**ORIGINAL ARTICLE /** *ARTIGO ORIGINAL*

# Prevalence and sociodemographic factors associated with heavy drinking in Brazil: cross-sectional analyses of the National Health Survey

*Prevalência e fatores sociodemográficos associados ao beber pesado no Brasil: análises transversais da Pesquisa Nacional de Saúde*

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**ABSTRACT:** *Objective:* This article aims to characterize the heavy drinking behavior in the Brazilian population, using data from the two editions of the "National Health Survey" (PNS), 2013 and 2019. *Methods:* The sample sizes in 2013 and 2019 were 60,202 and 88,943 individuals aged 18 years or older, respectively. The prevalence of the habit of heavy drinking (defined as 8 or more doses per week for women, and 15 or more doses for men) was estimated, and the confidence intervals were defined by sex, age group, schooling, skin color/race, marital status and household status (urban/rural). Poisson regression models were used to compare prevalence rates. *Results:* 6.1% of Brazilians were heavy drinkers in 2013, and 7.3% in 2019. In the two editions of the PNS there was a gradient of reduction in heavy drinking throughout life, being the highest prevalence among young adults, men, with low schooling, single and living in the urban area. *Conclusions:* The high prevalence rates expose the need to consider the habit of heavy drinking as a risk factor for the health of the Brazilian population, and the urgency to adopt strategies to reduce it.

*Keywords:* Alcohol drinking. Lifestyle. Health surveys. Brazil.

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**RESUMO:** *Objetivo:* Este estudo teve o objetivo de caracterizar o hábito de beber pesado na população brasileira, utilizando os dados das duas edições da Pesquisa Nacional de Saúde 2013 e 2019. *Métodos:* O tamanho das amostras em 2013 e 2019 foi de 60.202 e 88.943 indivíduos de 18 anos ou mais, respectivamente. Foram estimadas as prevalências do hábito de beber pesado (definido por 8 ou mais doses por semana para as mulheres e 15 ou mais doses para os homens) e os intervalos de confiança por sexo, faixa etária, grau de escolaridade, cor da pele/raça, estado civil e situação de residência (urbana/rural). Foram usados modelos de regressão de Poisson para comparar as prevalências. *Resultados:* 6,1% dos brasileiros tinham o hábito de beber pesado em 2013 e 7,3% em 2019. Nas duas edições da Pesquisa Nacional de Saúde, observou-se um gradiente de diminuição do beber pesado durante a vida, com as maiores prevalências entre os adultos jovens, entre os homens, com baixo nível de escolaridade, entre os solteiros e residentes da área urbana. *Conclusões:* As altas prevalências encontradas expõem a necessidade de considerar o hábito de beber pesado como um fator de risco à saúde da população brasileira e a urgência em adotar estratégias para a sua diminuição.

*Palavras-chave:* Consumo de bebidas alcoólicas. Estilo de vida. Inquéritos de saúde. Brasil.

# INTRODUCTION

Alcohol can be considered as a substance that promotes the integration between individuals, since its characteristics facilitate social interactions. Even though, in several cultures, the consumption of alcohol is related to celebrations and parties[1], from the collective health perspective, abusive consumption is associated with the occurrence of many diseases[2].

Harmful drinking, according to the World Health Organization (WHO), is a type of use that generates damaging consequences for the health of the individual[2]. One of the patterns of harmful drinking is heavy drinking, which is characterized by the abusive and frequent alcohol use.

Abusive alcohol use can cause several harms concerning external causes, such as traffic accidents, which represent a great portion of this problem; besides the involvement in violent actions, as the aggressor or the victim. According to studies, the alcohol use before driving vehicles and heavy drinking are major risk factors for these situations[3,4].

From the perspective of collective health, besides accidents and violence, the harmful use of alcohol has become a major problem, especially for being a risk factor for some health problems and chronic noncommunicable diseases, such as diabetes, anxiety and depression, among others[5]. According to previous studies, there is evidence of an increased risk of premature incapacities, disorders and mortality caused by cirrhosis and liver cancer related to the abusive consumption of alcohol[6,7].

A study about alcohol and cirrhosis in Brazil, based on information from the Global Burden of Disease (GBD), showed that when considering the ten first causes of "disability-adjusted life years" (DALY), among men, alcohol came in second for the age group of 15-29 years; in third for the age group of 30-44 years; and in sixth for the age group of 45-49

years. Among women, alcohol use was not present among the ten first causes of DALY, in any age group[8]. Likewise, a more recent study showed that alcohol use was the second risk factor that had most impact on DALY among men, whereas among women this risk factor was less relevant, in the 13rd position[9].

Issues related to hospital expenses also show that the cost of health care involving problems associated with alcohol use is much higher than the ability of the State to collect with the distribution and sale of the product[10].

For being considered an indispensable public health data source, population surveys have been more and more used to analyze alcohol consumption in Brazil, thus being considered as essential tools for obtaining information on the lifestyle and health status of the Brazilian population[11].

This article aims at investigating the sociodemographic characteristics of the heavy drinkers in the Brazilian population through the two editions of the National Health Survey (PNS), carried out in 2013 and in 2019. This is an original article that, for the first time, enables the comparison between the variations in the habit of heavy drinking according to population groups between the years of 2013 and 2019.

## METHODS

This is a cross-sectional study that used the data from the two editions of PNS, carried out in 2013 and in 2019, as sources of information. We selected individuals aged 18 years or more, living in permanent private households in Brazil, who consented to participated in the study by signing a Consent Form.

