PREVALENCE OF OLDER DRIVERS IN BRAZIL: RESULTS FROM VIGITEL 2018

Prevalência de motoristas idosos no Brasil: resultados do Vigitel 2018

Eduardo Hauser^a , Aline Rodrigues Barbosa^a , Andréa Holz Pfützenreuter^a

ABSTRACT

OBJECTIVE: To estimate the prevalence of Brazilian older adults who drive a car/ride a motorcycle, according to sociodemographic characteristics. **METHODS:** This cross-sectional study uses data from the 2018 Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel). The prevalence of drivers was determined by an affirmative answer to the following question: "Do you drive a car, motorcycle and/or other vehicle?". **RESULTS:** Among the 15 333 individuals aged 65 and over living in Brazilian capitals and the Federal District, the overall prevalence of drivers was 28.73% (95%CI 27.22 – 30.29) and was higher among men (53.37%; 95%CI 50.45 – 56.28), those with higher education (65.44%; 95%CI 61.98 – 68.75), and individuals aged 65 to 69 years (35.7%; 95%CI 33.06 – 38.61). Among the regions of Brazil, prevalence varied from 35% (Midwest and South) to approximately 22% (North and Northeast). Florianópolis (42.2%; 95%CI 38.05 – 46.47) and Palmas (40.32%; 95%CI 32.74 – 48.38) were the cities with the highest prevalence of older drivers. **CONCLUSIONS:** Characteristics such as sex, age group, region, and state capital of residence affect the prevalence of older drivers. Our results contribute to knowledge about how older adults choose to move around in large Brazilian cities, enabling proposal of strategies to improve the quality of this population's displacement.

KEYWORDS: aged; automobile driving; social indicators.

RESUMO

OBJETIVO: Estimar a prevalência de idosos brasileiros que dirigem carro/motocicleta, de acordo com características sociodemográficas. **METODOLOGIA:** Trata-se de estudo transversal realizado com dados do Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas (Vigitel 2018). A prevalência de motoristas foi determinada pela resposta positiva à questão: "O(A) sr(a) dirige carro, moto e/ou outro veículo?". **RESULTADOS:** Entre os 15 333 indivíduos de 65 anos ou mais, residentes nas capitais brasileiras e no Distrito Federal, a prevalência de motoristas foi de 28,76% (IC95% 27,22 – 30,29), sendo maior entre os homens (53,37%; IC95% 50,45 – 56,28), naqueles com maior escolaridade (65,44%; IC95% 61,98 – 68,75) e nos indivíduos de 65 a 69 anos (35,79%; IC95% 33,06 – 38,61). Entre as regiões do Brasil, a prevalência variou de 35% (centro-oeste e sul) a, aproximadamente, 22% (norte e nordeste). As capitais com maior percentual de idosos motoristas foram Florianópolis (42,20%; IC95% 38,05 – 46,47) e Palmas (40,32%; IC95% 32,74 – 48,38). **CONCLUSÕES:** Características como sexo, faixa etária, região e capitais do Brasil afetam a prevalência de motoristas. Espera-se que os resultados apresentados aqui possam contribuir para o conhecimento de como os idosos escolhem se locomover nas grandes cidades brasileiras, permitindo propor estratégias para melhorar a qualidade de deslocamento dessa população.

PALAVRAS-CHAVE: idoso; condução de veículo; indicadores sociais.

^aUniversidade Federal de Santa Catarina – Florianópolis (SC), Brazil.

Correspondence data

Eduardo Hauser – Rua Waldemar Ouriques, 992 – CEP: 88090-051 – Florianópolis (SC), Brazil. E-mail: ehauser07@gmail.com

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INTRODUCTION

Among the significant challenges arising from population aging, maintenance of autonomy, independence, and social participation stand out.¹ Mobility, or movement, is essential in all its forms for individuals to remain active and healthy.² Mobility is needed to perform activities of daily living such as working, physical activity, and shopping and leisure activities, and to access services and engage in social participation, which are all factors inherent to the autonomy and engagement of non-institutionalized individuals.^{2,3}

Although older people, especially the oldest among them, are at greater risk of being involved in traffic collisions,⁴ driving and walking are older people's leading forms of mobility in their neighborhoods, especially in regions where access to public transport is poor.⁵ Data from the 2013 Survey of Basic Municipal Information (Pesquisa de Informações Básicas Municipais)⁶ showed that 96% of Brazilian cities lacked transportation planning: less than 1% of municipalities had a metro; 2.5% had trains; 38% had municipal buses; and in 67.7%, vans were providing public transport. Moreover, by the start of 2019, only 14 capitals had drawn up mobility plans.⁷ This precarious public service and lack of planning may be reflected in higher numbers of people using a private motorized vehicle, probably as a driver.

