







# Convergence in alcohol abuse in Brazilian capitals between genders, 2006 to 2019: what population surveys show

*Convergência no consumo abusivo de álcool nas capitais brasileiras entre sexos, 2006 a 2019: o que dizem os inquéritos populacionais*

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**ABSTRACT:** *Objective:* To analyze the temporal trend of the prevalence of alcohol abuse among adults in Brazilian capitals, between 2006 and 2019. *Methods:* Time series study, based on data from the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel), between 2006 and 2019. The population consisted of adults ( $\geq 18$  years old) with landline telephone residing in Brazilian capitals. The trend analysis was performed by linear regression. *Results:* Between 2006 and 2019 there was a significant increase ( $p = 0.03$ ) in the abusive consumption of alcoholic beverages in the total adult population, from 15.6 to 18.8%. Among men, there was a stability trend ( $p = 0.96$ ), and among women, there was an increase from 7.7 to 13.3% ( $p < 0.001$ ;  $\beta = 0.295$ ). In the male gender stratified by capitals, from 2006 to 2019 there was a reduction in Belém, Fortaleza, João Pessoa, Macapá, Manaus, Natal, Recife, São Luis, and Teresina. On the other hand, there was growth in the Federal District. Among women, the trend was upward in: Aracaju, Belo Horizonte, Cuiabá, Curitiba, Florianópolis, Goiânia, Palmas, Porto Alegre, Rio de Janeiro, Salvador, São Paulo, Vitória, and the Federal District. *Conclusion:* The results indicate that more adult women are currently drinking in excess compared to previous years, suggesting an increased risk of alcohol-related harm in this portion of the population in Brazilian capitals, bringing about a convergence effect with the prevalence among men and women.

**Keywords:** Alcohol drinking. Men. Women. Time series studies.

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**Conflict of interests:** nothing to declare – **Financial support:** National Health Fund, Secretariat of Health Surveillance (SVS) and Ministry of Health (TED 66/2018).

**RESUMO:** *Objetivo:* Analisar a tendência temporal da prevalência do uso abusivo de bebidas alcoólicas em adultos nas capitais brasileiras, entre 2006 e 2019. *Métodos:* Estudo de série temporal, com base nos dados do Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (Vigitel), entre 2006 e 2019. A população foi constituída de adultos ( $\geq 18$  anos) residentes nas capitais brasileiras com telefone fixo. Utilizou-se a regressão linear para análise da tendência. *Resultados:* Entre 2006 e 2019, houve aumento significativo ( $p = 0,03$ ) do consumo abusivo de bebidas alcoólicas para o total da população adulta, de 15,6 para 18,8%. Entre os homens, a tendência foi de estabilidade ( $p = 0,96$ ), e entre as mulheres, ocorreu aumento de 7,7 para 13,3% ( $p < 0,001$ ;  $\beta = 0,295$ ). Quando estratificado por capitais e sexo masculino, de 2006 a 2019 ocorreu redução em Belém, Fortaleza, João Pessoa, Macapá, Manaus, Natal, Recife, São Luís e Teresina. Em contrapartida, houve crescimento no Distrito Federal. Entre o sexo feminino, a tendência foi de aumento em: Aracaju, Belo Horizonte, Cuiabá, Curitiba, Florianópolis, Goiânia, Palmas, Porto Alegre, Rio de Janeiro, Salvador, São Paulo, Vitória e Distrito Federal. *Conclusão:* os resultados indicaram que mais mulheres adultas estão atualmente bebendo em excesso em comparação aos anos anteriores, sugerindo aumento dos riscos de danos relacionados ao álcool nessa parcela da população nas capitais brasileiras, trazendo um efeito de convergência com as prevalências entre homens e mulheres.

*Palavras-chave:* Consumo de bebidas alcoólicas. Homens. Mulheres. Estudos de séries temporais.

## INTRODUCTION

The consumption of alcoholic beverages is an encouraged behavior in most cultures due to celebrations, socialization, religious ceremonies and other practices and social events<sup>1,2</sup>; however, alcohol is a major public health issue<sup>1-3</sup>, since its chronic use can cause harm and dependence, resulting in mental, liver, heart diseases, neoplasm, among others. The problems coming from the episodic and acute use also constitute a significant risk factor for violence (aggression, homicide, suicide), traffic and work accidents etc.<sup>3-5</sup>. Besides, it leads to a global economic cost that surpasses 1% of the Gross Domestic Product (GDP) of middle and high income countries<sup>6</sup>.

The World Health Organization (WHO) estimates that, every year, there are approximately three million deaths associated with alcohol consumption, which represents 5.3% of all deaths<sup>4</sup>. Alcohol is the main risk factor for premature mortality and disability in the population aged between 15 and 49 years, causing 10% of all deaths in this age group<sup>7,8</sup>. In Brazil, alcohol consumption was the sixth risk factor for loss of disability-adjusted life years (DALYs) in 2019, leading to 3,716,649 million (5.69%) DALYs<sup>7,8</sup>.

The effects of alcohol in the body change according to the quantity and frequency of intake; they also depend on metabolism, genetic vulnerability, gender and life style. Once absorbed, it reaches all body parts and leads to reduced motor coordination and reflexes. The initial effect promotes a state of euphoria and disinhibition, but, if

consumed in larger amounts, the opposite takes place, causing the depression of the nervous system<sup>1,9</sup>.

Studies show that alcohol abuse has increased around the world, with differences between genders, as well as disorders caused by alcohol intake and hospitalizations caused by this behavior<sup>10-14</sup>. The increasing alcohol use among women and the convergence between prevalence rates according to gender have been described in the literature<sup>13,14</sup>; however, there are not many studies that investigate this phenomenon in Brazil.

Aiming at reducing the harmful intake of alcohol and its impact on health, the WHO and its member states defined the goal to reduce this consumption in 10%<sup>15</sup>. The theme was also included in the Sustainable Development Goals (SDGs), whose objective is to strengthen the prevention and treatment of substance abuse, including the abuse of narcotic drugs and the harmful consumption of alcohol<sup>16</sup>. However, it is still necessary to institute measures and public policies that promote advances, as well as establishing monitoring alcohol use systems and morbidity and mortality patterns.

