Heavy episodic drinking trends in the Brazilian state capitals and Federal District, 2006-2018: an ecological time series analysis*

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Abstract

Objective: To assess heavy episodic drinking trends in the 26 Brazilian state capitals and Federal District, overall and according to sex. Methods: This was an ecological time series study of heavy episodic drinking patterns among adults, from 2006 to 2018. The data were obtained from VIGITEL Survey time series. Prais-Winsten regression was used. Results: In the period studied a stationary heavy episodic drinking trend was found in 23 out of the 27 state capitals, with the exception of Macapá, where there was a decrease in this practice, and in São Paulo, Florianópolis and the Federal District, where an increase was found. There were important differences by sex in relation to heavy episodic drinking, with a tendency to increased consumption among women in seven state capitals. Conclusion: There was no reduction in heavy episodic drinking in most capitals, showing the urgency of implementing interventions to reduce alcohol consumption among the Brazilian population.

Keywords: Binge Drinking; Alcoholic Beverages; Brazil; Risk Factors; Telephone Survey; Time Series Studies.

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Introduction

Alcohol use accounts for 2.2% and 7.1% of the global disease burden for males and females, respectively. This substance is the main risk factor for death and disability among the 15-49 year-old population. In 2016, some three million deaths worldwide were attributed to alcohol use.1

In Brazil were are still at an incipient stage in preparing an epidemiological surveillance system for alcohol that takes into account the overall consumption indicators suggested by the World Health Organization (WHO), such as liters of alcohol per capita.2 At the moment, the only indicator of harmful alcohol use monitored annually by the federal government is the pattern known as ‘heavy episodic drinking’ (HED) or binge drinking. This pattern, characterized by consumption of five measures of alcoholic beverage by males and four measures by females on a single occasion, is associated with diverse individual and social risk behaviors.3

The purpose of this article was to assess HED trends in the Brazilian state capitals and Federal District in the last 30 days, by sex, based on the VIGITEL Survey time series for the period 2006-2018.

Methods

This is an ecological time series study of heavy episodic drinking patterns among adults conducted in the 26 Brazilian state capitals and Federal District between 2006 and 2018.

The data were retrieved from the VIGITEL Survey8 reports available on the Ministry of Health website (http://www.saude.gov.br/saude-de-a-z/vigitel#resultados). With effect from 2006, the VIGITEL Survey has collected information on people resident in the 26 Brazilian state capitals and Federal District aged 18 years old or over, selected by means of probabilistic sampling conducted in two stages: random selection of landline telephones; and random selection of a resident in each household to be interviewed. The system establishes a sample size of approximately 2,000 individuals per municipality for each year data is collected. This enables the frequency of any risk factors in the adult population to be estimated with a maximum error of two percentage points, with a 95% confidence coefficient, enabling stratification by sex.

In August 2019, the mass media highlighted information that alcohol consumption had increased among Brazilians,6,7 taking as their reference the results of the Non-Communicable Disease Risk and Protective Factors Surveillance Telephone Survey (VIGITEL).8 Following the change in the post-stratification weighting calculation methodology in 2012, rake weighting was calculated for all the VIGITEL databases. This post-stratification weighting corrects possible flaws due to low residential telephone coverage in some cities.9 However, the Survey only provides representation of the cities involved and not of Brazil as a whole.

The response variable was excessive alcohol consumption, obtained by means of the following questions:

In the last 30 days, have you drunk four or more drinks of alcoholic beverage on a single occasion?

(four measures of alcoholic beverage would be four cans of beer, four glasses of wine or four measures of sugar per occasion.)
In the last 30 days, have you drunk five or more measures of alcoholic beverage on a single occasion?

(five measures of alcoholic beverage would be four cans of beer, four glasses of wine or four measures of sugar cane rum, whisky or other distilled alcoholic beverage, in this question asked only of females)

There were two answer options for both questions: yes; no. In the case of the VIGITEL Survey, ‘abusive consumption of alcohol’ is taken to be intake of five or more measures (males) or four or more measures (females) on a single occasion, at least once in the 30 days prior to the interview.

