ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Alcohol consumption and driving in Brazilian capitals and Federal District according to two national health surveys

Consumo de bebidas alcoólicas e direção de veículos nas capitais brasileiras e no Distrito Federal, segundo dois inquéritos nacionais de saúde

Deborah Carvalho Malta[I,II], Regina Tomie Ivata Bernal[III], Márcio Dênis Medeiros Mascarenhas[IV], Marta Maria Alves da Silva[I], Celia Landman Szwarcwald[V], Otaliba Libânio de Morais Neto[VI]

ABSTRACT: *Objective:* To present the results of indicators of alcohol consumption and driving for Brazilian capitals based on two population surveys performed in Brazil in 2013. *Methods:* Cross sectional study with data from adults (≥ 18 years) participants of the Telephone Survey on Risk and Protective Factors for Chronic Diseases (Vigitel) and the National Health Survey (NHS). Prevalence for indicators of alcohol consumption and driving was then calculated. *Results:* The proportion of adult drivers who drove soon after drinking was significantly higher among males (29.3% – Vigitel and 24.4% – NHS), the young aging 18 to 29 years (31.6% – Vigitel and 24.1% – NHS) and among residents of the capitals of the Midwest (33.7% – Vigitel and 28.3% – NHS). The proportion of adults who reported drinking and driving was higher among males (9.4% – Vigitel and 7.4% – NHS) in the 18 to 29 age group (7.1% – Vigitel; 4.5% – NHS), and among residents of the capitals of the Midwest (7.9% – Vigitel and 6.1% – NHS). *Conclusion:* The study estimated the prevalence of the habit of driving after alcohol consumption among drivers and in the general population. There was consistency between the results from two nationwide surveys.

Keywords: Alcohol drinking. Automobile driving. Accidents, traffic. Risk factors. Health surveys. Law enforcement.

[I]Department of Noncommunicable Diseases Surveillance, and Health Promotion, Secretariat of Health Surveillance, Ministry of Health – Brasília (DF), Brazil.

[II]Nursing school, *Universidade Federal de Minas Gerais* – Belo Horizonte (MG), Brazil.

[III]Public Health School, *Universidade de São Paulo* – São Paulo (SP), Brazil.

[IV]Departament of Community Medicine, *Universidade Federal do Piauí* – Teresina (PI), Brazil.

[V]Institute for Communication and Science Information and Health Technology, *Fundação Oswaldo Cruz* – Rio de Janeiro (RJ), Brazil.

[VI]Department of Public Health, Institute of Tropical Pathology and Public Health, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.

Correspondence to: Deborah Carvalho Malta, Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde, Secretaria de Vigilância em Saúde, Ministério da Saúde, SAF Sul, Trecho 02, Lotes 05 e 06, Bloco F, Torre I, Edifício Premium, Térreo, Sala 16, CEP: 70070-600, Brasília, DF, Brasil. E-mail: dcmalta@uol.com.br

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RESUMO: *Objetivo:* Apresentar os resultados dos indicadores sobre consumo de álcool e direção para as capitais brasileiras obtidos em dois inquéritos populacionais realizados em 2013 no Brasil. *Métodos:* Estudo transversal realizado com dados da população adulta (≥ 18 anos) participante da Vigilância de Doenças Crônicas por Inquérito Telefônico (Vigitel) e da Pesquisa Nacional de Saúde (PNS). Foram calculadas as prevalências para os indicadores de consumo de bebida alcoólica e direção veicular. *Resultados:* A proporção de motoristas adultos de carro ou moto que dirigiram logo depois de beber foi significativamente maior no sexo masculino (29,3% – Vigitel; 24,4% – PNS), entre jovens de 18 a 29 anos (31,6% – Vigitel; 24,1% – PNS) e entre os residentes das capitais da Região Centro-Oeste (33,7% – Vigitel; 28,3% – PNS). A proporção de adultos que referiram beber e dirigir foi maior no sexo masculino (9,4% – Vigitel; 7,4% – PNS), no grupo de 18 a 29 anos (7,1% – Vigitel; 4,5% – PNS) e entre os residentes das capitais da Região Centro-Oeste (7,9% – Vigitel; 6,1% – PNS). *Conclusão:* O estudo permitiu estimar a prevalência do hábito de dirigir após ingestão de bebida alcoólica entre motoristas e na população em geral e mostrou coerência entre os resultados dos dois inquéritos epidemiológicos de abrangência nacional.