Based on the exposed, the objective was to analyze the temporal trend of the prevalence in alcohol abuse among adults in Brazilian capitals, between 2006 and 2019.

## **METHODS**

### **STUDY DESIGN AND DATA COLLECTION**

This is a time series study about the prevalence of alcohol abuse among adults living in Brazilian capitals.

We used data from the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (Vigitel), from 2006 to 2019. Vigitel is a population-based telephone survey, performed by the Ministry of Health, which annually monitors the frequency and distribution of the main risk and protective factors for chronic non-communicable diseases (NCDs), such as alcohol consumption. Since 2006, a probability sample of adults aged 18 years or older, living in households with a landline telephone, in the 26 Brazilian capitals and the Federal District is interviewed. Approximately two thousand interviews are carried out in each city, accounting for 54 thousand per year.

The estimates made by Vigitel receive a sample weight due to the differences in coverage of landline telephones, so that they are representative of the total adult population in each city. Therefore, a weight is attributed to each individual, aiming at correcting the differences in the probability of selection, and at equalizing the socio-demographic composition of the population served by household landlines to the total adult population of each city in each year of the survey, called post-stratification weight. Details about the sampling process and data collection are provided in the publications of Vigitel<sup>17,18</sup>.

## DEFINITION OF INDICATORS

For this study, the following Vigitel questions were used<sup>17</sup>:

- Do you usually consume alcohol? For those who answer yes, other questions are asked about frequency: how often do you consume alcohol? The alternatives are: one or two days a week; three or four days a week; five or six days a week; everyday; less than one day a week.

The indicator of alcohol abuse per gender was assessed by the following questions:

- For men: in the past 30 days, did you drink five or more doses of alcohol in a single occasion? Here, we consider those who answer yes;
- For women: in the past 30 days, did you drink four or more doses of alcohol in a single occasion? Here, we consider those who answer yes.

The indicator analyzed in the study was the abusive consumption of alcohol (binge drinking or heavy episodic use of alcohol), which constitutes an excessive amount of alcohol consumed in a short period of time, five or more doses of standard drinks (considering that one dose of alcohol or equivalent contains 12 g of pure alcohol, about 60 g) for men, and four or more doses for women (48 g)<sup>2,17</sup>.

## ORGANIZATION AND DATA ANALYSIS

The indicator was stratified according to: gender (female and male); age group (18 to 24; 25 to 34; 35 to 44; 45 to 54; 55 to 64; and 65 or more); regions (North, Northeast, Center-West, Southeast and South); schooling (0 to 8; 9 to 11; and 12 years or more); and Brazilian capitals stratified by gender.

The percentage of adults who consumed alcohol in an abusive manner was calculated by the relation of the number of adults who reported alcohol abuse by the total of interviewees.

To identify the existence of a linear trend, we used a linear regression model, in which the dependent variable was the prevalence of alcohol abuse, and the explanatory variable was the year of the survey. The angular coefficient ( $\beta$ ) of these models expressed the mean annual variation (increase or reduction) of the prevalence of alcohol abuse. A significant linear trend was considered when the  $\beta$  of the model was different than 0 and p value was lower than 0.05.

For data analysis, the post-stratification weights used in Vigitel were considered<sup>17,18</sup>. The analyses were performed using the software Stata (Stata Corp LP, College Station, Texas, United States), version 14.0.

## ETHICAL ASPECTS

The Vigitel data are available for public access and use, and their collection was approved by the National Ethics and Human Research Commission of the Ministry of Health,

report n. 355,590. An informed consent form was obtained orally, at the time of the telephone call.

## RESULTS

Between 2006 and 2019, there was a significant increase ( $p = 0.03$ ) in alcohol abuse for the total adult population, from 15.6 to 18.8%, with a growth rate of 0.157. Among men, the trend was stable ( $p = 0.96$ ) and, among women, there was significant increase ( $p < 0.001$ ), from 7.7 to 13.3% ( $\beta = 0.295$ ). The prevalence among men was about three times higher than among women in 2006, and decreased to about two times higher in 2019, presenting tendency of convergence of the curves.

Regarding schooling, an upward trend was exhibited only for those with 12 or more schooling years ( $p = 0.05$ ), moving from 17.9 to 23.1%. For the other categories, the trend was stable. There was significant increase in the prevalence of this consumption among individuals aged from 25 to 44 years, and those aged between 55 and 64 years. The highest increase affected those aged between 25 and 34 years ( $\beta = 0.339$ ). According to region, there was significant increase ( $p < 0.05$ ) in the Center-West, Southeast and South. In the North and the Northeast, prevalence rates were stable throughout the years (Table 1).