For the analysis performed in this study, we built time series based on the weighted percentage of adults reporting HED in the last month between 2006 and 2018, for the 26 state capitals and the Federal District, stratified by sex. The base-10 logarithm transformation of percentage HED was taken to be the dependent variable (log[y]) and the centralized year was taken to be the independent variable (x). The Prais-Winsten model was used for trend analysis. As such, we estimated annual percent change (APC) and respective 95% confidence intervals. Trend was considered to be present when zero did not fall within the APC 95%CI, where (i) trend was ‘rising’ when APC was positive and (ii) trend was ‘falling’ when APC was negative. When zero fell within the APC 95%CI, trend was considered to be ‘stationary’. R version 3.6.1 was used to perform all the analyses.

The VIGITEL Survey was approved by the National Research Ethics Committee (CONEP)/National Health Council, for each year the survey was conducted. In relation to 2018, the Certificate of Submission for Ethical Appraisal to CONEP was recorded under number 65610017.1.0000.0008

**Results**

There was no fall in HED in the absolute majority of the Brazilian state capitals (23/27 = 85%), and the overall trend was stationary. However, a reduction of 1.51% (95%CI 1.48%;3.25%), 1.84% (95%CI 1.27%;2.42%) and 2.62% (95%CI 0.62%;4.67%), respectively (Table 1).

When stratifying by sex, an increase in HED among males in the Federal District and Florianópolis was found. There was a reduction in HED among males in seven state capitals: Macapá, Manaus, João Pessoas, São Luís, Teresina, Belo Horizonte and Porto Alegre.

No falling HED trends were found for females in any of the state capitals, while there was a rising trend among females in seven of them: Aracaju, Cuiabá, Goiânia, Belo Horizonte, São Paulo, Curitiba and Florianópolis.

**Discussion**

The results show important differences in HED trend among the Brazilian population, according to state capital of residence and sex of the interviewees, in a sample of residents who owned landline telephones.

It stands out that there was no reduction in alcoholic beverage consumption in the majority of the state capitals. As such, Brazil has not reacted adequately in relation to the United Nations Organization proposal for the Millennium Development Goals. However, it should be highlighted that the VIGITEL Survey results do not provide a representative sample of the Brazilian population as a whole, but rather enable inferences only for adults living in the Brazilian state capitals and Federal District in households that have landline telephones.

It is consensus in the international literature that the best way of reducing social harm associated with alcohol consumption consists of implementing public policies to restrict access, such as pricing policies and reduced advertising. At the time this study was concluded, Brazil had not brought itself in line with the policies proposed by WHO in this field of environmental prevention, and generally speaking its federal policies had remained unaltered, with the exception of drink driving legislation.

As a federative republic, Brazil confers autonomy on its states to propose and put into force public policies that aim to reduce risk factors to which their populations are subject. In the case of alcohol, the states and municipalities are competent to legislate on all policies on control of access to alcoholic beverages, as long as such policies do not contradict Federal Legislation on the subject. However, it is known that the states only tend to adhere to federal laws, and these have demonstrated low effectiveness in reducing the costs arising from alcohol
Table 1 – Trend and annual percent change in prevalence of adult abusive alcohol consumption,† Brazilian state capitals and Federal District, 2006-2018