PNS is a national household survey carried out by the Ministry of Health, in partnership with the Brazilian Institute of Geography and Statistics (IBGE), in 2013 and 2019. PNS was approved by the National Commission of Ethics in Research (CONEP), in July, 2013, n. 328,159 for the 2013 edition, and in August, 2019, with n 3,529,376 for the 2019 edition.

PNS is part of the Integrated System of Household Surveys of IBGE and uses a subsample of the Master Sample of IBGE[12]. The surveyed population corresponds to the residents of permanent private households in Brazil. The sample was selected by three-stage clusters, and stratification of the primary sampling units (UPA). In each stage, the simple random sampling was used to selected the sampling units. In 2013, 60,202 interviews were carried out with the selected resident aged 18 years or older; and, in 2019, there were 88,943 interviews. The expansion factors correspond to the inverse of the product of the selection probabilities in each stage, and were calibrated considering the population projections for Brazil and the Federation units[13].

In this study, we used data referring to the selected resident in the household, aged 18 years or older, for purposes of comparing the habit of heavy drinking in 2013 and in 2019. To characterize the outcome of heavy drinking in the Brazilian population, we used the

heavy drinking indicator proposed by the Center for Disease Control and Prevention – CDC)[14], defined as the intake of 8 or more doses of alcohol a week for women, and 15 or more doses for men. Therefore, we considered two questions from both editions of PNS: "On how many weekdays do you usually drink alcohol?", and "In general, on the day when you drink, how many doses of alcohol do you consume? (*1 dose of alcohol is equivalent to 1 can of beer, 1 glass of wine, or 1 dose of* cachaça*, whiskey or any other distilled drink*)". The results of the two questions were multiplied, and to characterize heavy drinking, we considered results higher than or equal to 8 doses per week for women, and higher than or equal to 15 doses per week for men.

The heavy drinking indicator was analyzed according to the sociodemographic characteristics: sex (male; female), age group (18–29; 30–44; 45–59; 60 and older), schooling (no education/incomplete elementary school; complete elementary school/incomplete high school; complete high school/incomplete higher education/complete higher education or more), skin color/race (white; brown; black), marital status (single; separated/divorced; widow(er); married), geographic location of the individual's household (urban; rural). For each one of the categories of sociodemographic variables, the prevalence of the heavy drinking behavior was estimated, as well as the respective 95% confidence intervals. The Poisson regression models were calculated to compare prevalence rates. Then, we calculated the Poisson multivariate regression models, considering all of the sociodemographic variables with the heavy drinking outcome for 2013 and 2019. To compare the prevalence rates between the years of 2013 and 2019, we used Student's t-test for independent samples, with 5% significance level.

Due to the small sample size of people with the habit of heavy drinking in the older age groups, the outcome was only analyzed for two age groups – 18 to 29 years, and 30 to 44 years, according to schooling per gender, using data from both editions of PNS. For each stratification, we estimated the prevalence of the heavy drinking behavior and the respective 95% confidence intervals. We calculated the Poisson regression models to compare prevalence rates. For the comparison of prevalence rates between the years of 2013 and 2019, we used the Student's t-test for independent samples, with 5% significance level. The estimations were obtained considering the sampling design of both studies, including the expansion factors and the clustering effects[15]. The Poisson regression models to compare prevalence rates were calculated in Stata[16], version 14.0, *survey* module, considering the sampling plan effect.

## RESULTS

We analyzed 60,202 individuals interviewed in PNS 2013, and 88,943 individuals in PNS 2019. In total, in 2013, 6.1% of the Brazilians were heavy drinkers and, in 2019, the percentage was 7.3%. The heavy drinking prevalence was higher among men (8.9%; 95%CI 8.3 – 9.5%) in 2013 and in 2019 (9.7%; 95%CI 9.1 – 10.3%), than among women (3.6%; 95%CI

3.3 – 4.0%) in 2013 (5.2%; 95%CI 4.9 – 5.6%) and in 2019. Only among women the increase in the prevalence of heavy drinking was statistically significant (Table 1).

Observing the intake according to age groups, there is a gradient of reduction in heavy drinking with increasing age: in 2013, the prevalence rate decreased from 8.1%, among young adults aged 18 to 29 years, to 2.2% among the elderly (60 years or older); in 2019, the percentage rates maintained the same reduction trend, decreasing from 10.1 to 3% in the same age groups. In the comparison of both PNS editions, there is statistically significant increase in heavy drinking among individuals aged from 18 to 29 years and 30 to 44 years (Table 1).

Regarding schooling, in 2013 and 2019, the highest prevalence rates of heavy drinking were found among individuals with complete elementary school or incomplete high school. The prevalence rates that showed significant increase between 2013 and 2019 were observed both for people with complete elementary school or incomplete high school and for those who reported having complete high school, incomplete higher education, or higher education and more (Table 1).