Palavras-chave: Consumo de bebidas alcoólicas. Condução de veículo. Acidentes de trânsito. Fatores de risco. Levantamentos epidemiológicos. Executoriedade da lei.

INTRODUCTION

The consumption of alcoholic beverages is among practices and cultural habits of various civilizations for millennia. Thus, their intake is encouraged and associated with festivities, religious ceremonies, celebrations and moments of joy[1,2]. However, alcohol is also associated with deleterious effects. The World Health Organization (WHO) links alcohol to about 1.8 million deaths worldwide (3.2% of all deaths), and to 4% of diseases, which represents 58.3 million disability-adjusted life years (DALYs). Alcohol is the fifth leading risk factor when it comes to premature deaths and disabilities worldwide[1]. In the Americas, alcohol consumption has been considered the most important risk factor for diseases[2,3].

The problems caused by alcohol intake can affect not only the consumer, but their family and social circle, as in cases of domestic violence, marital conflict, child abuse[4]. Alcohol consumption can result in social and health consequences, including reduced productivity at work, violent behavior, sports and leisure injuries, traffic deaths and injuries[4,5], unsafe sex and use of other psychoactive substances[6].

Even in small amounts, alcohol increases the risk of involvement in traffic accidents for both drivers and pedestrians, for it changes judgment capacity, vision, reaction time and motor coordination[7]. Studies conducted in Brazil show the high frequency of alcohol consumption among victims of car accidents and violence seen at emergency services[8,9]. Even being preventable conditions, the combination of alcohol and driving may account for approximately 20 to 50% of traffic-related deaths[1,2,10].

Because of this evidence, the Brazilian Ministry of Health began to monitor alcohol consumption and driving among Brazilians through two major epidemiological surveys: the Telephone Survey on Risk and Protective Factors for Chronic Diseases (Vigitel)[11], held since 2007 by the MoH, and the National Health Survey (NHS), conducted by the Brazilian Institute of Geography and Statistics (IBGE), in partnership with the MoH in 2013[12].

The aim of this study was to present the results of indicators on alcohol consumption and driving obtained from two population surveys (Vigitel and NHS), held in 2013.

METHODS

Cross-sectional study with data from an adult population (≥ 18 years) participating in Vigitel and NHS surveys in 2013.

Vigitel data from adults (≥ 18 years) living in the capitals of the 26 Brazilian states and the Federal District were analyzed, all of them having a phone number. Vigitel is based on two-stage probabilistic sample draw:

- systematic draw of 5,000 telephone lines in each city, followed by a second draw and organization of 25 replicates (subsamples) of 200 lines;
- draw of an adult resident (≥ 18 years) of the household to answer the interview. About 54,000 people were interviewed, with about 2,000 interviews per city / year.

The calculation of post-stratification weight was made by the rake method, considering gender, age and educational level, aiming to match the composition of the sample of the city to the socio-demographic composition of the whole adult population of each city in the year of survey[11].

NHS was held in 2013, being an epidemiological home-based survey representative of the major regions of Brazil, federal units and capitals. Sample calculation was initially performed randomly based on census data from 2010. The planned sample was 81,167 households, considering those with residents; 69,994 households were eligible, and interviews were conducted in 64,348 households, with an 8.1% rate of non-response[12].

The sampling plan of the NHS was made in three stages. The primary sampling units (PSUs) were the census sectors or set of sectors; secondary units were households; tertiary units were adult residents (≥ 18 years). Weighting factors were calculated for each sampling unit, considering probabilities of selection. The weighting factor for the resident selected for interview was also calculated considering the weight of the household, non-response adjustment for sex and balanced with total population by sex and age groups, estimated with the weight of all residents. Details about the sampling and weighting processes are provided in the publication of NHS results[12].

Chart 1 shows the indicators analyzed in this study, with description of calculation method, source of the data and questions asked during the interviews.

The study population consisted of adults aging 18-74 years, living in the capitals of Brazil and the Federal District. Prevalence and respective 95% confidence interval (95%CI) were calculated for each indicator, stratified by sex, age group (18-29, 30-59, 60-64, 65-74 years), educational level (uneducated and incomplete primary school; complete primary school and incomplete high school; complete high school and incomplete higher education; higher education), race/skin color (white, black and brown) and set of capitals by geographic regions (North, Northeast, Southeast, South and Midwest). Data were analyzed in Stata version 11.0 (StataCorp., CollegeStation, USA), using the command "survey" for complex samples.