| Capitals and Federal District | Total |          | Male |          | Female |          |
|------------------------------|-------|----------|------|----------|--------|----------|
|                              | %     | APC      | %    | APC      | %      | APC      |
|                              | 95%CI |          | 95%CI|          | 95%CI  |          |
| North                        |       |         |      |          |        |          |
| Belem                         | 18.48 | -1.31 (-3.62;1.05) | 29.10 | -1.55 (-3.87;0.84) | 9.45 | -0.87 (-4.46;2.87) |
| Boa Vista                     | 17.48 | -0.44 (-3.27;2.47) | 26.15 | -1.23 (-3.77;1.38) | 8.94 | 2.39 (-2.85;7.90) |
| Macapá                        | 18.75 | -1.51 (-2.61;-0.40) | 29.67 | -2.10 (-3.23;-0.96) | 8.52 | 0.77 (-0.75;2.32) |
| Maceió                        | 15.22 | -2.56 (-5.30;0.26) | 24.75 | -3.51 (-6.06;-0.89) | 6.51 | 0.49 (-5.50;6.85) |
| Rio Branco                    | 14.51 | -0.68 (-2.72;1.39) | 21.79 | -1.13 (-2.34;0.09) | 7.81 | 0.67 (-3.93;5.50) |
| Palmas                        | 20.46 | 0.51 (-1.33;2.39) | 30.32 | 0.51 (-1.41;2.47) | 10.93 | 1.45 (-0.60;3.54) |
| Porto Velho                   | 18.25 | -0.18 (-1.47;1.13) | 26.78 | -0.49 (-1.99;1.03) | 9.44 | -0.06 (-3.34;3.34) |
| Northeast                     |       |         |      |          |        |          |
| Aracaju                       | 19.42 | 0.31 (-1.52;2.17) | 29.87 | -1.12 (-3.21;1.01) | 10.49 | 3.57 (1.41;5.77) |
| Fortaleza                      | 16.61 | -1.65 (-3.83;0.58) | 26.76 | -2.34 (-4.70;0.07) | 8.16 | -0.16 (-2.87;2.62) |
| Maceió                         | 18.04 | -0.90 (-3.11;1.37) | 28.26 | -0.87 (-3.00;1.32) | 9.61 | -0.79 (-4.51;3.07) |
| Natal                          | 17.39 | -0.63 (-2.29;1.05) | 28.57 | -1.32 (-3.49;0.90) | 8.07 | 1.33 (-0.33;2.00) |
| João Pessoa                    | 16.84 | -1.48 (-3.32;1.02) | 28.04 | -2.05 (-3.84;0.22) | 7.63 | -0.71 (-5.48;4.31) |
| Salvador                       | 23.32 | -0.04 (-1.44;1.37) | 32.31 | -0.98 (-2.08;0.13) | 15.51 | 1.03 (-1.89;4.03) |
| São Luís                       | 19.45 | -1.48 (-2.93;0.00) | 31.39 | -2.21 (-2.95;1.47) | 9.61 | 1.13 (-3.29;5.74) |
| Recife                         | 19.75 | -0.72 (-2.69;1.30) | 29.47 | -1.51 (-3.13;0.13) | 12.03 | 0.89 (-1.89;3.76) |
| Teresina                       | 20.41 | -1.09 (-2.27;0.10) | 32.59 | -2.02 (-3.24;0.77) | 10.42 | 1.23 (-0.46;2.95) |
| Midwest                       |       |         |      |          |        |          |
| Distrito Federal               | 19.76 | 2.62 (0.62;4.67) | 28.32 | 2.45 (0.19;4.76) | 12.26 | 3.09 (-0.29;6.59) |
| Cuiabá                        | 20.66 | 1.17 (-0.16;2.52) | 30.63 | -0.16 (-1.83;1.53) | 11.49 | 4.57 (3.05;6.11) |
| Campo Grande                  | 17.36 | 0.61 (-1.49;2.76) | 26.01 | 0.79 (-1.38;3.01) | 9.54 | 0.17 (-2.38;8.20) |
| Goiânia                       | 17.82 | 1.63 (-0.10;3.39) | 26.37 | 0.84 (-1.05;2.77) | 10.40 | 3.80 (1.19;6.48) |
| Southeast                     |       |         |      |          |        |          |
| Belo Horizonte                | 20.74 | 0.37 (-0.17;0.92) | 29.17 | -0.91 (-1.62;0.19) | 13.62 | 2.76 (1.36;4.18) |
| Rio de Janeiro                | 19.13 | 0.68 (-0.81;2.19) | 26.57 | 0.67 (-0.49;1.85) | 12.66 | 1.19 (-0.81;3.23) |
| São Paulo                     | 14.62 | 2.36 (1.48;3.25) | 22.27 | 1.21 (-0.14;2.58) | 7.99 | 5.43 (3.09;7.82) |
| Vitoria                       | 19.70 | 0.93 (-0.60;2.48) | 27.92 | 0.04 (-1.16;1.25) | 14.28 | 2.92 (-0.64;6.62) |
| South                         |       |         |      |          |        |          |
| Curitiba                      | 13.66 | 1.88 (-0.38;4.19) | 22.02 | 0.89 (-0.74;2.55) | 6.42 | 5.03 (0.34;9.94) |
| Florianópolis                 | 19.61 | 1.84 (1.27;2.42) | 29.50 | 1.41 (0.46;2.37) | 10.68 | 3.15 (1.39;4.93) |
| Porto Alegre                  | 15.32 | -0.37 (-1.05;0.33) | 22.22 | -1.46 (-2.56;0.33) | 9.65 | 1.28 (-0.07;2.64) |

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a) Abusive alcohol consumption: five or more measures for males and four or more measures for females on a single occasion, at least once in the last 30 days.
b) Average percentage consumption in the period analyzed.
c) APC: annual percent change.
d) 95%CI: 95% confidence interval.

