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# Consumption of alcoholic beverages, driving vehicles, a balance of dry law, Brazil 2007-2013

## Consumo de bebidas alcoólicas e direção de veículos, balanço da lei seca, Brasil 2007 a 2013

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### ABSTRACT

The study analyzes the trend in frequency of adults who drive under the influence of alcohol in major Brazilian cities after the passing of laws, which prohibit drunk driving. Data from the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL) between 2007 and 2013 were analyzed. The frequency of adults who drove after abusive alcohol consumption was reduced by 45.0% during this period (2.0% in 2007 to 1.1% in 2013). Between 2007 and 2008 (-0.5%) and between 2012 and 2013 (-0.5%), significant reductions were observed in the years immediately after the publication of these laws that prohibit drunk driving. These improvements towards the control of drunk driving show a change in the Brazilian population's lifestyle.

**DESCRIPTORS:** Alcohol Drinking, epidemiology. Automobile Driving. Accidents, Traffic, trends. Risk Factors. Social Control, Formal. Law Enforcement. Health Surveys.

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## RESUMO

O estudo analisa a tendência da frequência de adultos que dirigem alcoolizados, nas capitais brasileiras, após aprovação das leis que proíbem uso de álcool e direção. Foram utilizados dados do sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (Vigitel), entre 2007 e 2013. A frequência de adultos que dirigiram após o consumo abusivo foi reduzida em 45,0% no período (2,0% em 2007 a 1,1% em 2013). Reduções significativas foram verificadas nos anos imediatamente após a publicação das leis que proíbem o uso do álcool e direção entre 2007 e 2008 (-0,5%) e entre 2012 e 2013 (-0,5%). As melhorias apontadas em relação a dirigir alcoolizado mostram mudança dos hábitos da população brasileira.

**DESCRITORES:** Consumo de Bebidas Alcoólicas, epidemiologia. Condução de Veículo. Acidentes de Trânsito, tendências. Fatores de risco. Controles Formais da Sociedade. Executoriedade da Lei. Inquéritos Epidemiológicos.

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## INTRODUCTION

Excessive consumption of alcoholic beverages is a significant public health problem that influences morbidity and mortality. The World Health Organization (WHO) estimates that approximately 770,000 deaths occur worldwide each year (1.5% of total deaths) as a result of alcohol consumption.<sup>a</sup> Evidence links abusive alcohol consumption to work accidents, episodes of violence, and traffic accidents.<sup>a</sup>

Two federal laws were recently passed in Brazil that prohibit driving under the influence of alcohol: Law 11,705,<sup>b</sup> from 2008 and the new Dry Law – Law 12,760, from 2012.<sup>c</sup> In order to monitor the Brazilian population's consumption of alcohol and its harmful effects, in recent times, the Ministry of Health has conducted telephone surveys with adults aged 18 or older in major Brazilian cities, among them was the Surveillance System for Risk and Protective Factors for Chronic Diseases (VIGITEL).<sup>d</sup> The initial analysis by VIGITEL indicated a reduction in drunk driving during the first few months of the Dry Law effect.<sup>1</sup>

This study analyzes the trend in frequency of adults who drive under the influence of alcohol in major Brazilian cities after the passing of laws that prohibit drunk driving.

## METHODS

VIGITEL<sup>1</sup> data, collected from adults aged 18 or older, who had landline access and who were residing in major cities of the 26 Brazilian states and in Brasília (the country's capital), were analyzed. VIGITEL uses probabilistic sampling in two stages: 1) systematic selection of 5,000 telephone landlines in each city, followed by a new random selection and organization of 25 replicas (subsamples) of 200 lines; 2) random selection of an adult resident (18 years or older) to respond to the interview. Approximately 54,000 individuals were interviewed by VIGITEL, or roughly 2,000 interviews per city each year.<sup>d</sup> The calculation of the post-stratification weight is made through the rake method,<sup>d</sup> considering sex, age, and education level, with the aim to equalize the composition of adult population to the sociodemographic composition of the total adult population of each city, the year the research was conducted.<sup>d</sup>

In this study, the concept of abusive alcohol consumption was adopted – intake of four or more doses for women and five or more doses for men at one sitting in 30 days. A dose of alcohol was established as one shot of distilled alcohol, one can of beer, or one glass of wine. Those who reported having consumed alcohol

