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Alcohol use disorder in people with infectious and chronic diseases and mental disorders: Brazil, 2015

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Abstract *The study aimed to estimate the prevalence of alcohol use disorder (AUD) and associated factors in Brazilian adults that reported chronic noncommunicable diseases (NCDs), mental disorders (MDs), and infectious diseases (IDs). This was a secondary analysis of the 3rd National Survey on Drug Use by the Brazilian Population in which the principal outcome was presence of AUD. Prevalence of AUD was estimated for three subgroups: individuals that reported NCDs, MDs, and IDs. Factors associated with AUD in each group were analyzed using logistic regression models. Of the 15,645 adults interviewed, 30.5% (95%CI: 29.4-31.5) reported NCDs, 17.6% (95%CI: 16.5-18.7) MDs, and 1.6% (95%CI: 1.2-1.9) IDs. Considering comorbidities, the analytical sample was 6,612. No statistically significant difference was found in the prevalence of AUD between individuals with NCDs (7.5% [95%CI: 6.1- 8.7]), MDs (8.4% [95%CI: 6.7-10.2]), and IDs (12.4% [95%CI: 7.0-17.8]). The main factors associated with AUD in all the groups were male sex and young adult age. Considering the high prevalence of AUD in all the groups, systematic screening of AUD is necessary in health services that treat NCDs, MDs, and IDs.*

Key words *Epidemiological surveys, Alcohol use disorder, Chronic diseases, Mental disorders, Infectious diseases*

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Introduction

Harmful alcohol use is both a public health problem[1-3] and a risk factor for infectious and chronic diseases and mental disorders[3,4]. The potential consequences of alcohol use feature alcohol use disorder (AUD), which can be classified according to two distinct strategies: the International Classification of Diseases (ICD) and the Diagnostic and Statistical Manual of Mental Disorders (DSM)[5]. Briefly, ICD-11 classified AUD as harmful alcohol use and dependence[6,7]; DSM-IV[8] classified it as abuse and dependence; and DSM-V as mild, moderate, and severe AUD[9]. Despite the different nomenclatures, AUD is understood as "a pattern of compulsive heavy alcohol use and loss of control over alcohol intake (combining the definitions from Carvalho *et al.*'s paper"[10] and the official statement by the NIH [https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/understanding-alcohol-use-disorder]).

AUD is believed to result from the interaction of a series of individual and contextual risk factors. The individual risk factors frequently include male sex, low socioeconomic status[11,12], lack of religiousness/spirituality[13], impulsivity, and behavioral and mood disorders[14,15]. Among the contextual factors, according to the theory of alcohol availability[9], the greater the availability of alcoholic beverages in a given population (whether physical, social, subjective, or economic availability)[16], the greater the consumption and the higher the prevalence of negative consequences, including AUD.

In Brazil, the *3rd National Survey on Drug Use by the Brazilian Population* (III LNUD) in 2015 estimated the prevalence of AUD in the general population at 8.6% (95%CI:7.7-9.7), while prevalence of the most severe form (dependence) was 1.5% (95%CI:1.2-1.8)[17]. These prevalence rates tend to be substantially higher in clinical populations, due to both the juxtaposition of disorders and more systematic and careful detection than in the general population. For example: the prevalence of positive screening results for AUD was some 13.0% in patients seen in primary care in Rio de Janeiro[18]. Meanwhile, the prevalence rates of positive screening for alcohol dependence ranged from 2.0%[19,20] to 14%[21] according the type of service, region, and users' comorbidities. Note that these studies used different screening instruments, and none of them used validated scales for AUD diagnosis.

According to international evidence, individuals with certain clinical conditions present higher alcohol intake than others. However, we found no Brazilian study that compared frequency of AUD (using validated diagnostic criteria) among groups of individuals with specific diseases[22]. Despite the high prevalence, the resulting harms, and the availability of treatment, AUD is still rarely or ever evaluated by health teams[23]. It is important to identify the prevalence among individuals with different conditions and who are thus seen at different health services in the Unified Health System (SUS), to orient priorities for training and budget funding. The current study thus seeks to estimate the prevalence of AUD and associated factors in individuals that reported diagnosis and/or treatment of infectious and chronic diseases and mental disorders in the Brazilian population.

Methods

Study design

This cross-sectional study used data from the III LNUD[24], a population survey in 2015 that included a probabilistic sample of 16,273 individuals 12 to 65 years of age from urban and rural areas of Brazil[17,25-30], using a four-stage stratified cluster sample. All the methodological details were described in the survey's original report, available at: https://www.arca.fiocruz.br/handle/icict/34614.