The participation of adults in the survey was voluntary and confidentiality of information was guaranteed. Both surveys were approved by the National Research Ethics Committee, reports 13,081/2008 and 355,590/2013 (Vigitel) and 328,159/2013 (NHS).

Chart 1. Description of the study indicators.

Proportion (%) of adult drivers (≥ 18 years) who drove soon after using alcohol		
Indicator 1	- Numerator: people who use alcohol and drive soon after it. - Denominator: total of drivers (cars or motorcycles) who reported using alcohol.	
Source	Vigitel	NHS
Questions	1. Do you usually intake alcoholic beverage? (yes) 2. How often do you use alcohol? (any level) 3. In that day (or any other day), did you drive after drinking? (yes) 4. Regardless of quantity, do you usually drive after drinking? (always and sometimes)	1. How often do you use alcohol? (once or more per month). *(Note that NHS does not consider people who reported not using alcohol/never drinking and drinking less than once a month in the numerator). 2. Whenever you used alcoholic beverages, did you drive soon after it? (yes)
Proportion (%) of adult drivers (≥ 18 years) who drink and drive		
Indicator 2	- Numerator: people who use alcohol and drive soon after it. - Denominator: total participants.	
Source	Vigitel	NHS
Questions	1. Do you usually intake alcoholic beverage? (yes) 2. How often do you use alcohol? (any level) 3. In that day (or any other day), did you drive after drinking? (yes) 4. Regardless of quantity, do you usually drive after drinking? (always and sometimes)	1. How often do you use alcohol? (once or more per month). *(Note that people who reported not using alcohol/never drinking and drinking less than once a month in the numerator were not considered). 2. Whenever you used alcoholic beverages, did you drive soon after it? (yes)

Vigitel: Telephone Survey on Risk and Protective Factors for Chronic Diseases; NHS: National Health Survey.

RESULTS

In 2013, Vigitel and NHS interviewed, respectively, 52,929 and 60,202 people aged ≥18 years. The proportion of adult that conducted cars or motorcycles soon after drinking was significantly higher among males both in Vigitel (29.3%) and NHS (24.4%). As for the age group, proportion was significantly higher among young people aging 18-29 years, with 31.6% in Vigitel and 24.1% in NHS. Regarding educational level, the reference to such behavior was more common among those with complete primary school and incomplete high school, with similar values in both surveys (25.9% in Vigitel and 25% in NHS) without significant differences compared to other educational levels. The habit of driving after drinking was more common among black and brown-colored people, but with no significant difference in both surveys, compared to whites (Table 1).

Table 1 also shows the habit of driving after consuming alcohol among residents of the state capitals and the Federal District reported by 26.3% of adults surveyed in Vigitel and 21.3% of the participants of NHS. Such behavior was mostly reported by residents of the capital of the Midwest Region (33.7% in Vigitel and 28.3% in NHS).

Table 2 presents the proportion of adults who reported drinking and driving in both surveys. The highest rates were obtained from male respondents (9.4% in Vigitel and 7.4% in NHS), with statistically significant difference compared to females. The age group 18-29 had the highest rate (7.1%), according to Vigitel, followed by the age group 30-59 (5.2%); in NHS, these groups reported 4.5% and 4.4%, respectively, with significant difference compared to other age groups. The habit of drinking and driving was more frequently reported among individuals who had completed higher education, with statistically significant difference as compared to other levels of education. The highest proportion was seen among white people, but no difference was verified in the distribution of this indicator according to race/skin color.

The habit of drinking and driving in the state capitals and the Federal District was reported by 5.2% of adults surveyed in Vigitel and 3.9% in NHS, reaching the highest frequency among residents of the Midwest region (7.9% in Vigitel and 6.1% in NHS), as shown in Table 2.

DISCUSSION

Both surveys analyzed allowed assessing the habit of driving after drinking alcohol in any amount in the Brazilian capitals reported by about a third of adult drivers, according to Vigitel, or a quarter drivers, according to NHS. Prevalence was higher among male drivers aged between 18 and 29 years, and residents of the capitals of the Midwest Region. In general, the habit of drinking any amount of alcohol was reported by about one-tenth of the total population according to Vigitel, and by 7.4% according to NHS. Driving was also more reported by men, especially for the age group 18-29 and residents in the capitals of Midwest Brazil in 2013. These results are higher than the prevalence in developed countries like the

United States[13] and Japan[14], which can be explained by cultural differences and the imposition of legal control over alcohol consumption[15].