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<sup>a</sup> World Health Organization. Strategies to reduce the harmful use of alcohol. Geneva; 2008 [cited 2013 Apr 10]. Available from: [http://apps.who.int/ebwha/pdf\\_files/A61/A61\\_13-en.pdf](http://apps.who.int/ebwha/pdf_files/A61/A61_13-en.pdf)

<sup>b</sup> Lei nº 11.705, de 19 de junho de 2008. Altera a Lei nº 9.503, de 23 de setembro de 1997, que institui o Código de Trânsito Brasileiro, e a Lei nº 9.294, de 15 de julho de 1996, que dispõe sobre as restrições ao uso e à propaganda de produtos fumíferos, bebidas alcoólicas, medicamentos, terapias e defensivos agrícolas, nos termos do § 4º do art. 220 da Constituição Federal, para inibir o consumo de bebida alcoólica por condutor de veículo automotor, e dá outras providências. *Diário Oficial da União*. 20 Jun. 2008:1.

<sup>c</sup> Lei nº 12.760, de 20 de dezembro de 2012. Altera a Lei nº 9.503, de 23 de setembro de 1997, que institui o Código de Trânsito Brasileiro. *Diário Oficial da União*. 21 Dez. 2012:1.

<sup>d</sup> Ministério da Saúde. Vigitel 2013: Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Brasília (DF); 2014.

in excess were asked if they had driven a motor vehicle after drinking. A trend was presented over a seven-year period (2007-2013) for abusive alcohol consumption indicator and an annual variation ( $\Delta$ ) at times  $t+1$  and  $t$  expressed in percentages, according to sex, level of education, age, and major cities per region. The hypothesis test was used to detect change ( $H_0: \Delta = 0$  and  $H_1: \Delta \neq 0$ ) in that period, which sees the result expressed by a confidence interval of 95%. The variation is significant when the confidence interval of 95% does not contain 0.

**RESULTS**

Between 2007 and 2013, the prevalence of drunk driving in the adult population of the 27 cities surveyed by VIGITEL was reduced by 45.0% (2.0% in 2007 and 1.1% in 2013). In the annual variation analyses, significant reductions were observed between 2007 and 2008 (-0.5%) and between 2012 and 2013 (-0.5%). There was a significant reduction among men (from 4.0% to 2.1%), between 2007 and 2008 (-0.9%) and between 2012 and 2013 (-1.2%). In the periods, 2007-2008 and 2012-2013, significant differences were respectively found between the Northern (-0.5% and -0.7%) and Midwestern (-0.9% and -1.3%) regions. In the Midwestern region, there was also a reduction in the period from 2011 to 2012 (-0.8%); in the Northern region, the variation occurred between 2007 and 2008 (-0.5%) and between 2011 and 2012 (-0.4%); and, in the Southern region, between 2007 and 2008 (-0.8%). A significant reduction was observed only between the ages of 35 to 44 years (-1.2%) between 2012 and 2013. As for level of education, no difference was observed (Table).

The VIGITEL data file also points to a reduction in the cities of Salvador, Maceió, Macapá, Porto Velho, Palmas, and Belo Horizonte, and an increase in the city of Sao Paulo, involving only women.

**DISCUSSION**

Excessive alcohol consumption over a short period of time is internationally known as “binge drinking” or “heavy episodic drinking”. This type of consumption carries more risks of accidents and violence.<sup>a</sup> VIGITEL has shown that, in 2013, 16.4% of the adult population had this consumption pattern, especially among adult men and young people between the ages 18 and 34.<sup>1</sup>

Among the various problems resulting from harmful use of alcohol, automotive accidents (including cars, motorcycles, and trucks) occupy a place of prominence. Drunk driving is one of the main consequences from inappropriate use of drinking alcohol and increases the risk of vehicular accidents.<sup>a</sup> Alcohol intoxication produces neuro-motor alterations, its intensity depending on the level of blood alcohol concentration. Even with low consumption (0.3 dcg/l. or one dose), alcohol decreases concentration and creates a false sense of velocity, euphoria, and difficulty in discerning different luminosities.<sup>1,a</sup>

To reduce traffic accidents, it is important to have policies and legal measures to restrict drunk driving, control alcohol advertising, prohibit sale to minors, and have laws that regulate alcohol sales.<sup>2,a</sup>