Regarding the matter of skin color/race, the prevalence rates of heavy drinking were higher in the subgroups of black people, in comparison to white and brown, both

Table 1. Comparison of prevalence and prevalence ratios of heavy drinking according to gender, age group and schooling, in 2013 and 2019. Brazil, Health National Survey, 2013 and 2019.

| Sociodemographic characteristics | | 2013 | | | | 2019 | | | | t# |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | 95%CI | PR | n | % | 95%CI | PR | |
| Total | | 3,667 | 6.1 | 5.8 – 6.4 | - | 6,479 | 7.3 | 6.9 – 7.6 | - | < 0.001 |
| Sex | Male | 2,514 | 8.9 | 8.3 – 9.5 | 2.5* | 4,022 | 9.7 | 9.1 – 10.3 | 1.8* | 0.125 |
| | Female | 1,153 | 3.6 | 3.3 – 4.0 | - | 2,457 | 5.2 | 4.9 – 5.6 | - | < 0.001 |
| Age group (years) | 18 to 29 | 1,277 | 8.1 | 7.4 – 8.9 | 3.7* | 1,980 | 10.1 | 9.2 – 11.0 | 3.3* | < 0.001 |
| | 30 to 44 | 1,297 | 7.0 | 6.5 – 7.6 | 3.2* | 2,365 | 8.8 | 8.2 – 9.5 | 2.9* | < 0.001 |
| | 45 to 59 | 855 | 5.6 | 5.0 – 6.3 | 2.5* | 1,551 | 6.7 | 5.8 – 7.6 | 2.2* | 0.062 |
| | 60 and older | 238 | 2.2 | 1.7 – 2.8 | - | 583 | 3.0 | 2.7 – 3.4 | - | 0.011 |
| Schooling | No schooling/ incomplete elementary school | 1,374 | 5.9 | 5.3 – 6.4 | 1.0 | 1,828 | 5.9 | 5.4 – 6.5 | 0.8* | 0.889 |
| | Complete elementary school/incomplete high school | 680 | 7.3 | 6.4 – 8.3 | 1.2* | 1,201 | 9.3 | 8.4 – 1.3 | 1.2* | 0.003 |
| | Complete high school/incomplete higher education/ complete higher education or more | 1,613 | 5.9 | 5.4 – 6.4 | - | 3,450 | 7.6 | 7.2 – 8.1 | - | < 0.001 |

#t: Independent sample test (p value); *p < 0.05 estimated by the Poisson regression; PR: prevalence ratio; 95%CI: 95% confidence interval.

in 2013 and in 2019. Among the individuals who declared being white or brown, the increase in the period of 2013-2019 was statistically significant. As to marital status, the prevalence of heavy drinking was significantly higher among single individuals in the two analyzed years, and only among them the increased prevalence in heavy drinking was statistically significant between 2013 and 2019. About the rural/urban situation of the household, in the two editions of PNS, the highest prevalence rates were found among individuals living in urban areas. Additionally, there was a significant increased, from 6.4%, in 2013, to 7.7%, in 2019, in the prevalence rates of heavy drinking (Table 2).

Table 3 shows the results of the multivariate Poisson regression models, considering heavy drinking as the response variable. Both in 2013 and in 2019 there were higher prevalence rates of heavy drinking among men, aged from 30 to 44 years, being single and living in the urban area. Regarding schooling, in 2013 the highest prevalence rates included individuals without schooling or with incomplete elementary school; in 2019, it was for individuals with complete elementary school or incomplete high school, with 1.2 prevalence ratio when compared to individuals with complete high school, incomplete higher education or complete higher education and more. Regarding skin color/race, in 2013 the lowest prevalence was found for individuals who declared to be white (PR = 0.6; p < 0.001). In 2019, the prevalence ratio among white and black individuals was 0.9 (p = 0.018) (Table 3).

When analyzing the younger individuals (aged from 18 to 29 years old), men with complete elementary school or incomplete high school were those who stood out, with higher increase in prevalence rates from 2013 (9.3% 95%CI 7.1 – 12.1%) to 2019 (15% 95%CI

Table 2. Comparison of prevalence and prevalence ratios of heavy drinking according to skin color/race, marital status, and location of household in 2013 and 2019. Brazil, National Health Survey, 2013 and 2019.

| Sociodemographic characteristics | | 2013 | | | | 2019 | | | | t# |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | 95%CI | PR | n | % | 95%CI | PR | |
| Skin color/ race | White | 1,392 | 4.9 | 4.5 – 5.3 | 0.5* | 2,543 | 6.6 | 6.2 – 7.1 | 0.8* | < 0.001 |
| | Brown | 1,734 | 6.9 | 6.4 – 7.4 | 0.8* | 2,946 | 7.6 | 7.1 – 8.1 | 0.9* | 0.038 |
| | Black | 493 | 9.0 | 7.8 – 10.2 | - | 900 | 8.8 | 7.9 – 9.8 | - | 0.854 |
| Marital status | Single | 2,228 | 8.7 | 8.2 – 9.3 | 2.1* | 3,910 | 10.4 | 9.9 – 11.0 | 2.1* | 0.070 |
| | Separated/Divorced | 264 | 6.8 | 5.6 – 8.3 | 1.7* | 465 | 7.4 | 6.4 – 8.5 | 1.5* | 0.546 |
| | Widow(er) | 74 | 1.8 | 1.2 – 2.8 | 0.4* | 136 | 2.2 | 1.7 – 2.9 | 0.4* | 0.429 |
| | Married | 1,101 | 4.1 | 3.7 – 4.5 | - | 1,968 | 5.0 | 4.5 – 5.6 | - | 0.009 |
| Situation$ | Urban | 3,302 | 6.4 | 6.0 – 6.7 | 1.5* | 5,872 | 7.7 | 7.3 – 8.1 | 1.6* | < 0.001 |
| | Rural | 365 | 4.4 | 3.8 – 5.1 | - | 607 | 4.9 | 4.4 – 5.5 | - | 0.173 |

#t: Independent sample test (p value); $Situation of geographic location of the individuals' household; *p < 0.05 estimated by the Poisson regression; PR: prevalence ratio; 95%CI: 95% CI.

12 – 18.5%). Women with complete elementary school or incomplete high school also presented a growing tendency in the prevalence rates from 2013 (6.6% 95%CI 4.7 – 9.1%) to 2019 (10.4% 95%CI 7.9 – 13.7%) (Table 4).