In common with what has been seen in high-income countries,⁸ between 2005 and 2012, the number of older people (≥ 61 years) able to drive in Brazil increased by approximately 11%, reaching 3.6 million.⁹ The increase in the number of drivers in this age group is consistent with the trend of an aging population. In 2017, the number of older adults in Brazil was approximately 30.2 million, an 18% higher proportion than in 2012 ($n = 25.4$ million).¹⁰ In 2016, the United States had about 42 million older adults licensed drivers, an increase of 56% compared to 1999.⁸ In Japan, the number of driver's licenses increased, especially among those aged 75 and over, to the point that it was 200% higher in 2017 than in 1997.⁹

Sociodemographic characteristics such as sex, age, schooling, and geographic area, affect motorized mobility.¹¹ Men tend to be the majority of drivers, both among Europeans¹² and North Americans.¹³ The prevalence of older drivers reduces with increasing age^{13,14} and those with less schooling are less likely to keep driving.¹⁴

Despite the importance of driving as an element of mobility, no population studies have addressed any aspect of mobility using vehicles (or driving habits) among Brazilian older adults. Since Brazil is a country with continental dimensions, the marked environmental, cultural, demographic, and socioeconomic differences in different regions can have different repercussions on driving. Knowing the characteristics of

Brazil's older adults who use a car or motorbike contributes to understanding of urban mobility in capital cities and of how older people move about in their daily lives. This study aimed to estimate the prevalence of Brazilian older adults who drive a car or motorcycle, according to sociodemographic characteristics.

METHODS

This cross-sectional study uses data from the 2018 Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel). Vigitel is an annual survey, which has been conducted in Brazil since 2006. The sampling procedures aim to obtain probabilistic samples of the adult population (≥ 18 years old), residing in households served by at least one *fixed-line* home *phone*, in each of the Brazilian state capitals of the 26 Federation Units and the Federal District. Detailed information about the sampling process and instruments has been published previously¹⁵ and will be summarized briefly below.

From January to December 2018, 172 800 calls were made, identifying 73 648 eligible telephone lines, and 52 395 interviews were completed. The team responsible for the interviews consisted of 40 interviewers, four supervisors, and two coordinators. Sampling was conducted in two stages. In the first stage, at least 5 000 lines were drawn for each city. This draw was carried out systematically and stratified using postal codes (CEP), based on the register of fixed-line telephone numbers. One hundred and eighty-nine thousand telephone lines were initially drawn. In the second stage, adults residing in households selected were identified and drawn. This step was performed after identification, at the households served by the lines drawn, of those eligible for the system. Disabled lines, commercial and non-residential lines, and those at which there was no response after six call attempts on different days and at different times were excluded. After these steps, one adult resident (≥ 18 years old) was chosen for interview from among all adults living in the household.¹⁵

This study used interview data from individuals aged 65 and over. The prevalence of drivers was identified using the following question: "Do you drive a car, motorcycle and/or other vehicles?" (Yes/ No). We present the prevalence of drivers, and their respective 95% confidence intervals (95%CI) according to sex (male; female), age group (65 to 69; 70 to 74; 75 to 79; 80 to 84, and 85 years or over) and education, in years of study (0 to 8 years; 9 to 11 years; 12 years or more). We also present the prevalence rates for the country and for the geographic regions and the capital cities of the states of Brazil plus its Federal District. Analyses were performed

using R software version 3.5.2, using the Survey package, considering sample weightings (pesorake).

The present study used secondary data, with no identification of subjects, following the ethical principles established in National Health Council Resolution 510, of April 7, 2016. The Vigitel project was approved by the Ministry of Health's National Human Research Ethics Commission (CAAE: 65610017.1.0000.0008).¹⁵

RESULTS

In 2018, the Vigitel survey interviewed 15 338 individuals aged 65 and over, five of whom did not answer the question related to driving status. Therefore, the sample analyzed in the present study consisted of 15 333 respondents. Among the interviewees, 4 770 (28.76%; 95%CI 27.22 – 30.29) reported being drivers. The data in Table 1 show that although the number of older women is higher than men, the prevalence of drivers was higher among men (53.37 vs. 12.82%). The prevalence of drivers was lower in the older age groups and higher among older people in the group with highest educational level.