A previous study by VIGITEL<sup>1</sup> pointed out the importance of the Dry Law in reducing the consumption of alcohol in the first few months the Law 11,705<sup>1</sup> was in effect. The present study corroborates the positive effect of prohibiting drunk driving in the years immediately after the publication of the landmark regulation. In 2012, the Law 12,760<sup>b</sup> perfected the legislative framework and contributed to reduction<sup>b</sup> when it established other evidence and expanded sanctions. In 2011, other initiatives, such as the Traffic Life Program (*Programa Vida no Trânsito*), resulted in the reduction of mortality in three of the five major Brazilian cities where the project was implemented.<sup>3</sup>

**Table.** Confidence interval of 95% for annual variation (%)<sup>a</sup> of drunk driving,<sup>b</sup> according to demographic variable and geographic locality, in 26 major cities and in Brasília, DF, Midwestern Brazil, 2007 to 2013.

Variable	Statistics	Year (t)						
		2007	2008	2009	2010	2011	2012	2013
Sex								
Men	Proportion	4.0	3.1	3.5	3.1	3.0	3.3	2.1
	Annual variation		-0.9 <sup>c</sup>	0.4	-0.4	-0.1	0.3	-1.2 <sup>c</sup>
	95%CI		-1.51;-0.29	-0.23;1.02	-0.97;0.18	-0.62;0.39	-0.30;0.89	-2.75 ;-0.59
Women	Proportion	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Annual variation		-0.1	0.0	0.0	0.0	0.0	0.0
	95%CI		-0.20;0.05	-0.14;0.16	-0.14;0.17	-0.15;0.14	-0.17;0.13	-0.18;0.19
Both	Proportion	2.0	1.6	1.8	1.6	1.5	1.7	1.1
	Annual variation		-0.5 <sup>c</sup>	0.2	-0.2	-0.1	0.1	-0.5 <sup>c</sup>
	95%CI		-0.7;-0.2	-0.1;0.5	-0.4;0.1	-0.3;0.2	-0.2;0.4	-0.8;-0.2