Regarding individuals aged from 30 to 44 years, among men there was no statistically significant increase in heavy drinking for any schooling category. Among women, a significant increase was observed in the prevalence rates of heavy drinking from 2013 to 2019in all schooling categories, and the most significant prevalence ratio occurred among those with complete elementary school, incomplete higher education or complete higher education or more (Table 5).

Table 3. Estimated prvalence ratios by the multivariate Poisson regression of heavy drinking according to sex, age group, schooling, skin color/race and marital status in the years 2013 and 2019. Brazil, National Health Survey, 2013 and 2019.

| Sociodemographic characteristics | | 2013 | | | 2019 | | |
|---|---|---|---|---|---|---|---|
| | | PR | 95%CI | p* | PR | 95%CI | p* |
| Sex | Male | 2.4 | 2.1 – 2.6 | < 0.001 | 1.8 | 1.7 – 2.0 | < 0.001 |
| | Female | 1.0 | - | - | 1.0 | - | - |
| Age group (years) | 18 to 29 | 2.5 | 1.9 – 3.3 | < 0.001 | 2.1 | 1.8 – 2.5 | < 0.001 |
| | 30 to 44 | 2.6 | 2.0 – 3.3 | < 0.001 | 2.3 | 1.9 – 2.7 | < 0.001 |
| | 45 to 59 | 2.4 | 1.8 – 3.0 | < 0.001 | 1.9 | 1.6 – 2.3 | < 0.001 |
| | 60 and older | 1.0 | - | - | 1.0 | - | - |
| Schooling | No schooling/incomplete elementary school | 1.2 | 1.0 – 1.4 | 0.008 | 1.0 | 0.9 – 1.2 | 0.497 |
| | Complete elementary school/ incomplete high school | 1.1 | 1.0 – 1.3 | 0.105 | 1.2 | 1.1 – 1.4 | 0.005 |
| | Complete high school/ incomplete higher education/ complete higher education or more | 1.0 | - | - | 1.0 | - | - |
| Skin color/ race | White | 0.6 | 0.5 – 0.7 | < 0.001 | 0.9 | 0.8 – 1.0 | 0.018 |
| | Brown | 0.8 | 0.6 – 0.9 | < 0.001 | 0.9 | 0.8 – 1.0 | 0.100 |
| | Black | 1.0 | - | - | 1.0 | - | - |
| Marital status | Single | 1.8 | 1.6 – 2.0 | < 0.001 | 1.8 | 1.6 – 2.1 | < 0.001 |
| | Separated/divorced | 1.8 | 1.4 – 2.2 | < 0.001 | 1.6 | 1.3 – 2.0 | < 0.001 |
| | Widow(er) | 0.8 | 0.5 – 1.2 | 0.283 | 0.8 | 0.6 – 1.1 | 0.163 |
| | Married | 1.0 | - | - | 1.0 | - | - |
| Situation$ | Urban | 1.6 | 1.4 –1.9 | < 0.001 | 1.7 | 1.5 – 1.9 | < 0.001 |
| | Rural | 1.0 | - | - | 1.0 | - | - |

*p < 0.05 estimated by the multivariate Poisson regression considering all variables; $Situation of geographic location of the individual's household; PR: prevalence ratio; 95%CI: 95% confidence interval.

Table 4. Comparison of prevalence and prevalence ratios of heavy drinking according to schooling per gender for individuals aged from 18 to 29 years in 2013 and 2019. Brazil, National Health Survey, 2013 and 2019.

| G | S# | 2013 | | | | 2019 | | | | t$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | 95%CI | PR | n | % | 95%CI | PR | |
| M | 1 | 254 | 16.3 | 13.0 – 20.3 | 1.9* | 215 | 14.4 | 11.0 – 18.6 | 1.5* | 0.463 |
| | 2 | 183 | 9.3 | 7.1 – 12.1 | 1.1 | 352 | 15.0 | 12.0 – 18.5 | 1.6* | 0.006 |
| | 3 | 361 | 8.4 | 7.1 – 10.0 | - | 571 | 9.7 | 8.0 – 11.6 | - | 0.279 |
| | T | 798 | 10.2 | 9.1 – 11.5 | - | 1,138 | 11.7 | 10.3 – 13.2 | - | 0.135 |
| F | 1 | 96 | 8.0 | 5.5 – 11.5 | 1.5 | 94 | 9.0 | 6.7 – 11.8 | 1.1 | 0.619 |
| | 2 | 112 | 6.6 | 4.7 – 9.1 | 1.2 | 193 | 10.4 | 7.9 – 13.7 | 1.3 | 0.039 |
| | 3 | 271 | 5.4 | 4.4 – 6.6 | - | 556 | 7.9 | 6.8 – 9.2 | - | 0.003 |
| | T | 479 | 6.1 | 5.1 – 7.1 | - | 843 | 8.5 | 7.5 – 9.6 | - | 0.001 |
| T | 1 | 350 | 12.7 | 10.4 – 15.4 | 1.9* | 309 | 12.1 | 9.9 – 14.9 | 1.4* | 0.759 |
| | 2 | 295 | 8.0 | 6.6 – 9.8 | 1.2 | 545 | 13.0 | 10.9 – 15.3 | 1.5* | < 0.001 |
| | 3 | 632 | 6.8 | 6.0 – 7.7 | - | 1,127 | 8.7 | 7.7 – 9.8 | - | 0.005 |
| | T | 1,277 | 8.1 | 7.4 – 8.9 | - | 1,981 | 10.1 | 9.2 – 11.0 | - | 0.001 |