The Brazilian region with the highest prevalence of older drivers was the South (95%CI 33.38 – 38.11), followed by the Midwest (95%CI 32.80 – 37.98) and the Southeast (95%CI 27.02 – 32.49). The North (95%CI 18.60 – 24.46) and the Northeast (95%CI 21.24 – 24.57) had prevalence rates close to 20% (Figure 1).

As shown in Table 2, Florianópolis (42.20%) and Palmas (40.32%) were the state capitals with the highest prevalence rates of older drivers. Cities that were notable for low proportions of drivers among older people were Belém (16.56%), Salvador (18.41%), and Recife (18.75%). The prevalence of female drivers was only higher than 20% in Florianópolis (24.49%), Vitória (21.03%), and

Figure 1. Percentage of older people who drive (≥ 65 years), according to the major geographic regions of Brazil (n = 15 333).

Table 1. Prevalence rates of older drivers (≥ 65 years), according to sex, age group, and schooling. (n = 15 333).

	Sample n	Drivers n	Drivers % (95%CI)
Sex			
Male	4602	2860	53.37 (50.45 – 56.28)
Female	10 731	1910	12.82 (11.64 – 14.00)
Age groups (years)			
65–69	4897	1932	35.79 (33.06 – 38.61)
70–74	4158	1408	30.85 (27.94 – 33.91)
75–79	3055	863	27.02 (23.37 – 31.00)
80–84	2042	395	18.72 (15.72 – 22.14)
85 or over	1181	172	12.97 (9.80 – 16.97)
Schooling (years)*			
0–8	7865	1248	20.06 (18.20 – 22.05)
9–11	3829	1234	33.67 (30.87 – 36.60)
12 or more	3622	2283	65.44 (61.98 – 68.75)

95%CI: 95% confidence interval; *17 missing observations.

Table 2. Percentage of older people who drive (> 65 years) in the Brazilian state capitals plus the Federal District (FD), according to sex (n = 15 333).

State capitals and FD	Men and women		Women		Men	
	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)
Aracaju	172	27.68 (23.50 – 32.28)	55	7.89 (5.69 – 10.84)	117	59.51 (50.27 – 68.13)
Belém	115	16.56 (12.15 – 22.17)	48	6.47(4.49 – 9.24)	67	28.65 (19.40 – 40.10)
Belo Horizonte	235	34.59 (30.75 – 38.65)	75	15.20 (11.93 – 19.16)	160	60.50 (53.43 – 67.16)
Boa Vista	85	36.74 (28.64 – 45.67)	33	18.32 (12.18 – 26.62)	52	58.82(43.30-72.76)
Campo Grande	231	32.18 (28.40 – 36.21)	79	13.70 (10.69 – 17.40)	152	56.91 (49.81 – 63.74)
Cuiabá	156	29.56 (24.93 – 34.66)	54	10.27 (7.44 – 14.02)	102	59.95 (50.03 – 69.12)
Curitiba	176	37.46 (33.60 – 41.48)	123	19.46 (16.17 – 23.24)	153	71.13 (63.60 – 77.65)
Florianópolis	159	42.20 (38.05 – 46.47)	110	24.49 (20.35 – 29.17)	149	71.20 (63.97 – 77.49)
Fortaleza	170	25.57 (21.28 – 30.40)	77	10.83 (8.27 – 14.07)	93	47.96 (38.46 – 57.61)
Goiânia	233	37.57 (33.43 – 41.91)	93	17.70 (14.37 – 21.60)	140	65.06 (57.41 – 72.00)
João Pessoa	220	30.53 (25.87 – 35.61)	98	10.96 (8.59 – 13.88)	122	57.72 (48.08 – 66.80)
Macapá	92	28.16 (21.60 – 35.80)	32	8.66 (5.77 – 12.82)	60	49.44 (36.35 – 62.60)
Maceió	162	19.26 (15.31 – 23.94)	64	7.08 (4.94 – 10.04)	98	38.53 (29.29 – 48.68)
Manaus	89	20.35 (14.90 – 27.14)	42	7.24 (4.75 – 10.89)	47	38.16 (26.03 – 51.97)
Natal	207	28.97 (24.53 – 33.84)	85	10.75 (8.25 – 13.89)	122	55.97 (46.68 – 64.87)
Palmas	123	40.32 (32.74 – 48.38)	41	14.14 (9.52 – 20.48)	82	67.18 (54.61 – 77.69)
Porto Alegre	310	32.48 (29.18 – 35.96)	132	16.20 (13.46 – 19.37)	178	61.69 (54.82 – 68.11)
Porto Velho	123	20.61 (16.40 – 25.57)	45	9.05 (6.18 – 13.06)	78	39.30 (29.24 – 50.35)
Recife	174	18.75 (15.53 – 22.46)	84	9.29 (7.20 – 11.90)	90	36.07 (28.23 – 44.73)
Rio Branco	99	27.47 (21.07 – 34.96)	41	7.11 (4.57 – 10.09)	58	48.65 (36.44 – 61.02)
Rio de Janeiro	212	23.53 (20.34 – 27.06)	70	9.85 (7.58 – 12.71)	142	46.19 (36.04 – 53.50)
Salvador	102	18.41 (14.75 – 22.73)	30	4.65 (0.30 – 0.69)	72	37.20 (29.12 – 46.07)
São Luís	134	23.86 (19.21 – 29.23)	49	6.84 (4.77 – 9.69)	85	46.23 (36.89 – 55.85)
São Paulo	171	32.58 (28.08 – 37.42)	72	15.12 (11.83 – 19.12)	99	60.32 (51.57 – 68.46)
Teresina	140	23.55 (18.75 – 29.13)	44	5.55 (3.85 – 7.94)	96	51.64 (40.98 – 62.14)
Vitoria	254	35.04 (31.31 – 38.97)	123	21.03 (17.63 – 24.87)	131	63.29 (55.37 – 70.55)
Federal District	226	36.38 (31.83 – 41.20)	111	20.41 (16.61 – 24.81)	115	59.43 (50.15 – 68.07)