Despite the difficulty of obtaining data on the combination of drinking and driving, such information has been provided by recent surveys, which can support policies of prevention,

Table 1. Proportion (%) of adult drivers* (≥ 18 years) who reported using alcohol and driving soon after it according to sociodemographic variables and to region per survey (Vigitel and NHS). Brazil, 2013.

Variables	Vigitel		NHS	
	%	95%CI	%	95%CI
Gender				
Male	29.3	27.2 – 31.5	24.4	22.1 – 26.6
Female	16.5	13.5 – 19.4	11.8	9.0 – 14.5
Age (years)				
18 – 29	31.6	27.9 – 35.4	24.1	20.1 – 28.1
30 – 59	25.3	23.1 – 27.5	21.8	19.6 – 23.9
60 – 64	17.6	11.7 – 23.6	12.7	7.3 – 18.1
65 – 74	11.9	8.2 – 15.7	11.9	4.5 – 19.4
Educational level				
No education and incomplete primary school	22.5	17.4 – 27.6	17.5	13.3 – 21.7
Complete primary school and incomplete high school	25.9	19.8 – 32.0	25.0	18.2 – 31.9
Complete high school and incomplete higher education	27.6	24.9 – 30.3	22.9	20.0 – 25.8
Complete higher education	26.5	23.6 – 29.5	19.7	16.9 – 22.4
Race/skin color				
White	24.1	21.8 – 26.5	19.0	16.7 – 21.4
Black	29.8	23.1 – 36.5	25.6	18.6 – 32.7
Brown	29.8	26.3 – 33.2	24.5	21.5 – 27.5
Capitals of regions				
North	29.9	26.7 – 33.0	19.6	15.8 – 23.4
Northeast	29.1	26.7 – 31.6	25.6	21.5 – 29.7
Southeast	21.7	18.2 – 25.2	18.1	14.9 – 21.2
South	27.8	24.2 – 31.5	17.4	14.1 – 20.7
Midwest	33.7	30.3 – 37.1	28.3	24.1 – 32.5
Brazil (capitals)	26.3	24.5 – 28.1	21.3	19.4 – 23.2

Source: Vigitel and NHS, 2013.
95%CI: 95% confidence interval; NHS: National Health Survey, 2013; *includes all interviewees in denominator.

especially educational measures about the harmful effects of this behavior. Vigitel and NHS are thus precious because their data reveal the extent of the problem. Based on NHS data, at least 6.4 million drivers do drive after drinking alcohol in Brazil, and about 1.4 million drivers in capitals[12].

Tabela 2. Proportion (%) of adult drivers* (≥ 18 years) who reported using alcohol and driving soon after it according to sociodemographic variables and capitals of regions per survey (Vigitel and NHS). Brazil, 2013.

Variables	Vigitel		NHS	
	%	95%CI	%	95%CI
Gender				
Male	9.4	8.6 – 10.1	7.4	6.7 – 8.2
Female	1.6	1.3 – 1.9	0.9	0.7 – 1.2
Age (years)				
18 – 29	7.1	6.1 – 8.1	4.5	3.7 – 5.4
30 – 59	5.2	4.7 – 5.7	4.4	3.9 – 4.9
60 – 64	2.8	1.8 – 3.8	2.1	1.2 – 3.1
65 – 74	1.2	0.9 – 1.6	1.3	0.4 – 2.1
Educational level				
No education and incomplete primary school	2.3	1.7 – 2.8	1.6	1.2 – 2.1
Complete primary school and incomplete high school	4.1	3.1 – 5.2	3.5	2.3 – 4.6
Complete high school and incomplete higher education	5.7	5.1 – 6.3	4.3	3.7 – 4.9
Complete higher education	9.3	8.2 – 10.4	6.2	5.2 – 7.2
Race/skin color				
White	5.6	5.0 – 6.2	4.1	3.5 – 4.7
Black	5.3	3.9 – 6.6	3.7	2.5 – 4.8
Brown	5.2	4.6 – 5.9	3.7	3.2 – 4.2
Capitals of regions				
North	4.7	4.1 – 5.2	2.5	2.0 – 3.0
Northeast	5.1	4.6 – 5.5	4.5	3.6 – 5.3
Southeast	4.3	3.6 – 5.1	3.1	2.5 – 3.7
South	7.0	6.0 – 8.0	4.7	3.8 – 5.6
Midwest	7.9	6.9 – 8.8	6.1	5.0 – 7.2
Brazil (capitals)	5.2	4.8 – 5.6	3.9	3.5 – 4.2

Source: Vigitel and NHS, 2013.
95%CI: 95% confidence interval; NHS: National Health Survey, 2013; *includes all interviewees in denominator.