M: male; F: female; T: total; S#Schooling (1: no schooling/incomplete elementary school; 2: complete elementary school / incomplete high school; 3: complete high school/incomplete higher education/higher education or more; T=total); $t: Independent sample test (p value); *p < 0.05 estimated by the Poisson regression; PR: prevalence ratio; 95%CI: 95% confidence interval

Table 5. Comparison of prevalence and prevalence ratios of heavy drinking according to schooling per gender for individuals aged from 30 to 44 years in 2013 and 2019. Brazil, National Health Survey, 2013 and 2019.

| G | S# | 2013 | | | | 2019 | | | | t$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | 95%CI | PR | n | % | 95%CI | PR | |
| M | 1 | 361 | 12.4 | 10.5 – 14.5 | 1.5* | 410 | 12.5 | 10.7 – 14.5 | 1.2 | 0.954 |
| | 2 | 146 | 11.7 | 9.2 – 14.6 | 1.4* | 259 | 13.2 | 10.9 – 16.0 | 1.3* | 0.409 |
| | 3 | 379 | 8.5 | 7.3 – 9.9 | - | 770 | 10.4 | 9.1 – 11.8 | - | 0.058 |
| | T | 886 | 10.3 | 9.3 – 11.4 | - | 1,439 | 11.3 | 10.4 – 12.4 | - | 0.149 |
| F | 1 | 122 | 4.4 | 3.5 – 5.4 | 1.2 | 223 | 7.3 | 5.9 – 9.1 | 1.2 | 0.002 |
| | 2 | 78 | 5.6 | 3.9 – 7.8 | 1.5* | 155 | 8.6 | 6.7 – 11.1 | 1.5* | 0.042 |
| | 3 | 211 | 3.7 | 3.1 – 4.5 | - | 547 | 5.9 | 5.2 – 6.7 | - | < 0.001 |
| | T | 411 | 4.2 | 3.7 – 4.8 | - | 925 | 6.6 | 5.9 – 7.3 | - | < 0.001 |
| T | 1 | 483 | 8.5 | 7.4 – 9.7 | 1.5* | 633 | 10.0 | 8.8 – 11.3 | 1.3* | 0.081 |
| | 2 | 224 | 8.4 | 6.9 – 10.2 | 1.5* | 414 | 11.0 | 9.4 – 12.8 | 1.4* | 0.034 |
| | 3 | 590 | 5.8 | 5.2 – 6.6 | - | 1,317 | 7.9 | 7.2 – 8.7 | - | < 0.001 |
| | T | 1,297 | 7.0 | 6.5 – 7.6 | - | 2,364 | 8.8 | 8.2 – 9.5 | - | < 0.001 |

M: male; F: female; T: total; S#Schooling (1: no schooling/incomplete elementary school; 2: complete elementary school/ incomplete high school; 3: complete high school/incomplete higher education/complete higher education or more; T=total); $t: Independent test sample (p value p); *p < 0.05 estimated by the Poisson regression; PR: prevalence ratio; 95%CI: 95% confidence interval.

## DISCUSSION

In this article, it was possible to observe an increase in the heavy drinking behavior in the population in general, especially in younger age groups. PNS showed higher prevalence rates of heavy drinking among single men, with low schooling, black skin color and living in urban areas. In this study, the high prevalence rates of heavy drinking stood out among younger individuals (18 to 29; 30 to 44 years old) and those with low schooling. It is important to notice the significant increase of heavy drinking among women, especially those aged from 30 to 44 years.

Even if most studies in the Brazilian context uses the binge drinking indicator to represent episodic alcohol abuse[17], the data from PNS point out that abusive and frequent use, that is, heavy drinking, occurs at a considerable proportion, especially in specific population groups. The chronic and heavy use of alcohol is associated with several types of health issues, including premature mortality[18]. Worldwide, cirrhosis caused by the chronic alcohol use is responsible for 0.9% of the total deaths, and 47.9% of the deaths related to cirrhosis[19].

A study by Portugal et al.[8] showed that the alcohol load affects mostly younger age groups, whereas cirrhosis manifests later in life (in the age group of 45 to 59 years), indicating that the early use of alcohol is one of the most relevant predictive factors for posterior health problems[8,20,21]. According to a report by the Pan American Health Organization (PAHO/WHO) about the alcohol use in the Americas, there is sufficient evidence to understand that the damage caused by heavy drinking will increase significantly if nothing is done to eliminate the habit of heavy drinking in the younger age groups nowadays[22]. In this context, the findings in this study indicate the need to emphasize policies to reduce early alcohol use among Brazilian young adults.

The results found here showed the prevalence of the male gender in the heavy drinking behavior, corroborating patterns already found in the literature[23]. A revision study discusses that the differences in the habit of heavy drinking by gender can be motivated by cultural factors, which are related with the social role of the men and the women in society; this, in general, could justify higher consumption by the male gender[24]. However, there are indications that this pattern is changing in relation to the increased frequent and heavy use of alcohol by women[25].

In the comparison of data from PNS 2013 and 2019, the increase in the habit of heavy drinking in the Brazilian population is clear, generally, which is in agreement with a study carried out in Norway, which followed up the changes in alcohol use patterns throughout twenty years[26]. This article showed that the increase in heavy drinking was strongly influenced by changes in the heavy drinking behavior among women. It is important to draw attention to the increasing prevalence in the habit of chronic and heavy drinking among women, once the differences per gender are marked by the higher severity in functional deficit[25]. The lower amount of water in the body and the lower number of enzymes responsible for the metabolism of ethanol in the female body are physiological factors that should be considered when we analyze the increase in alcohol consumption by women and approach reduction strategies[27].