95%CI: 95% confidence interval.

the Federal District (20.41%). Salvador (4.65%), Teresina (5.55%), and Belém (6.47%) were the capitals with the lowest prevalence rates of female drivers. The highest prevalence rates of older male drivers were observed in Florianópolis (71.20%), Curitiba (71.13%), and Palmas (67.18%). Considerable differences were observed between capitals in the same region in the North and Northeast. In the North region, the prevalence of drivers in Belém was 16.56, compared to 40.32% in Palmas. In the Northeast region, there was a 10% difference between the rates in João Pessoa and Maceió.

DISCUSSION

Based on data from Vigitel 2018, this study estimated the prevalence of Brazilian older drivers (≥ 65 years), according to sociodemographic characteristics. Approximately 29% of older adults with a fixed-line phone, residing in Brazilian state capitals and the Federal District reported driving a motorized vehicle (car and/or motorcycle). The prevalence was higher among younger age groups, men, and individuals with more years of schooling. The results also revealed differences in the prevalence of drivers in broad geographic regions and between different state capitals (and the Federal District).

The estimated prevalence of drivers in the present study was lower than rates in the United States and some European countries.^{13,16} Data from the United States Department of Transportation¹³ show that, in 2017, approximately 80% of individuals aged 65 and over were drivers. In 2008–2009, Canada, Germany, Spain, and Great Britain had percentages exceeding 70%.¹⁶ Differences in the values of prevalence estimates were expected since these countries all have a higher Human Development Index (HDI) than Brazil. The studies were also different in terms of methods, including the sampling process.

The higher prevalence of male drivers and older adults with more years of schooling was consistent with the literature.¹³ These results can be explained, at least in part, by gender disparities in life span. Current cohorts of older women faced low levels of schooling, job opportunities in less qualified and profitable activities, and were generally educated for work at home or family salaried employment.¹⁷ Data from the 2013 National Health Survey (Pesquisa Nacional de Saúde) showed that schooling, participation in paid work, and income were lower for older women compared to their male peers,¹⁷ resulting in lesser need to travel, as well as greater difficulty in purchasing a car. Individuals with higher schooling levels have higher income¹⁸ and, consequently, better employment/retirement and higher purchasing power to acquire vehicles.