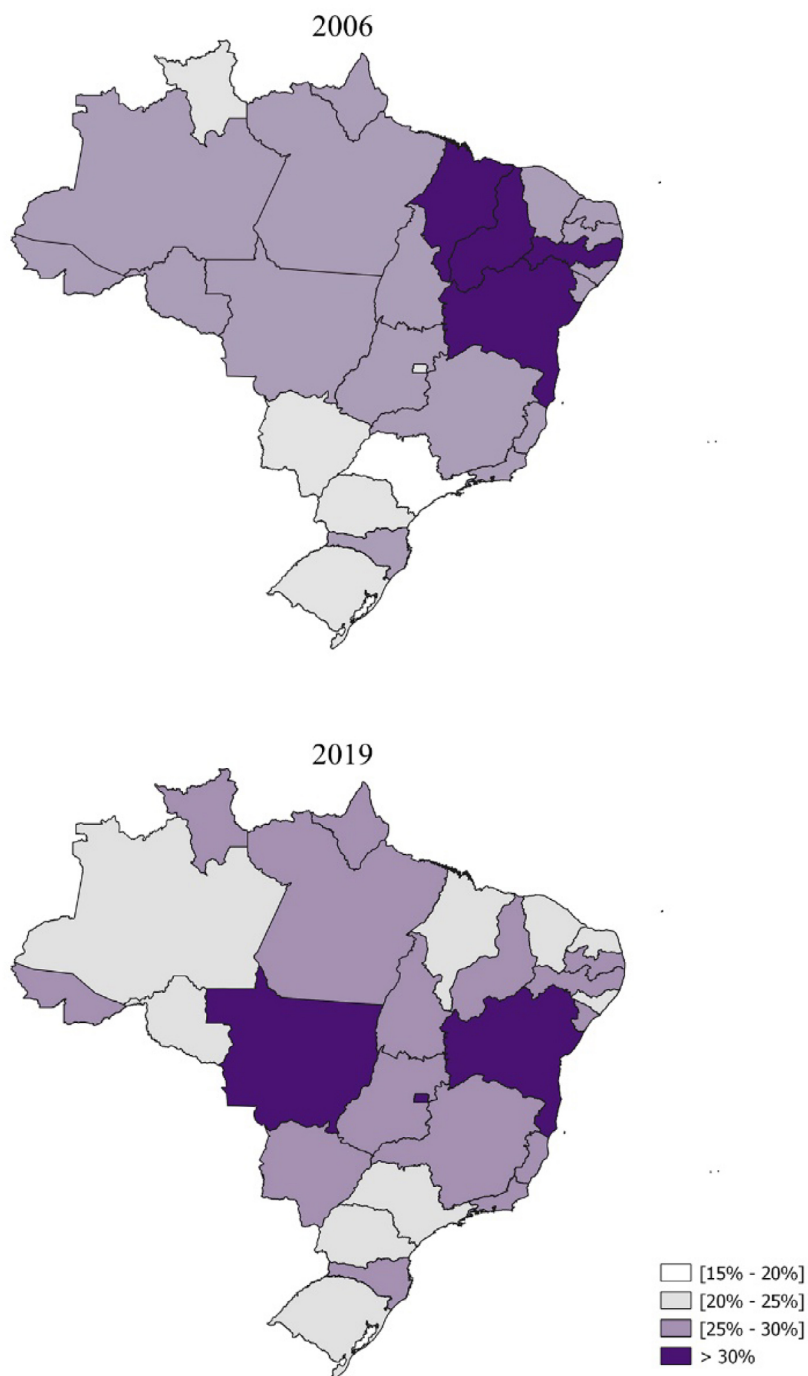
When stratified by capitals and the male gender, from 2006 to 2019, there was a reduction in alcohol abuse in nine capitals: Belém, from 26.9 to 25.4% ( $p = 0.04$ ;  $\beta = -0.485$ ); Fortaleza, from 25.9 to 24.1% ( $p = 0.03$ ;  $\beta = -0.434$ ); João Pessoa, from 28.6 to 26.2% ( $p = 0.02$ ;  $\beta = -0.399$ ); Macapá, from 29.3 to 26% ( $p = 0.04$ ;  $\beta = -0.472$ ); Manaus, from 28.6 to 21.9% ( $p = 0.01$ ;  $\beta = -0.613$ ); Natal, from 27.5 to 20.8% ( $p = 0.02$ ;  $\beta = -0.491$ ); Recife, from 32.5 to 25.6% ( $p = 0.03$ ;  $\beta = -0.395$ ); São Luís, from 30 to 24.5% ( $p < 0.001$ ;  $\beta = -0.61$ ); and Teresina, from 31.1 to 26.6% ( $p = 0.01$ ;  $\beta = -0.605$ ). On the other hand, the Federal District showed significant increase in the prevalence rates, from 22.1 to 30.9% ( $p < 0.001$ ;  $\beta = 0.812$ ). For the other capitals, the trend was stable ( $p > 0.05$ ) (Figure 1; Supplementary Material 1).

The female gender showed a different behavior in comparison to the male gender. There was a significant increase in alcohol abuse in 13 capitals: Aracaju, from 8.2 to 12.7% ( $p < 0.001$ ;  $\beta = 0.365$ ); Belo Horizonte, from 12.1 to 15.2% ( $p < 0.01$ ;  $\beta = 0.341$ ); Cuiabá, from 7.7 to 10.9% ( $p < 0.001$ ;  $\beta = 0.381$ ); Curitiba, from 4.8 to 8.9% ( $p = 0.01$ ;  $\beta = 0.335$ ); Florianópolis, from 7.1 to 13.5% ( $p < 0.001$ ;  $\beta = 0.377$ ); Goiânia, from 7.4 to 14.4% ( $p < 0.001$ ;  $\beta = 0.446$ ); Palmas, from 9.9 to 17.4% ( $p < 0.001$ ;  $\beta = 0.384$ ); Porto Alegre, from 6.7 to 13% ( $p = 0.01$ ;  $\beta = 0.283$ ); Rio de Janeiro, from 9.6 to 17.6% ( $p = 0.01$ ;  $\beta = 0.291$ ); Salvador, from 11.5 to 18.1% ( $p = 0.05$ ;  $\beta = 0.268$ ); São Paulo, from 4.7 to 12.1% ( $p < 0.001$ ;  $\beta = 0.458$ ); Vitória, from 10.8 to 12.3% ( $p = 0.02$ ;  $\beta = 0.243$ ); and the Federal District, from 8.7 to 17.1% ( $p = 0.01$ ;  $\beta = 0.484$ ). For the other capitals, trends were stable ( $p > 0.05$ ) (Figure 2; Supplementary Material 2).

Table 1. Time trend of the prevalence of alcohol abuse, according to sociodemographic characteristics. Vigitel. Brazilian capitals, 2006 to 2019.