The data from PNS show that single and divorced men present higher prevalence in the habit of heavy drinking than individuals living with partners. Alcohol is a licit drug related to relaxation and sociability, and is more consumed among people who are not married, which corroborates the results of Spindola et al.[28] The frequent use that occurs in parties, bars and night clubs is a major reason for concern, especially regarding the harmful consequences to the health of these people[29,30].

The findings show clear evidence of heavy drinking among young adults with low schooling; the prevalence was 16.1%, in 2013, and 14.4%, in 2019. These results corroborate a study carried out in Ecuador, which showed that the lower the socioeconomic status of the individual, the higher the chances of becoming an abusive and frequent alcohol consumer[31]. In another study from Japan, in 2019, we observed that schooling and income were associated to patterns of alcohol use differently. Among men who lived in community households, those with low schooling had higher risks of heavy drinking[32].

Regarding the high prevalence rates of heavy drinking observed in the selection by the black race/skin color, it is necessary to argue that social exclusion permeates this group. As previously suggested, the adoption of unhealthy behaviors can be influenced by the matter of racial discrimination[33]. Another possible explanation is in the colonial heritage historically associated with black individuals in the production of sugar cane, which may contribute with the habit of heavy drinking in this population group[34].

An updated record of the Global Burden of Disease (GBD) on risk factors pointed out that the alcohol use was the factor that had the most influence on disability-adjusted life years (DALY), in 1990, and remained in the first position in 2019, in the age groups of 25 to 49 years[35]. In Brazil, alcohol use maintained the sixth position in the ranking of risk factors that contribute with the total number of DALYs, considering all age groups, with an increase of 3.6% from 2009 to 2019[36]. Another GBD report showed the need to better understand the matter of regulation and taxes on the substance, so that the disorders related to alcohol use could reduce to less damaging levels[37]. Besides, a study about comparative evaluations of risk showed that most disease had monotonic relationships with the volume of alcohol consumed, that is, the higher the amount of alcohol the higher the risk of disease or death[38].

According to the WHO, since there is no safe level for alcohol use, the ideal is to prevent its consumption in general, in order to reduce the negative effects of alcohol in the society[39]. The programs of prevention and encouragement to moderation should be mainly addressed to these specific groups, as is the case of young adults who, until the age of 25, are in the process of brain development, and especially among young women, considering several aspects that make them more vulnerable to the damages related to heavy drinking[25,40]. The exaggerated alcohol consumption is not only related to several health problems, but it also affects more than the person who consumes it. So, the general reduction of the per capita use is necessary in the population in general to prevent such a damage[41].

The results of this study show the need to consider the habit of heavy drinking as a risk factor to the health of the Brazilian population, as well as the urgency to adopt strategies to reduce it[42], reinforcing the need for improvements in the policy of labelling and limiting

the production, commercialization and distribution[43]. The increase in the habit of heavy drinking, especially in population groups of young adults and those with low schooling, indicate that it is essential to stimulate education measures to prevent the frequent and abusive alcohol consumption in youth, in order to prevent chronic dependence throughout life, which can have a direct impact on the DALY and premature death.

Among the limitations of this study, it is important to mention that despite the use of a large sample in both editions of PNS, it was not possible to analyze heavy drinking in some population clusters, formed by crossings of variables of interest, for instance, elderly individuals per schooling. Besides, the type of alcoholic drink was not specified in PNS. Due to the cross-sectional nature of this study, it is important to consider that temporality and causality may be compromised[44]. Finally, we adopted the CDC criterion to define the behavior of heavy drinking. Other alcohol use scales[45,46] that include questions on the frequency and number of consumed doses per week can be used to build the same indicator used here. However, the type of question can affect the results[47].

# REFERENCES

1. Malta DC, Bernal RTI, Mascarenhas MDM, Silva MMA, Szwarcwald CL, Morais Neto OL, et al. Consumo de bebidas alcoólicas e direção de veículos nas capitais brasileiras e no Distrito Federal, segundo dois inquéritos nacionais de saúde. Rev Bras Epidemiol 2015; 18(Supl. 2): 214-23. http://dx.doi.org/10.1590/1980-5497201500060019

2. World Health Organization. Global status report on alcohol and health 2018. Genebra: World Health Organization; 2018.

3. Mascarenhas MDM, Malta DC, Silva MMA, Gazal-Carvalho C, Monteiro RA, Morais Neto OL, et al. Consumo de álcool entre vítimas de acidentes e violências atendidas em serviços de emergência no Brasil, 2006 e 2007. Ciên Saúde Colet 2009; 14(5): 1789-96. http://dx.doi.org/10.1590/S1413-81232009000500020

4. Damacena GN, Malta DC, Boccolini CS, Souza-Júnior PRB, Almeida WS, Ribeiro LS, et al. Consumo abusivo de álcool e envolvimento em acidentes de trânsito na população brasileira, 2013. Ciên Saúde Colet 2016; 21(12): 3777-86. http://dx.doi.org/10.1590/1413-812320152112.25692015

5. Malta DC, Morais-Neto OL, Silva-Júnior JB. Apresentação do plano de ações estratégicas para o enfrentamento das doenças crônicas não transmissíveis no Brasil, 2011 a 2022. Epidemiol Serv Saúde 2011; 20(4): 425-38. http://dx.doi.org/10.5123/S1679-49742011000400002

