







Hospitalizations for mental and behavioral disorders due to alcohol use in Brazil and regions: a temporal trend analysis, 2010-2020

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ABSTRACT

Objective: to analyze the trend in hospitalization rates for mental and behavioral disorders due to alcohol use (ICD-10: F10.0), Brazil and its five regions, 2010-2020. **Methods:** this was an ecological time-series study using data from the Hospital Information System of the Brazilian National Health System; to calculate the trend in hospitalizations, we used the Prais-Winsten generalized linear regression model and the Stata Statistical Software 14.0; a decreasing trend was considered when p-value < 0.05, and the regression coefficient was negative.

Results: in the period analyzed, there were 423,290 hospitalizations for mental and behavioral disorders due to alcohol use in the country; the data analyzed showed a decreasing trend in adult hospitalization rates for this cause in the country (p-value < 0.001; 95%CI -0.094;-0.079) and in all its regions, for both sexes (p-value < 0.001).

Conclusion: hospitalizations for mental and behavioral disorders due to alcohol use have reduced in Brazil and in its macro-regions.

Keywords: Alcohol Use Disorder; Alcoholism; Hospitalization; Time-Series Studies.

INTRODUCTION

Alcohol is the most widely consumed licit substance in the world and one of the most harmful to public health, both in terms of morbidity and mortality, being present in every social structure.¹ Globally, in people aged 20-39 years, approximately 13.5% of total deaths are attributable to alcohol.² In Brazil, in 2010, individuals aged 15 years and older consumed a total of 8.8 liters of alcohol *per capita*, decreasing to 7.8 liters in 2016.²

Brazil has developed comprehensive population-based studies on the implications of alcohol consumption in the adult population, focusing mainly on harmful drinking and associated socioeconomic factors.³ However, there is a gap in the literature about hospitalizations for mental and behavioral disorders due to alcohol use in the country as a whole and in each of its five macro-regions, given that these would be costly studies, from a methodological point of view, taking into consideration regional diversity.⁴ Disseminating knowledge on this topic can lead to the development of more effective interventions, and a better understanding of the impacts of alcohol consumption and the damage related to this practice. Studies that seek to identify trends in hospitalizations for alcohol abuse have been conducted in Brazil, although in a small number,⁵⁻⁸ taking into account their importance in terms of guiding public policies for prevention and treatment.

The objective of this study was to analyze the trend in hospitalization rates for mental and behavioral disorders due to alcohol use in Brazil and its five macro-regions, between 2010 and 2020.

METHODS

This was an ecological time-series study on hospitalization data obtained from the Hospital Information System of the Brazilian National Health System (*Sistema de Informações Hospitalares do Sistema Único de Saúde – SIH/SUS*), of the Brazilian National Health System Information Technology Department (*Departamento de Informática*

Study contributions	
Main results	There were 423,290 hospitalizations for mental and behavioral disorders due to alcohol use in Brazil between 2010 and 2020. It could be seen a decreasing trend in adult hospitalization rates in the country and in its five regions, for both sexes.
Implications for services	The results can highlight the difficulty in accessing healthcare sectors and, perhaps, not a reduction in hospitalizations. Interoperability of electronic medical records in the three spheres of management can provide longitudinal care and better data visibility.
Perspectives	It is expected that the proposed agenda will be taken into consideration by social policies, especially those aimed at preventing the use/abuse of alcohol and other drugs, so that the treatment offered ensures a significant coverage of this population.

do Sistema Único de Saúde – DATASUS), by consulting the Department's website – <https://datasus.saude.gov.br/>, on July 13, 2021.

Hospitalizations were selected for each of the four adult age groups defined by the World Health Organization (WHO)⁹ (in years: 20-29; 30-39; 40-49; 50-59), for both sexes (female; male) and according to the five macro-regions (North, Northeast, South, Southeast and Midwest). The records of diagnoses related to adult hospitalizations for mental and behavioral disorders due to alcohol use correspond to the Morbidity List of the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), precisely to category F-10 of chapter V of the Classification.

For the calculation of the crude rates, hospitalizations were divided by the total population and then multiplied by 100,000, using population data from the estimates of the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística – IBGE*). In order to reduce the probable differences among populations and adequately compare the Brazilian macro-regions, we used the direct method of standardization of hospitalization coefficients according to age strata. The standard population proposed by the WHO was used.¹⁰

Data analysis was performed using Stata Statistical Software®, 14.0. The trend was calculated from the logarithm of standardized hospitalization rates, given that the data did not follow a normal distribution; subsequently, the logarithm was removed for interpretation. We also used the Prais-Winsten generalized linear regression model, which evaluates this temporal trend¹¹ and allows us to produce a first-order autocorrelation correction.¹² This process made it possible to interpret the trend

in hospitalizations as ascending, descending or stationary.¹² The results generated indicated a decreasing trend in hospitalizations when p -value < 0.05 and the regression coefficient was negative, ascending when p -value < 0.05 and the coefficient was positive, and stationary when p -value ≥ 0.05 .