The reduction in the prevalence of drivers in line with advancing age was expected and is consistent with data from the United States.^{13,14} The leading causes of this decrease may be related to natural changes in the aging process, health conditions of the individual, and greater use of medications. These changes affect physical and cognitive limitations¹⁴ affecting the ability to drive.

According to the data, the Midwest (35.35%), South (35.71%), and Southeast (29.68%) regions had the highest prevalence of older drivers. The high rate of older drivers in the Midwest region may be due to several factors, such as long distances to be covered, lack of adequate public transport, and improved income. According to data from the Brazilian Institute of Geography and Statistics (Portuguese acronym IBGE),¹⁹ the Midwest region underwent rapid growth in per-capita income between 2002 and 2016. However, there were no improvements in local infrastructure. Additionally, this region includes the Federal capital, where the result of urban planning was to make mobility dependent on vehicles.²⁰ The metropolitan areas in the South and Southeast of Brazil tend to have higher population densities and higher rates of vehicle ownership and usage than the metropolitan regions of the North and Northeast.²¹

Moreover, the Southeast and South regions are the most economically advanced and have the highest schooling rates. The lower prevalence of older drivers in the Southeastern region, compared to the South and Midwest, was a result of the low prevalence of older drivers in the municipality of Rio de Janeiro. Certain characteristics, such as the topography and social contrasts of Rio de Janeiro, which are reflected in the population density and population distribution, may help to explain, in part, this lower percentage of drivers. Preexisting physical barriers channeled urban occupation of the city and the southern zone and the coast of Barra da Tijuca (west zone) became areas where the highest-income residents are concentrated.²² Added to this, the Center and the South Zone, both regions with better access to public transport and where it is easier to travel on foot or by bicycle,²³ have higher percentages of older adults (21%) than the northern (15%) and West regions (12%), and the neighborhoods Copacabana (30%), Flamengo (29%), Ipanema, and Leblon (28%) have particularly high proportions.²⁴

The state capitals with the highest percentages of older drivers were Florianópolis (42.20%), in the South region, and Palmas (40.32%), in the North region. In Brazil, types of mobility are associated with regions' income and development indexes.²⁵ Among other particularities, the quality of public transport influences the decision to drive, since older adults who live near bus stops are less likely to drive than those who live farther away.³ Florianópolis has high schooling rates and high income and has the highest HDI of the Brazilian capitals (0.84); while Palmas has the highest HDI of the state capitals in the North region (0.788).²⁶ However, it is important to note that Palmas has poor public transport. It was also designed as a city with wide and long streets and has the second-highest rate of urban mobility among Brazil's state capitals,²⁷ which may favor the use of private vehicles. On the other hand, Florianópolis is the capital with the worst mobility rate index in the country, that is, the capital with the worst displacement and one with substantial irregularities and discontinuity of its trunk highways, which, supposedly, would not encourage use of cars.²⁷

The cross-sectional design and self-report by participants could be considered a limitation of this study. The results only apply to Brazilians with *fixed-line* home phones, since inclusion of cellphones in the sampling process would increase the cost of data collection for Vigitel²⁸ and has not yet been adopted. The probabilistic sampling process is a positive aspect, allowing for extrapolation of the results. The Vigitel survey has validity and reproducibility for several indicators, presenting results similar to household surveys conducted in Brazil.²⁹

CONCLUSION

In conclusion, prevalence rates of older drivers in Brazilian capitals are higher among males, younger age groups, and those with more years of schooling. Our results show differences in the prevalence of drivers between the major geographic regions and between different state capitals (and the Federal District), highlighting that, in general, the prevalence of older drivers was higher in more developed capitals and regions. As seen among adolescent drivers in Brazil, it seems possible to speculate about environmental effects, with driving linked to locations with more precarious public transport and greater distances to be covered.³⁰

Thus, these findings contribute to knowledge about the mobility choices of adults for moving around in large Brazilian cities, allowing proposal of strategies to improve this population's quality of displacement. Consideration should also be given to concerns about the way older adults plan to get around when they stop driving, so that they can remain socially participative and healthy, without,

however, forgetting the possibility of chronic diseases, visual impairment, and physical and cognitive limitations in this population.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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AUTHORS' CONTRIBUTION

E.H.: conceptualization, methodology, formal analysis, investigation, writing – review & editing. A.R.B.: conceptualization, methodology, supervision, project administration, writing – review & editing. A.H.P.: writing – review & editing.

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