6. Melo APS, França EB, Malta DC, Garcia LP, Mooney M, Naghavi M. Mortalidade por cirrose, câncer hepático e transtornos devidos ao uso de álcool: Carga Global de Doenças no Brasil, 1990 e 2015. Rev Bras Epidemiol 2017; 20(Supl. 1): 61-74. http://dx.doi.org/10.1590/1980-5497201700050006

7. Roerecke M, Rehm J. Alcohol use disorders and mortality: a systematic review and meta-analysis. Addiction 2013; 108(9): 1562-78. http://dx.doi.org/10.1111/add.12231

8. Portugal FB, Campos MR, Carvalho JR, Flor LS, Schramm JMA, Costa MFS, et al. Carga de doença no Brasil: um olhar sobre o álcool e a cirrose não viral. Ciên Saúde Colet 2015; 20(2): 491-501. https://doi.org/10.1590/1413-81232015202.01142014

9. Malta DC, Felisbino-Mendes MS, Machado IE, Passos VMA, Abreu DMX, Ishitani LH, et al. Fatores de risco relacionados à carga global de doença do Brasil e Unidades Federadas, 2015. Rev Bras Epidemiol 2017; 20(Supl. 1): 217-32. https://doi.org/10.1590/1980-5497201700050018

10. Andrade AG, Anthony JC, Silveira CM. Álcool e suas consequências: uma abordagem multiconceitual. Barueri: Minha; 2009.

11. Castilho E, Goldbaun M. Doenças crônicas não transmissíveis e inquéritos populacionais [editorial]. Rev Saúde Pública 2017; 51(Supl. 1): 1s. https://doi.org/10.1590/s1518-8787.201705100supl1ed

12. Souza-Jr. PRB, Freitas MPS, Antonaci GA, Szwarcwald CL, et al. Desenho da amostra da Pesquisa Nacional de Saúde 2013. Epidemiol Serv Saúde 2015; 24(2): 207-16. http://dx.doi.org/10.5123/S1679-49742015000200003

13. Instituto Brasileiro de Geografia e Estatística (IBGE). 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: IBGE; 2020.

14. Centers for Disease Control and Prevention (CDC). Fact Sheets - Preventing Excessive Alcohol Use 2019 [Internet]. Atlanta: CDC; 2020 [accessed on Jan. 4, 2021]. Available at: https://www.cdc.gov/alcohol/fact-sheets/prevention.htm

15. Lee S, Davis WW, Nguyen HA, McNeel TS, Brick JM, Flores-Cervantes I, et al. Examining trends and averages using combined cross-sectional survey data from multiple years. CHIS Methodology Paper [Internet]. 2007 [accessed on Dec. 14, 2020]. Available at: https://healthpolicy.ucla.edu/chis/faq/Documents/paper_trends_averages.pdf

16. Stata Statistical Software [computer program]. Version 14.0. College Station: StataCorp LP; 2015.

17. Souza e Souza LP, Miranda AES, Hermsdorff HHM, Silva CSO, Barbosa DA, Bressan J, et al. Consumo pesado episódico de álcool e excesso de peso em adultos brasileiros - Projeto CUME. Rev Bras Enferm 2020; 73(Supl. 1): e20190316. https://doi.org/10.1590/0034-7167-2019-0316

18. Hesselbrock MN, Hesselbrock VM, Chan G, Del Boca F, Chartier K. Subtypes of Alcohol Dependence and 36-Year Mortality. Alcohol Clin Exp Res 2020; 44(8): 1658-65. https://doi.org/10.1111/acer.14398

19. Caputo F, Testino G. Orthotopic liver transplantation for patients with end-stage alcohol-related liver disease and severe acute alcohol-related hepatitis: a concise review. Minerva Chir. 2021. https://doi.org/10.23736/S0026-4733.20.08685-X

20. Best LM, Wardell JD, Tyndale RF, McPhee MD, Le Foll B, Kish SJ, et al. Association of the Fatty Acid Amide Hydrolase C385A Polymorphism With Alcohol Use Severity and Coping Motives in Heavy-Drinking Youth. Alcohol Clin Exp Res. 2021; 45(3): 507-17. https://doi.org/10.1111/acer.14552

21. Strauch ES, Pinheiro RT, Silva RA, Horta BL. Uso de álcool por adolescentes: estudo de base populacional. Rev Saúde Publica 2009; 43(4): 647-55. http://dx.doi.org/10.1590/S0034-89102009005000044

22. OPAS. Regional status report on alcohol and health in the Americas [Internet]. OPAS; 2015 [accessed on Jan.5, 2021]. Available at: https://www.paho.org/hq/dmdocuments/2015/Alcohol-Report-Health-Americas-2015.pdf

23. Sandoval GA, Monteiro MG, De Pinho Campos K, Shield K, Marinho F. Sociodemographics, lifestyle factors and health status indicators associated with alcohol consumption and related behaviours: a Brazilian population-based analysis. Public Health 2020; 178: 49-61. https://doi.org/10.1016/j.puhe.2019.08.011

24. Erol A, Karpyak VM. Sex and gender-related differences in alcohol use and its consequences: Contemporary knowledge and future research considerations. Drug Alcohol Depend 2015; 156: 1-13. https://doi.org/10.1016/j.drugalcdep.2015.08.023

25. Fama R, Le Berre AP, Sullivan EV. Alcohol's Unique Effects on Cognition in Women: A 2020 (Re)view to Envision Future Research and Treatment. Alcohol Res 2020; 40(2): 3. https://doi.org/10.35946/arcr.v40.2.03