RESULTS

Between 2010 and 2020, there were 423,290 hospitalizations for mental and behavioral disorders due to alcohol use in Brazil. Table 1 shows that 89.1% of hospitalizations occurred among males, and 40-49 age group presented the highest concentration of hospitalizations for both sexes: 36.3% for females and 37.5% for males.

Table 2 shows that the country reduced its hospitalization rate by 60.4% between 2010 and 2020, with a change in the standardized coefficient from 120.51 to 47.75 per 100,000 inhabitants. The region that reduced the hospitalization rate the most was the Midwest, with 66.1%, ranging from 122.3 to 41.43 per 100,000 inhabitants. The North

Table 1 – Characteristics of individuals hospitalized for mental and behavioral disorders due to alcohol use (n = 423,290), according to sex and age, Brazil, 2010-2020

Variables	n	%
Sex		
Female	46,203	10.9
Male	377,087	89.1
Age (in years)		
Female		
20-29	5,573	12.1
30-39	12,392	26.8
40-49	16,764	36.3
50-59	11,474	24.8
Male		
20-29	31,439	8.3
30-39	96,772	25.7
40-49	141,464	37.5
50-59	107,412	28.5

Table 2 – Rate of hospitalizations for mental and behavioral disorders due to alcohol use (n = 423,290), standardized by population according to the World Health Organization, Brazil and its macro-regions, 2010-2020

Year	Rate of hospitalizations for mental and behavioral disorders (per 100,000 inhabitants)					
	Brazil	North	Northeast	South	Southeast	Midwest
2010	120.51	10.00	60.83	220.08	95.85	122.30
2011	114.35	13.31	55.53	216.50	89.45	116.72
2012	102.82	11.81	53.26	196.99	77.94	109.39
2013	89.18	7.54	46.45	189.29	63.66	86.82
2014	84.75	13.20	47.01	182.90	60.66	73.72
2015	76.43	9.82	42.53	175.27	51.34	68.37
2016	66.41	7.75	36.88	160.10	42.64	57.51
2017	62.19	7.06	34.64	154.46	37.95	57.19
2018	59.43	5.72	34.97	142.63	38.90	46.96
2019	57.63	5.01	35.66	128.45	40.74	46.38
2020	47.75	6.13	29.03	105.80	33.90	41.43

region, in turn, showed the lowest reduction, 38.7%. The lowest coefficient record in 2020 was related to the North region (6.13/100,000 inhabitants), and the highest to the South region (105.8/100,000 inhabitants).

Based on the analysis used, the hospitalization coefficients showed a downward trend, both for the country as a whole and for each of its macro-regions (Table 3).

DISCUSSION

The data analyzed revealed a downward trend in the rates of adult hospitalizations for mental and behavioral disorders due to alcohol use, in Brazil as a whole and in each of its five regions. This trend could reflect, on the one hand, (i) the movement toward the deinstitutionalization of people with mental illness, based on psychiatric reform, which provides for the progressive reduction of beds, and on the other hand, (ii) a greater social reintegration of these individuals as a result of the implementation of an out-of-hospital service network.¹³

Taking into consideration the psychiatric reform, the decrease in hospitalizations due to harmful alcohol use may also be related to the advance in the development of “therapeutic communities”, which are collective residences, and its main objective is to assist individuals with substance abuse problems.¹⁴ These institutions do not depend upon the Hospital Admission Authorization (*Autorização de Internação Hospitalar – AIH*), a document that identifies the individual and the services provided under the hospital admission procedures, in addition to providing information for the management of the SIH/SUS.¹⁵ Therefore, hospitalization in therapeutic communities is not accounted for in the official data and thus it does not represent the real epidemiological situation of this population.

It is noteworthy that results similar to those of this study were found in a quantitative, retrospective and descriptive study conducted in the state of Goiás, where a downward trend in hospitalizations for mental and behavioral disorders due to alcohol use between 2008 and 2016 was found, with the majority of hospitalizations among males and aged 30 to 59 years (81.6%),⁸ thus in line with the

Table 3 – Trend in hospitalizations for mental and behavioral disorders due to alcohol use (n = 423,290), according to sex, Brazil and its macro-regions, 2010-202

