JCA participated in the design, development, and coordination of the study, performed the statistical analysis, and helped in writing the manuscript. Both authors read and approved the final manuscript.

## Conflict of interest

The authors declare that they have no competing interests.

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