26. Bratberg GH, Wilsnack SC, Wilsnack R, Håvås Haugland S, Krokstad S, Sund ER, et al. Gender differences and gender convergence in alcohol use over the past three decades (1984-2008), The HUNT Study, Norway. BioMed Central 2016; 16: 723. https://doi.org/10.1186/s12889-016-3384-3

27. National Institute on Alcohol and Alcoholism (NIAAA). Alcohol Alert no. 72 – Alcohol metabolism: an update [Internet]. NIAAA; 2007 [acessado em 14 fev. 2020]. Disponível em: https://pubs.niaaa.nih.gov/publications/aa72/aa72.htm

28. Spindola T, Araújo ASB, Brochado EJ, Marinho DFS, Martins ERC, Pereira TS. Prácticas sexuales y comportamiento de jóvenes universitarios frente a la prevención de infecciones de transmisión sexual. Enferm Glob 2020; 19(58): 109-40. http://dx.doi.org/eglobal.382061

29. Sanchez ZM, Ribeiro KJ, Wagner GA. Binge Drinking Associations with Patrons' Risk Behaviors and Alcohol Effects after Leaving a Nightclub: Sex Differences in the "Balada com Ciência" Portal Survey Study in Brazil. PLoS One 2015; 10(8): e0133646. http://dx.doi.org/10.1371/journal.pone.0133646

30. Carlini C, Andreoni S, Martins SS, Benjamin M, Sanudo A, Sanchez ZM. Environmental characteristics associated with alcohol intoxication among patrons in Brazilian nightclubs. Drug Alcohol Rev 2014; 33(4): 358-66. http://dx.doi.org/10.1111/dar.12155

31. Meneses K, Cisneros MV, Braganza ME. Análisis socioeconómico del consumo excesivo de alcohol en Ecuador. Rev Cienc Salud 2019; 17(2): 293-308. https://doi.org/10.12804/revistas.urosario.edu.co/revsalud/a.7938

32. Murakami K, Hashimoto H. Associations of education and income with heavy drinking and problem drinking among men: evidence from a population-based study in Japan. BioMed Central 2019; 19: 420. https://doi.org/10.1186/s12889-019-6790-5

35. Borrell LN, Kiefe CI, Diez-Roux AV, Williams DR, Gordon-Larsen P. Racial discrimination, racial/ethnic segregation, and health behaviors in the CARDIA study. Ethn Health 2013; 18(3): 227-43. https://doi.org/10.1080/13557858.2012.713092

34. Simas LA. Álcool e escravos. Estud Afro-asiát 2003; 25(3): 607-9. http://dx.doi.org/10.1590/S0101-546X2003000300009

35. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 2020; 396(10258): 1223-49. http://dx.doi.org/10.1016/S0140-6736(20)30752-2

36. Institute for Health Metrics and Evaluation (IHME). Estimates from the Global Burden of Disease (GBD) – Brazil [Internet]. Seattle: University of Washington; 2020 [acessado em 30 abr. 2021]. Disponível em: http://www.healthdata.org/brazil

37. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet 2020; 396(10258): 1204-22. http://dx.doi.org/10.1016/S0140-6736(20)30925-9

38. Rehm J, Imtiaz S. A narrative review of alcohol consumption as a risk factor for global burden of disease. Subst Abuse Treat Prev Policy 2016; 11(1): 37. https://doi.org/10.1186/s13011-016-0081-2

39. World Health Organization. Q&A – How can I drink alcohol safely? [Internet]. World Health Organization; 2021 [accessed on April 7, 2021]. Available at: https://www.euro.who.int/en/health-topics/disease-prevention/alcohol-use/data-and-statistics/q-and-a-how-can-i-drink-alcohol-safely

40. Cipriani G, Nuti A, Carlesi C, Lucetti C, Di Fiorino M, Danti S. Categorising a problem: alcohol and dementia. Acta Neurol Belg 2021; 121(1): 1-10. http://dx.doi.org/10.1007/s13760-020-01515-y

41. Monteiro MG. Políticas públicas para a prevenção dos danos relacionados ao consumo de álcool. Epidemiol Serv Saúde 2016; 25(1): 171-4. http://dx.doi.org/10.5123/S1679-49742016000100017

42. Babor TF, Caetano R, Casswell S, Edwards G, Giesbrecht N, Graham K, et al. Alcohol: no ordinary commodity. Nova York: Oxford University Press; 2003.

43. Trangenstein PJ, Morojele NK, Lombard C, Jernigan DH, Parry CDH. Heavy drinking and contextual risk factors among adults in South Africa: findings from the International Alcohol Control study Subst Abuse Treat Prev Policy 2018; 13(1): 43. https://doi.org/10.1186/s13011-018-0182-1

44. Szklo M, Nieto FJ. Epidemiology beyond the basics. Maryland: Gaithersburg; 2000.

45. Babor TF, Higgings-Biddle JC, Sauders JB, Monteiro MG. AUDIT: teste para identificação de problemas relacionados ao uso de álcool: roteiro para uso em atenção primária. Ribeirão Preto: Programa de Ações Integradas para Prevenção e Atenção ao Uso de Álcool e Drogas na Comunidade; 2003.

46. Williams N. The CAGE questionnaire. Occup Med (Lond) 2014; 64(6): 473-4. https://doi.org/10.1093/occmed/kqu058

47. Sahker E, Arndt S. Alcohol use screening and intervention by American primary care providers. Int J Drug Policy 2017; 41: 29-33. https://doi.org/10.1016/j.drugpo.2016.11.013