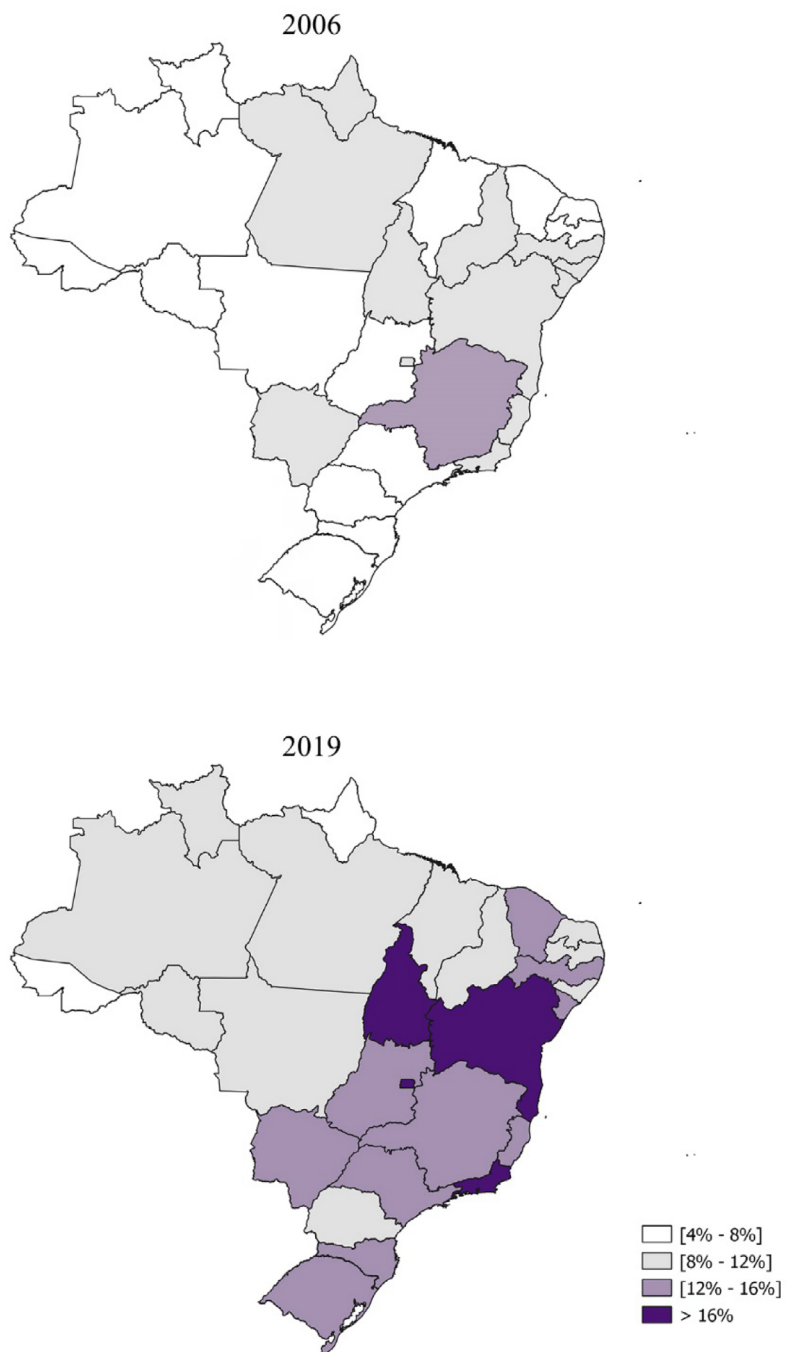
| Variables         | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | P value | $\beta$ |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------|---------|
| Total*            | 15.6 | 16.6 | 17.2 | 18.4 | 18.1 | 16.5 | 18.4 | 16.4 | 16.5 | 17.2 | 19.1 | 19.1 | 17.9 | 18.8 | 0.03    | 0.157   |
| Sex               |      |      |      |      |      |      |      |      |      |      |      |      |      |      |         |         |
| Male              | 24.8 | 25.7 | 26.1 | 28.3 | 27.0 | 25.3 | 27.9 | 24.2 | 24.8 | 25.3 | 27.3 | 27.1 | 26.0 | 25.3 | 0.96    | -0.004  |
| Female*           | 7.7  | 8.8  | 9.6  | 10.0 | 10.5 | 9.0  | 10.3 | 9.7  | 9.4  | 10.2 | 12.1 | 12.2 | 11.0 | 13.3 | < 0.001 | 0.295   |
| Schooling (years) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |         |         |
| 0 to 8            | 13.5 | 14.0 | 14.5 | 14.5 | 14.0 | 13.4 | 15   | 12.8 | 12.3 | 13.2 | 14.2 | 13.8 | 13.0 | 12.4 | 0.07    | -0.095  |
| 9 to 11           | 17.0 | 18.6 | 19.2 | 19.8 | 19.6 | 17.5 | 19.4 | 17.5 | 18.4 | 18.1 | 19.2 | 20.2 | 19.1 | 20.0 | 0.16    | 0.094   |
| $\geq 12^*$       | 17.9 | 18.9 | 19.5 | 23.7 | 22.9 | 20.0 | 22.0 | 19.7 | 19.5 | 20.9 | 24.0 | 22.8 | 21.2 | 23.1 | 0.05    | 0.244   |
| Age group (years) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |         |         |
| 18 to 24          | 18.7 | 22.7 | 21.3 | 23.3 | 22   | 20.2 | 21.8 | 19.0 | 18.2 | 20.2 | 22.1 | 23.8 | 23.0 | 25.8 | 0.16    | 0.202   |
| 25 to 34*         | 21.6 | 21.6 | 22.1 | 23.9 | 24.1 | 21.3 | 24.7 | 22.7 | 23.2 | 23.5 | 25.8 | 27.7 | 24.2 | 26.3 | < 0.001 | 0.339   |
| 35 to 44*         | 17.4 | 16.7 | 19.4 | 20   | 19.8 | 18.2 | 20.0 | 17.5 | 18.0 | 19.4 | 21.2 | 22.2 | 21.7 | 20.9 | 0.01    | 0.284   |
| 45 to 54          | 13.2 | 14.4 | 15.2 | 16.8 | 15.9 | 14.8 | 16.6 | 15   | 15.1 | 15.5 | 18.2 | 15.8 | 14.7 | 15.8 | 0.17    | 0.109   |
| 55 to 64*         | 7.0  | 9.4  | 10.2 | 10.4 | 10.7 | 10.6 | 11.9 | 10.5 | 11.0 | 11.0 | 12.6 | 10.3 | 11.0 | 11.2 | 0.01    | 0.197   |
| 65 or older       | 2.5  | 2.7  | 3.3  | 4.1  | 4.4  | 4.5  | 5.0  | 4.0  | 3.8  | 3.7  | 4.6  | 3.0  | 4.1  | 4.1  | 0.17    | 0.067   |
| Region            |      |      |      |      |      |      |      |      |      |      |      |      |      |      |         |         |
| North             | 17.2 | 17.3 | 19.7 | 18.4 | 18.3 | 15.9 | 16.6 | 14.5 | 14.8 | 15.1 | 17.0 | 16.5 | 16.7 | 16.7 | 0.09    | -0.161  |
| Northeast         | 18.4 | 19.2 | 19.9 | 20.8 | 20.8 | 19.2 | 20.5 | 18.0 | 16.7 | 17.2 | 20.1 | 19.4 | 18.7 | 19.0 | 0.37    | -0.077  |
| Center-West*      | 15.4 | 17.0 | 17.3 | 18.6 | 18.7 | 15.1 | 19.3 | 17.1 | 18.5 | 20.8 | 22.0 | 23.7 | 19.7 | 21.8 | < 0.001 | 0.468   |
| Southeast*        | 14.3 | 15.3 | 16   | 17.6 | 16.9 | 15.9 | 18.1 | 16.2 | 16.5 | 17.2 | 18.7 | 18.5 | 17.7 | 18.8 | < 0.001 | 0.256   |
| South*            | 13.3 | 14.5 | 12.8 | 15.4 | 15.3 | 14.1 | 15.2 | 13.4 | 15.4 | 14.1 | 16.3 | 17.7 | 15.7 | 16.6 | 0.01    | 0.225   |