Continue

## Continuation

Age bracket (years)								
18 to 24	Proportion	1.9	1.8	2.0	1.7	2.2	1.6	1.3
	Annual variation		-0.1	0.2	-0.3	0.5	-0.6	-0.3
	95%CI		-0.7;0.4	-0.5;0.9	-0.9;0.4	-0.1;1.2	-1.4;0.1	-1.0; 0.4
25 to 34	Proportion	3.0	2.1	2.5	2.3	2.3	2.8	2.2
	Annual variation		-0.9	0.4	-0.2	0.0	0.5	-0.6
	95%CI		-1.5;0.2	-0.2;1.0	-0.8;0.4	-0.6;0.6	-0.3;1.2	-1.4;0.2
35 to 44	Proportion	2.1	1.9	2.0	1.7	1.4	2.0	0.8
	Annual variation		-0.2	0.1	-0.3	-0.3	0.6	-1.2 <sup>c</sup>
	95%CI		-0.8;0.4	-0.6;0.8	-0.9;0.3	-0.7;0.1	-0.1;1.2	-1.8;-0.6
45 to 54	Proportion	1.9	1.5	1.2	1.5	1.0	1.2	0.8
	Annual variation		-0.4	-0.3	0.2	-0.5	0.2	-0.4
	95%CI		-1.2;0.5	-1.0;0.5	-0.3;0.7	-0.9;0.0	-0.2;0.6	-0.8;0.0
55 to 64	Proportion	1.2	0.6	1.4	0.8	0.8	0.5	0.5
	Annual variation		-0.6	0.8	-0.6	0.0	0.3	0.0
	95%CI		-1.1;0.0	-0.1;1.4	-1.3;0.2	-0.4;0.3	-0.5;0.1	-0.3;0.2
≥ 65	Proportion	0.4	0.2	0.2	0.3	0.2	0.3	0.1
	Annual variation		-0.2	0.0	0.1	-0.1	0.1	-0.2
	95%CI		-0.5;0.0	-0.1;0.2	-0.2;0.3	-0.3;0.1	-0.1;0.4	-0.4;0.0
Education (years)								
0 to 8	Proportion	1.3	1.0	1.1	0.8	0.7	0.9	0.7
	Annual variation		-0.3	0.1	-0.3	-0.1	0.2	-0.2
	95%CI		-0.7;0.1	-0.3;0.6	-0.7;0.0	-0.4;0.1	-0.1;0.5	-0.5;0.2
9 to 11	Proportion	2.2	1.5	1.6	1.6	1.6	1.7	1.1
	Annual variation		-0.7	0.1	0.0	0.0	0.1	-0.6
	95%CI		-1.1;-0.3	-0.2;0.5	-0.4;0.4	-0.3;0.3	-0.3;0.4	-1.0;-0.1
≥ 12	Proportion	3.2	2.8	3.1	2.8	2.7	2.7	1.7
	Annual variation		-0.4	0.3	-0.3	-0.1	0.0	-1.0
	95%CI		-1.0;0.2	-0.4;0.9	-0.9;0.4	-0.7;0.5	-0.7;0.7	-1.6;-0.2
Region								
North	Proportion	2.2	1.7	1.6	2.1	1.8	1.7	1.0
	Annual variation		-0.5 <sup>c</sup>	-0.1	0.5	-0.3	-0.1	-0.7 <sup>c</sup>
	95%CI		-0.9;-0.04	-0.6;0.3	0.04;1.0	-0.8;0.2	-0.6;0.3	-1.1;-0.2
Northeast	Proportion	2.4	1.9	1.9	2.0	2.0	1.6	1.2
	Annual variation		-0.5 <sup>c</sup>	0.0	0.1	0.1	-0.4 <sup>c</sup>	-0.4
	95%CI		-0.9;-0.1	-0.4;0.4	-0.3;0.5	-0.3;0.4	-0.8;-0.02	-0.7;0.0
Midwest	Proportion	3.0	2.1	2.5	2.1	2.3	3.1	1.8
	Annual variation		-0.9 <sup>c</sup>	0.4	-0.4	0.2	0.8 <sup>d</sup>	-1.3 <sup>c</sup>
	95%CI		-1.6;-0.2	-0.2;1.1	-1.1;0.3	-0.4;0.8	0.03;1.5	-2.1;-0.4
Southeast	Proportion	1.5	1.3	1.5	1.1	1.0	1.3	0.9
	Annual variation		-0.2	0.3	-0.5	-0.1	0.2	-0.4
	95%CI		-0.7;0.3	-0.2;0.8	-0.9;0.0	-0.5;0.3	-0.2;0.7	-0.9;0.1
South	Proportion	2.1	1.3	1.7	1.7	1.3	1.7	1.1
	Annual variation		-0.8 <sup>c</sup>	0.4	0.0	-0.4	0.5	-0.6
	95%CI		-1.4;-0.1	-0.3;1.0	-0.7;0.8	-1.1;0.2	-0.1;1.1	-1.3;0.0

<sup>a</sup> Annual variation (%): difference between the proportion at times t+1 and t multiplied by 100.

<sup>b</sup> Ingestion of four or more doses for women, or five or more for men at one sitting, in 30 days.

<sup>c</sup> Significant decrease.

<sup>d</sup> Highly significant.

Despite the analysis of all major Brazilian cities, exclusion of individuals from other cities and those without landline access presents a limitation to this study. However, weighting factors, which make it possible to adjust the estimates, enabled extrapolation of the entire adult population of the cities.<sup>d</sup> What must also be considered is the possibility of under-reporting, in as much for abusive consumption of alcohol as for driving after drinking, as this custom is against the law.<sup>1</sup>

The current law prohibits driving under influence of alcohol. Nevertheless, this study refers to drunk driving, a VIGITEL factor present since 2007, before the law came into effect, allowing monitoring over time and

support of the law. In 2011, VIGITEL introduced a specific indicator for the consumption of any quantity of alcohol and then driving. In 2013, 5.2% of the adult population admitted driving after ingesting some quantity of alcohol.<sup>d</sup> However, there is no previous historical period of this indicator allowing its monitoring before the law was implemented.

This study highlights improvements relating to the control of drunk driving, showing a change in the behavior of the Brazilian population. It is necessary, however, for further research to be conducted to evaluate other aspects such as the reduction of morbimortality from traffic accidents as a result of the impact of laws that prohibit drunk driving.

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