Brazil and macro-regions	p-value ^a	R ² ^b	Regression coefficient	95%CI ^c	Trend ^d
Brazil					
Female	< 0.001	0.97	-0.065	-0.078;-0.052	Decreasing
Male	< 0.001	0.99	-0.089	-0.096;-0.082	Decreasing
Total	< 0.001	0.99	-0.087	-0.094;-0.079	Decreasing
North					
Female	0.001	0.75	-0.084	-0.118;-0.049	Decreasing
Male	< 0.001	0.78	-0.084	-0.116;-0.050	Decreasing
Total	< 0.001	0.78	-0.084	-0.116;-0.050	Decreasing
Northeast					
Female	0.008	0.87	-0.060	-0.098;-0.021	Decreasing
Male	< 0.001	0.96	-0.067	-0.076;-0.058	Decreasing
Total	< 0.001	0.95	-0.066	-0.076;-0.056	Decreasing
South					
Female	< 0.001	1.00	-0.053	-0.057;-0.050	Decreasing
Male	< 0.001	1.00	-0.069	-0.089;-0.049	Decreasing
Total	< 0.001	1.00	-0.067	-0.085;-0.050	Decreasing
Southeast					
Female	< 0.001	0.94	-0.071	-0.096;-0.046	Decreasing
Male	< 0.001	0.99	-0.104	-0.129;-0.079	Decreasing
Total	< 0.001	0.99	-0.101	-0.125;-0.076	Decreasing
Midwest					
Female	< 0.001	0.85	-0.069	-0.092;-0.045	Decreasing
Male	< 0.001	0.99	-0.115	-0.126;-0.103	Decreasing
Total	< 0.001	0.98	-0.109	-0.121;-0.097	Decreasing

a) Significance of the association of coefficients using Prais-Winsten regression t-test; b) R²; coefficient of determination; c) 95%CI: 95% confidence interval; d) Decreasing trend, when the p-value < 0.05 and the regression coefficient was negative.

present research. In addition to having concluded that there was a reduction in hospitalizations in the Midwest region, the on-screen study showed a high number of hospitalizations among males, aged 20 to 59 years, in the period from 2010 to 2020: 30,838 males and 4,615 females (data not shown in table).

Regarding the state of São Paulo, an ecological study, conducted between 2009 and 2012, revealed a reduction in the proportion of hospitalizations for alcohol abuse,⁷ a fact also evidenced in this study when taking into consideration the

Southeast region as a whole, which dropped from 21,767 hospitalizations in 2010 to 9,029 in 2020 (data not shown in table). However, even though the aforementioned study highlights the reduction in hospitalizations due to this cause, hospitalizations related to ICD-10, chapter V, which comprises all the causes of mental and behavioral disorders, did not decrease.⁷ Another specific study conducted in the state of Sergipe, about the 2017-2018 biennium, also reported a fall in hospital admissions related to code F10.0 of ICD-10.⁹

On the other hand, a cross-sectional study conducted in the United States reported a 3.5% increase in hospitalizations for alcohol use disorders between 1998 and 2016.¹⁶ Similarly, a time series study conducted in Finland, in the period from 1996 to 2006, found an increase in the rate of hospitalizations attributable to alcohol-related diagnoses among men under 70 years of age, with the reduction in alcoholic beverage prices due to the lowering of alcohol taxes, a measure taken by the government of that country in 2004,¹⁷ being cited as a possible cause for this finding.

Despite the downward results, the harmful use of alcohol is a major public health problem and it is closely related to a high burden of morbidity, given that epidemiological studies have already described a complex relationship between the volume and patterns of alcohol consumption, and the occurrence of cardiovascular diseases.^{18,19} Moreover, the data presented and analyzed in this study may be evidence of the difficulty of access that people with problems related to the use of alcohol and other drugs face in the various health care sectors and, perhaps, not a real reduction in these hospitalizations.

Regarding the limitations of this research, it is noteworthy that it was not possible to establish associations at the individual level. In addition,

the data were retrieved from information systems that depend on the correct filling in of the AIH by the health professional in charge, which may even underestimate the hospitalizations if the ICD-10 code corresponding to the disease in question, is not registered. Finally, given that the SIH/SUS coverage is restricted to the population using SUS accredited health care centers, the data end up being limited because they are not universal. These limitations are in line with those described in the literature.²⁰

It can be concluded that between 2010 and 2020, there was a reduction in hospitalizations for mental and behavioral disorders due to alcohol use in Brazil and in its five macro-regions. After this study, it could be seen that the situation in which this trend is presented, needs to be taken into consideration for planning social policies, so that the treatment provided can ensure significant coverage of this population and investments are directed to the implementation of actions aimed at promoting health and preventing mental illness. Finally, further studies that take into consideration other variables are recommended, aimed at proposing new explanatory hypotheses for the downward trend observed in hospitalizations for mental and behavioral disorders due to alcohol use in Brazil.

AUTHOR CONTRIBUTIONS

Oliveira RSC, Matias JC and Assis FB collaborated with the study conception and design, analysis and interpretation of the results, preparation of preliminary versions, critical reviewing of important intellectual content and approval of the final version of the manuscript. Fernandes CAOR, Gavioli A and Marangoni SR collaborated with the study conception and design, analysis and interpretation of the results, critical reviewing of important intellectual content and approval of the final version of the manuscript. All authors have approved the final version of the manuscript and declared themselves to be responsible for all aspects of the work, including ensuring its accuracy and integrity.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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