\*significant p ( $p < 0.05$ );  $\beta$ : angular coefficient; Vigitel: Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey.



\*The colors of the map refer to the prevalence rates in the State capitals and the Federal District; Vigitel: Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey.

Figure 1. Prevalence of alcohol abuse for males according to Brazilian capitals\* and Vigitel. Brazilian capitals, 2006 and 2019.



\*The colors of the map refer to the prevalence rates in the State capitals and the Federal District; Vigitel: Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey.

Figure 2. Prevalence of alcohol abuse for females according to Brazilian capitals\*. Vigitel. Brazilian capitals, 2006 and 2019.



## DISCUSSION

The study pointed to an upward trend in alcohol abuse in the total population and among women, maintaining stable among men. It was also possible to observe growth in alcohol abuse among those with higher schooling, the ones aged between 25 and 44 years and 55 to 64 years, as well as in the Center-West, Southeast and South regions of Brazil. Among men, there was increase only in the Federal District, and reduction in nine capitals. However, among women, there was an increasing trend in 13 capitals.

Abusive alcohol consumption (binge drinking) in a short period of time may result in severe events, such as violence, traffic accidents, accidents in general, alcohol poisoning, unsafe sex, unplanned pregnancy and sexually transmitted diseases<sup>2,19</sup>.

The prevalence of binge drinking is higher among young individuals who participate in social events more often<sup>19</sup>, and in the American countries, including Brazil<sup>2</sup>. Studies have shown changes in the patterns of consumption according to age, decreasing among adolescents and adults aged up to 30 years, and increasing among those aged from 31 to 64 years<sup>20,21</sup>. These findings are similar to the ones in this study, which showed stability in the younger age groups (18 to 24 years), and increase among young adults (25 to 44 years) and the older population (55 to 64 years).

Regarding gender, the international literature shows changes in the pattern of alcohol consumption, increasing among women and stable among men<sup>10,13,21-23</sup>, which is in accordance with the results of this study. Other analyses show increase in the prevalence of high risk alcohol use and mental disorders caused by alcohol among female individuals<sup>10,13</sup>.

Studies in the United States also revealed the slow narrowing of gender differences regarding alcohol abuse and chronic consumption/alcohol dependence<sup>14,23,24</sup>. The increasing alcohol use among women can be related to increasing autonomy, larger participation in the work market and education, which enables and encourages alcohol intake<sup>25</sup>. Other hypotheses observed in the American studies were changes in the rules about alcohol consumption and fewer social sanctions; more social tolerance, especially among people with higher schooling<sup>24,26</sup>; changes in alcohol marketing, addressed to adult women<sup>27</sup>, with increasing number of products addressed to women and mothers<sup>28</sup>; and the use of social media to increase consumption among women<sup>29</sup>.

The increasing alcohol abuse brings harmful consequences for women<sup>14</sup>, such as adverse effects in pregnancy and risk for the fetus<sup>30</sup>, higher chances of breast cancer<sup>31</sup> and heart disease<sup>32</sup>. Besides, women have lower rates of treatment and use of services for alcoholism<sup>24</sup>. Therefore, the increasing alcohol consumption among women translates into worse consequences for the health of this group.

There was an increase in alcohol abuse among adults. This consumption also tends to be higher among those with higher socioeconomic status. North-American studies from the National Alcohol Survey, using the binge drinking indicator, found increased risk of alcohol consumption among women with college education or higher<sup>33</sup>. There are also the effects of economic and political crisis in the health indicators<sup>34</sup>, since the reduction of income and

unemployment can reduce the expenses with alcohol, especially in the populations that are mostly affected economically<sup>25,35,36</sup>. On the other hand, the pathological suffering and the stress caused by reduced income and unemployment may lead to more alcohol consumption<sup>35</sup>. Therefore, the increasing stress resulting from the economic and political crisis in Brazil may also have contributed with the increasing alcohol consumption among Brazilian adults.