Notes:
†Significant rising trend.
§Significant falling trend.

Consumption. These costs are not limited to expenditure on health, but also include lost productivity and several other forms of social harm, especially environmental and domestic violence.14

If Brazil intends to make progress with social protection against the effects resulting from abusive alcohol use and leave behind the average profile of stagnation identified in this study, then it must urgently start discussing policies on restricted access to alcohol which have been proven to be essential for reducing intake of alcoholic beverages worldwide and, consequently, reducing their impact on the global burden of the disease.15

Apart from this, a national alcohol surveillance system needs to be put in place, based on international indicators.16 Within alcohol surveillance, the measurement used for HED does not appear to be the most adequate, since it does not include frequency of consumption nor the real amount of ethanol consumed, classifying as cases both adults with a single episode of binge drinking per month, such as drinking five cans of beer...
on a single occasion, and also adults who consume this amount or more every day. HED pattern as an indicator of harmful alcohol use has low sensitivity to changes in total consumption by drinkers, and the choice of its use in Brazil will limit evaluation of the effect of future legislation aimed at restricting access to alcohol.

Finally, standing out in the analysis stratified by sex is the increase in alcohol consumption following the HED pattern, above all among females, in seven state capitals, whilst among males this increase was only found in two state capitals. The rising trend in HED among females has been the subject of debate in Brazil since 2010, following evidence found among adolescents. This finding is not uncommon and has also been described recently in relation to the United States population. According to McKetta & Keys, despite the prevalence of women practicing binge drinking being lower than that of men, women showed a greater trend of increased consumption between 2006 and 2018, coinciding with the period covered by our study. A variety of hypotheses regarding this phenomenon can be discussed. One of them relates to alcohol industry marketing focusing on the female target population, using products that are more attractive to them. Another hypothesis relates to changes in women’s social roles and excessive workload, which may lead, incorrectly, to them using alcohol as a form of self-medication to cope with anxiety and stress.

The VIGITEL Survey has some important limitations, already mentioned above, such as not being representative of regions outside of the state capitals nor of people who do not have landline telephones; as well as the fact of it not containing questions about general alcohol consumption among the population, so that it is impossible to infer whether there is an increase in the number of drinkers in Brazil or in the amount they consume.

When evaluating the general population, this study demonstrates stagnation in alcohol consumption according to the HED pattern between 2006 and 2018. Stratification by sex reveals a scenario of concern, highlighting the increase in excessive drinking episodes by women in seven of the 27 Brazilian state capitals. Alcohol policies seek to reduce consumption and, consequently, to reduce alcohol morbidity and mortality, so that both the stagnation and the increase in consumption found by the VIGITEL Survey reflect the insufficiency of these policies. We suggest that an alcohol surveillance system be implemented, including annual per capita consumption, measurements of consumption patterns (quantity and frequency, prevalence of abstainers and former-drinkers), data on alcohol-associated morbidity and mortality, as well as a system for evaluating federal and state-level public alcohol policies, consistent with the WHO Global Strategy to Reduce the Harmful Use of Alcohol, aimed at achieving a measurable and substantial reduction in harmful alcohol use in Brazil.

Authors’ contributions

Sanchez ZM was responsible for the concept of the manuscript and drafting it. Wagner GA and Monteiro MG reviewed and corrected the final version of the manuscript and contributed to the discussion on the study’s results and limitations. Martins CB and Konstantyner TCRO were responsible for analyzing and interpreting the results. Konstantyner TCRO structured the database, planned and performed the first version of the analyses. Martins CB repeated the analyses for the purposes of verification and drafted the results. All the authors critically reviewed the manuscript, approved its final version and are responsible for the contents presented.

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