Among many problems resulting from the harmful use of alcohol, driving under the effects of this drug increases the risk of traffic accidents[1]. In Brazil, studies have shown the relationship between the harmful effects of alcohol and driving. The review by Carlini Cotrim and Matta Chasin[16] showed a study conducted in four Brazilian cities where alcohol was present in 92% (n = 865) of victims of traffic accidents' blood in a typical week. Any amount of alcohol was found in 61% of the sample and 16.6% of the total sample had this value higher than 0.6 g/L. In Recife, during Carnival, 80.7% of victims of traffic accidents had positive blood alcohol testings[17]. In São Paulo, a study conducted in the emergency room of a public hospital found that 21.8% of victims of traffic accidents had any alcohol concentration in blood[18]. In Diadema, São Paulo, 30% of drivers were under the influence of alcohol and 22% had blood alcohol concentrations above 0.6 g/L[19].

The concentration of alcohol in blood produces several neuromotor changes even at low doses, since there is a reduction of attention, false perception of speed, euphoria and difficulty in perceiving different luminosities[10].

Policies and legal restriction actions on alcohol consumption and driving, as the control of alcohol ads, the ban on sales to minors and laws that regulate the operation of alcohol outlets are important to reduce risk and, especially, to save lives[1,2,4,10].

The literature shows significant reductions in the number of deaths and injuries in countries that have adopted strict laws for alcohol consumption and driving, including the United States[20], Cali, Colombia, among others[2]. Overall, the most effective measures are strict legislation, systematic and continued supervision, and a strong law system to ensure that the offenders are penalized[10].

Studies on Vigitel data[21,22] show improvements over the habit of drinking abusively and driving, which shows a change in the habits of the population, with decline in the trend of drinking and driving between 2007 and 2013 among men of all educational levels in most regions of the country. Thus, the importance of prohibition of alcohol consumption before driving is confirmed, coinciding with the publication of laws 11,705/2008[23] and 12,760/2012[24], reinforcing the importance of the regulatory framework prohibiting drinking and driving. In 2012, the new law improved and contributed to the reduction of driving after alcohol abuse when other testimonial evidence and extensive sanctions to the offender were established[24]. More recently, other initiatives such as the Life in Traffic Program[25] resulted in reduction of mortality in capitals where it was initially implemented.

The prevalence estimated by Vigitel was higher than that of NHS. The survey used questions that are able to calculate similar indicators. Vigitel used four issues and the NHS used two, besides adopting different filters, which may explain such differences. In NHS, the question about frequency of alcohol consumption was added a filter that excludes reports of people drinking less than once a month. Thus, Vigitel considered any level of alcohol consumption, while NHS only considered consumption once or more per month. These variations in questions and filters can justify the differences in estimates' values. However, the

values were very similar. Another possible difference between the results of surveys may result from interview approaches: while Vigitel takes telephone interviews, NHS does it face-to-face. A face-to-face interview can cause the interviewee to feel embarrassed when reporting something that is considered illegal.

Among the limitations of this study, we point the fact that data were restricted to capital cities, where more rigorous supervision is expected. The studies adopted different methodologies and samples. While Vigitel was held with a population with telephone lines in the capitals, NHS was conducted in households. These methodological issues can affect comparability of surveys, for they use different strategies for sampling, with face-to-face data collection in NHS and by phone in Vigitel, also with different questions and filters. The use of weighting factors in Vigitel enables correction of estimates for factors studied in the adult population of all the cities[11].

However, the results were similar and point out the importance of the problem of drinking and driving in Brazilian capitals, confirming the need to monitor and establish punishment measures.

CONCLUSION

The study allowed us to estimate the prevalence of the habit of driving after alcohol consumption among drivers and in the general population with two epidemiological surveys nationwide. Although distinct in methodology, both are useful to monitor this risky condition for morbidity and mortality resulting from the combination of alcohol intake and driving in Brazil.

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