The study showed that, in 2006, the prevalence ratio between alcohol intake among men and women was 3 and, in 2019, 2, showing convergence in tendencies. This aspect was also identified in the National Health Survey (PNS), carried out in 2013 and 2019, which pointed out to the increasing prevalence rates of this consumption in the general population, of 13.7% (95%CI 13.0 – 14.2) in 2013 to 17.1% (95%CI 16.6 – 17.5) in 2019. This increase was more present among women (39%), going from 6.6% (95%CI 6.1 – 7.1), in 2013, to 9.2% (95%CI 8.7 – 9.7) in 2019, whereas among men the increase was 20% in the period, from 21.6% (95%CI 20.7 – 22.5) to 26% (95%CI 25.2 – 26.8)<sup>37,38</sup>.

The increasing alcohol abuse was also observed in the Brazilian capitals, with tendency of approximation of prevalence rates among genders throughout the studied period. It is known that local, regional and cultural factors have an influence on the pattern of alcohol consumption and dependence<sup>39</sup>. Regional differences in alcohol abuse in the past 30 days were also observed in PNS. In 2013, the highest prevalence rates among men were in Bahia (29.4%; 95%CI 25.6 – 33.2), Rio Grande do Norte (28.7%; 95%CI 24.7 – 32.7), Piauí (28.5%; 95%CI 24.5 – 32.5) and Mato Grosso do Sul (27.7%; 95%CI 23.7 – 31.6). Among women, in Amapá (10.2%; 95%CI 6.8 – 13.5), Bahia (9.7%; 95%CI 7.2 – 12.1), Mato Grosso do Sul (9.9%; 95%CI 7.7 – 12.1) and Goiás (10.9%; 95%CI 8.6 – 13.1)<sup>37</sup>. In 2019, according to PNS, the highest prevalence rates of this consumption, in the female gender, occurred in Bahia (13%; 95%CI 11.0 – 15), Sergipe (13%; 95%CI 10.8 – 15.1) and Mato Grosso do Sul (12.2%; 95%CI 10 – 14.4)<sup>38</sup>.

Such an increase shows that Brazil has not responded properly to the global goals for the reduction of alcohol abuse<sup>15</sup>. To stop the consumption from growing, it is important to invest in public surveillance policies, risk and damage control and health promotion. Therefore, understanding the sociodemographic characteristics related to groups with higher exposure to risk factors and behaviors contributes with the elaboration of equanimous and more efficient health policies and programs<sup>40</sup>.

In order to reduce alcohol abuse, several global and national initiatives were undertaken. In May, 2010, the World Health Assembly approved the Global Strategy to Reduce the Harmful use of Alcohol<sup>1</sup>, which defines guiding principles for the development and implementation of alcohol prevention policies. Besides, it exhorts a set of political options to national implementation. The strategy recommends ten points: leadership and effort in the subject; structure of health services for counselling and treatment; involvement of the community to identify the needs and solutions; establishment of policies to monitoring and control alcoholemy; reduction in the availability of alcohol; regulation of alcohol commercialization; definition of a pricing policy; reduction of the negative consequences alcohol use and poisoning; reduction of illegal and informal alcohol impact on public health; and establishment of alcohol monitoring and surveillance.

Brazil adopted important public policies, such as Vida no Trânsito Program<sup>41</sup> and the prohibition of drinking and driving (Lei Seca — Law n. 11,705/2008; Nova Lei Seca — Law n. 12,760/2012), which already resulted in the reduction of alcohol use for drivers<sup>42</sup>. However, it is still necessary to make progress in regulating actions to increase taxes on products, to restrict access to alcohol, to forbid wide alcoholic beverages publicity, including the promotion and sponsorship, as well as the monitoring of the adopted measures<sup>43</sup>. The Brazilian legislation is flawed, and only forbids advertisements of beverages whose alcohol by volume is above 13 degrees Gay Lussac. Therefore, beer can be advertised freely. That is why it is important to advance in the improvement of law, including for beers<sup>44</sup>.

Among the study limitations, it is important to mention its cross-sectional design, with telephone interviews involving adults with a telephone landline, which may not represent the entire population. However, this issue is minimized by the use of data weighting factors. Besides, the Vigitel survey does not include all forms of alcohol consumption, such as chronic use.

The results show that there has been an increase in alcohol abuse among adult women in the Brazilian capitals, and show a convergence effect in the prevalence rates between men and women. The study highlights the increasing consumption among those aged from 25 to 44 years and 55 to 64 years, as well as individuals with high schooling. The surveillance of alcohol use and the related damage among women must be improved, in order to understand the causes that determine this phenomenon locally. Finally, the observed growth may affect the reach of national and global goals of reducing alcohol abuse.

## REFERENCES

1. World Health Organization. Strategies to reduce the harmful use of alcohol [Internet]. Geneva: World Health Organization; 2008 [accessed on nov. 9. 2020]. Available at: [http://apps.who.int/gb/ebwha/pdf\\_files/A61/A61\\_13-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/A61/A61_13-en.pdf)
2. World Health Organization. Global Status Reporter 2018. Geneva: World Health Organization; 2018.
3. World Health Organization. Global status report on alcohol and health. Geneva: World Health Organization; 2011.
4. World Health Organization. Harmful use of alcohol [Internet]. Geneva: World Health Organization; 2019 [accessed on Nov 10. 2020]. Available at: <http://www.emro.who.int/noncommunicable-diseases/causes/harmful-use-of-alcohol.html>
5. Gawryszewski VP, Monteiro MG. Mortality from diseases, conditions and injuries where alcohol is a necessary cause in the Americas, 2007–09. *Addiction* 2014; 109(4): 570-7. <https://doi.org/10.1111/add.12418>
6. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet* 2009; 373(9682): 2223-33. [https://doi.org/10.1016/S0140-6736\(09\)60746-7](https://doi.org/10.1016/S0140-6736(09)60746-7)
7. GBD 2016 Alcohol Collaborators. Alcohol use and burden for 195 countries and territories, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2018; 392(10152): 1015-35. [https://doi.org/10.1016/S0140-6736\(18\)31310-2](https://doi.org/10.1016/S0140-6736(18)31310-2)
8. Institute for Health Metrics and Evaluation. GBD Compare, Viz Hub. Institute for Health Metrics and Evaluation [Internet]. Institute for Health Metrics and Evaluation; 2019 [accessed on Jan 21. 2021]. Available at: <https://vizhub.healthdata.org/gbd-compare/>

9. Mascarenhas MDM, Malta DC, Silva MMA, Carvalho CG, Monteiro RA, Morais Neto OL. Consumo de álcool entre vítimas de acidentes e violências atendidas em serviços de emergência no Brasil, 2006 e 2007. *Ciênc Saúde Coletiva* 2009; 14(5): 1789-96. <https://doi.org/10.1590/S1413-81232009000500020>
10. Gruzca RA, Sher KJ, Kerr WC, Krauss MJ, Lui CK, McDowell YE, et al. Trends in Adult Alcohol Use and Binge Drinking in the Early 21 st Century United States: A Meta-Analysis of Six National Survey Series. *Alcohol Clin Exp Res* 2018; 42(10): 1939-50. <https://doi.org/10.1111/acer.13859>
11. Haughwout SP, LaVallee RA, Castle JJP. Apparent per capita alcohol consumption: national, state, and regional trends, 1977–2014. Arlington: National Institute on Alcohol Abuse and Alcoholism; 2016.
12. Sacco P, Unick GJ, Kuerbis A, Koru AG, Moore AA. Alcohol-Related Diagnoses in Hospital Admissions for All Causes among Middle-Aged and Older Adults: Trends and Cohort Differences from 1993 to 2010. *J Aging Health* 2015; 27(8): 1358-74. <https://doi.org/10.1177/0898264315583052>
13. Grant BF, Chou SP, Saha TD, Pickering RP, Kerridge BT, Ruan WJ, et al. Prevalence of 12-month alcohol use, high-risk drinking, and DSM-IV alcohol use disorder in the United States, 2001–2002 to 2012–2013: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *JAMA Psychiatry* 2017; 74(9): 911-23. <https://doi.org/10.1001/jamapsychiatry.2017.2161>
14. White A, Castle JJP, Chen CM, Shirley M, Roach D, Hingson R. Converging Patterns of Alcohol Use and Related Outcomes Among Females and Males in the United States, 2002 to 2012. *Alcohol Clin Exp Res* 2015; 39(9): 1712-26. <https://doi.org/10.1111/acer.12815>
15. World Health Organization. Global Action Plan for the Prevention and Control of NCDs 2013-2020 [Internet]. Geneva: World Health Organization; 2013 [accessed on Nov 10. 2020]. Available at: [http://www.who.int/nmh/events/ncd\\_action\\_plan/en/](http://www.who.int/nmh/events/ncd_action_plan/en/)
16. Organização das Nações Unidas. Objetivos de Desenvolvimento Sustentável. Agenda 2030 [Internet]. Organização das Nações Unidas; 2020 [accessed on Nov 10. 2020]. Available at: <http://www.agenda2030.org.br/ods/3/>
17. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise em Saúde e Vigilância de Doenças Não Transmissíveis. Vigitel Brasil 2019: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2019. Brasília: Ministério da Saúde; 2020.
18. Bernal RTI, Iser BPM, Malta DC, Claro RM. Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (Vigitel): mudança na metodologia de ponderação. *Rev Bras Epidemiol* 2017; 26(4): 701-12. <https://doi.org/10.5123/s1679-49742017000400003>
19. Kuntsche E, Kuntsche S, Thurl J, Gmel G. Binge drinking: Health impact, prevalence, correlates and interventions. *Psychol Health* 2017; 32(8): 976-1017. <https://doi.org/10.1080/08870446.2017.1325889>
20. White AM, Slater ME, Ng G, Hingson R, Breslow R. Trends in Alcohol-Related Emergency Department Visits in the United States: Results from the Nationwide Emergency Department Sample, 2006 to 2014. *Alcohol Clin Exp Res* 2018; 42(2): 352-9. <https://doi.org/10.1111/acer.13559>
21. Keyes KM, Jager J, Mal-Sarkar T, Patrick ME, Rutherford C, Hasin D. Is There a Recent Epidemic of Women's Drinking? A Critical Review of National Studies. *Alcohol Clin Exp Res* 2019; 43(7): 1344-59. <https://doi.org/10.1111/acer.14082>
22. Polcin DL, Korcha RA, Kerr WC, Bond J, Greenfield TK. Gender and social pressure to change drinking behavior: Results from the National Alcohol Surveys from 1984 to 2010. *Addict Res Theory* 2014; 22(6): 481-9. <https://doi.org/10.3109/16066359.2013.877455>
23. Schulenberg JE, Johnston LD, O'Malley PM, Bachman JG, Miech RA, Patrick ME. Monitoring the Future national survey results on drug use, 1975–2017 [Internet]. Ann Arbor: Institute for Social Research; 2018 [accessed on Nov 10. 2020]. v. 2. Available at: <https://files.eric.ed.gov/fulltext/ED589764.pdf>
24. Keyes KM, Miech R. Age, period, and cohort effects in heavy episodic drinking in the US from 1985 to 2009. *Drug Alcohol Depend* 2013; 132(1-2): 140-8. <https://doi.org/10.1016/j.drugalcdep.2013.01.019>
25. Munhoz TN, Santos IS, Nunes BP, Mola CL, Silva ICMD, Matijasevich A. Tendências do uso abusivo de álcool nas capitais brasileiras de 2006 a 2013: uma análise dos dados da pesquisa VIGITEL. *Cad Saúde Pública* 2017; 33(7): e00104516. <https://doi.org/10.1590/0102-311x00104516>
26. Skog OJ. The Collectivity of Drinking Cultures: A Theory of the Distribution of Alcohol Consumption. *Br J Addict* 1985; 80(1): 83-99. <https://doi.org/10.1111/j.1360-0443.1985.tb05294.x>
27. Petticrew M, Shemilt I, Lorenc T, Marteau TM, Melendez-Torres GJ, O'Mara-Eves A, et al. Alcohol advertising and public health: Systems perspectives versus narrow perspectives. *J Epidemiol Community Health* 2017; 71: 308-12. <https://doi.org/10.1136/jech-2016-207644>
28. Kindy K, Keating D. For women, heavy drinking has been normalized. That's dangerous. *Washington Post* [Internet] 2016 [accessed on Nov 10. 2020]. Available at: [https://www.washingtonpost.com/national/for-women-heavy-drinking-has-been-normalized-thats-dangerous/2016/12/23/0e701120-c381-11e6-9578-0054287507db\\_story.html](https://www.washingtonpost.com/national/for-women-heavy-drinking-has-been-normalized-thats-dangerous/2016/12/23/0e701120-c381-11e6-9578-0054287507db_story.html)

29. Lindsay JM, Supski SD. Curating identity: Drinking, young women, femininities and social media practices. In: Lyons AC, McCreanor T, Goodwin I, Moewaka Barnes H, editores. *Youth Drinking Cultures in a Digital World: Alcohol, Social Media and Cultures of Intoxication*. Abingdon Oxon: Routledge; 2017. p. 49-65.
30. Nanda S. The Essential Guide to Doing Research. 2004. *Social Change* 2005; 35(4): 167-9. <https://doi.org/10.1177/004908570503500413>
31. Bagnardi V, Rota M, Botteri E, Tramacere I, Islami F, Fedirko V, et al. Light alcohol drinking and cancer: A meta-analysis. *Ann Oncol* 2013; 24(2): 301-8. <https://doi.org/10.1093/annonc/mds337>
32. Keyes KM, Gary D, O'Malley PM, Hamilton A, Schulenberg J. Recent increases in depressive symptoms among US adolescents: trends from 1991 to 2018. *Soc Psychiatry Psychiatr Epidemiol* 2019; 54(8): 987-96. <https://doi.org/10.1007/s00127-019-01697-8>
33. Lui CK, Kerr WC, Mulia N, Ye Y. Educational differences in alcohol consumption and heavy drinking: An age-period-cohort perspective. *Drug Alcohol Depend* 2018; 186: 36-43. <https://doi.org/10.1016/j.drugalcdep.2017.12.046>
34. Paes-Sousa R, Schramm JMA, Mendes LVP. Fiscal austerity and the health sector: the cost of adjustments. *Ciênc Saúde Coletiva* 2019; 24(12): 4375-84. <https://doi.org/10.1590/1413-812320182412.23232019>
35. Frone MR. The Great Recession and employee alcohol use: a U.S. population study. *Psychol Addict Behav* 2016; 30(2): 158-67. <https://doi.org/10.1037/adb0000143>
36. Goeij MCM, Suhrcke M, Toffolutti V, van de Mheen D, Schoenmakers TM, Kunst AE. How economic crises affect alcohol consumption and alcohol-related health problems: a realist systematic review. *Soc Sci Med* 2015; 131: 131-46. <https://doi.org/10.1016/j.socscimed.2015.02.025>
37. Instituto Brasileiro de Geografia e Estatística. Coordenação de Trabalho e Rendimento. Pesquisa nacional de saúde: 2013: acesso e utilização dos serviços de saúde, acidentes e violências: Brasil, grandes regiões e unidades da federação. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2015.
38. Instituto Brasileiro de Geografia e Estatística. Coordenação de Trabalho e Rendimento. Pesquisa nacional de saúde: 2019: informações sobre domicílios, acesso e utilização dos serviços de saúde: Brasil, grandes regiões e unidades da federação. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2020.
39. Almeida-Filho N, Lessa I, Magalhães L, Araújo MJ, Aquino E, Kawachi I, et al. Alcohol drinking patterns by gender, ethnicity, and social class in Bahia, Brazil. *Rev Saúde Pública* 2004; 38(1): 45-54. <https://doi.org/10.1590/S0034-89102004000100007>
40. Ferreira LN, Sales ZN, Casotti CA, Bispo Júnior JP, Braga Júnior ACR. Perfil do consumo de bebidas alcoólicas e fatores associados em um município do Nordeste do Brasil. *Cad Saúde Pública* 2011; 27(8): 1473-86. <https://doi.org/10.1590/S0102-311X2011000800003>
41. Moraes Neto OL, Silva MMA, Lima CM, Malta DC, Silva Jr. JB. Projeto Vida no Trânsito: avaliação das ações em cinco capitais brasileiras, 2011-2012. *Epidemiol Serv Saúde* 2013; 22(3): 373-82. <https://doi.org/10.5123/S1679-49742013000300002>
42. Malta DC, Bernal RTI, Silva AG, Lima CM, Machado IE, Silva MMA. Tendência temporal da prevalência de indicadores relacionados à condução de veículos motorizados após o consumo de bebida alcoólica, entre os anos de 2007 e 2018. *Rev Bras Epidemiol* 2020; 23(Supl. 1): e200012. <https://doi.org/10.1590/1980-549720200012.supl.1>
43. World Health Organization (WHO). "Best buys" and other recommended interventions for the prevention and control of noncommunicable diseases [Internet]. Geneva: World Health Organization; 2011 [accessed on Nov 10, 2020]. Available at: <https://apps.who.int/iris/bitstream/handle/10665/259232/WHO-NMH-NVI-17.9-eng.pdf>
44. Vendrame A, Pinsky I, Faria R, Silva R. Apreciação de propagandas de cerveja por adolescentes: relações com a exposição prévia às mesmas e o consumo de álcool. *Cad Saúde Pública* 2009; 25(2): 359-65. <https://doi.org/10.1590/S0102-311X2009000200014>

Received on: 11/12/2020

Revised on: 12/03/2020

Accepted on: 12/10/2020

Preprint on: 12/15/2020

**Authors' Contribution:** The authors substantially contributed with the study conception and design; acquisition, analysis and interpretation of the work data; elaboration of preliminary versions of the article and critical review; approval of the final version to be published; agreement to be responsible for all of the aspects of the study, in order to make sure that the questions related to the accuracy or integrity of any part of the study be properly investigated and solved.