Participants

The analysis only included individuals 18 years or older that presented some infectious or chronic disease or mental disorder (= 6,612). Three non-mutually exclusive subgroups were defined, considering individuals that reported:

Chronic noncommunicable diseases (diabetes, cardiac diseases, hypertension, asthma, cirrhosis, kidney disease, and/or cancer);

Infectious diseases (HIV/AIDS, hepatitis B or C, sexually transmissible infections such as chlamydia, genital herpes, syphilis, etc., and/or tuberculosis);

Mental disorders (depression, anxiety, schizophrenia, bipolar disorder, and eating disorders).

Each of the above-mentioned conditions was assessed with the following question: "Has a doctor or other healthcare professional ever told you that you have...?"[31]. The possible answers were: "No", "Yes", "I don't know", and "I prefer not to answer". The option "yes" was considered a positive

diagnosis, and all the other options were considered negative diagnosis.

The decision to create non-exclusive categories was because most of the individuals presented some comorbidity, so that exclusive categories would have generated "artificial" groups, inconsistent with spontaneous report by participants and with Brazil's public health reality.

Outcome

The principal outcome was dichotomous: presence or absence of AUD. For the purposes of this study, AUD was operationalized by adding the diagnoses of abuse and dependence as measured by the DSM-IV criteria[8]. Assessment of the diagnostic criteria used the standardized questions from the *U.S. Substance Abuse and Mental Health Services Administration* for the *National Survey on Drug Use and Health* (2014)[32], validated in the 2nd Household Survey on Psychoactive Drug Use in Brazil[33]. According to the DSM-IV, diagnosis of abusive use was defined as the presence of one or more of the four criteria for abuse, and diagnosis of dependence was defined as the presence of three or more of the seven criteria for dependence.

Independent variables

The variables included in the analysis were sex at birth (male/female), gender (heterosexual/LGBTQ+, doesn't know/prefers not to answer), age group (18 to 24, 25 to 34, 35 to 34, 35 to 44, 45 to 54, or 55 years and older), monthly income (zero to BRL 1,500.00 versus greater than BRL R$ 1,500.00), skin color (white/non-white), fixed partner (yes/no), religion (none, Catholic, Evangelical/Protestant, other), schooling (up to 8 years, 8 to 12 years, 12 years or more), self-rated health status at the time of the interview (very good or good, fair or doesn't know, bad or very bad), and self-rated consumption of alcoholic beverages (abstemious, doesn't drink, occasional drinker, light drinker, social drinker, heavy drinker/alcoholic).

Statistical analysis

All the analyses were performed for each of the three subgroups (i.e., infectious diseases, chronic diseases, and mental disorders) and considered the sample design, weighting, and calibration of the weights, in keeping with the original analytical plan, described in detail in the respective report and in an extensive series of publication[5,17,24-30,34].

Population totals were estimated with their respective standard errors (SE) for each independent variable in each of the three subgroups. Next, a bivariate analysis was performed with the independent variables according to alcohol use disorder (AUD) for the three subgroups, estimating the prevalence and respective 95% confidence intervals. To verify the associations between the independent variables and AUD, the chi-square test was calculated with Rao-Scott correction, considering significance at 5%.

All the variables were tested for collinearity before the data modeling phase, with cutoff point at 0.60, using Cramer's V test from the MASS package.

Finally, to assess factors associated with AUD, unconditional logistic regression models were performed, using the backward stepwise strategy for the elaboration of the intermediate and final models. Variables with p-value < 0.2 in the bivariate analysis were included, in addition to the variables "sex" and "age" (defined *a priori*). Age was included in the models as a continuous variable. Dummy variables were created to control the effect of each disease group, indicating their presence or absence. These variables were included according to each respective subgroup. For example, the model for the subgroup of individuals with infectious diseases included the dummy variables "chronic disease" and "mental disorder". Odds ratios and 95% confidence intervals were calculated. The analyses were performed in the R software version 3.6.1 using the Survey and Survyer libraries[35].

Ethical considerations

The current analysis was approved by the Institutional Review Board of the Brazilian National Institute of Infectious Diseases "Evandro Chagas" on February 13, 2020 (CAAE: 23232019.8.0000.5262). The original study was approved on April 1st, 2015, by the Ethics Committee for Research in Human Beings of FIOCRUZ (review no. 902.763 by CEP/EPSJV – CAAE: 35283814.4.0000.5241).

Results

The sample initially included 15,645 individuals 18 years or older, in which prevalence of self-reported infectious diseases was 1.6% (95%CI:

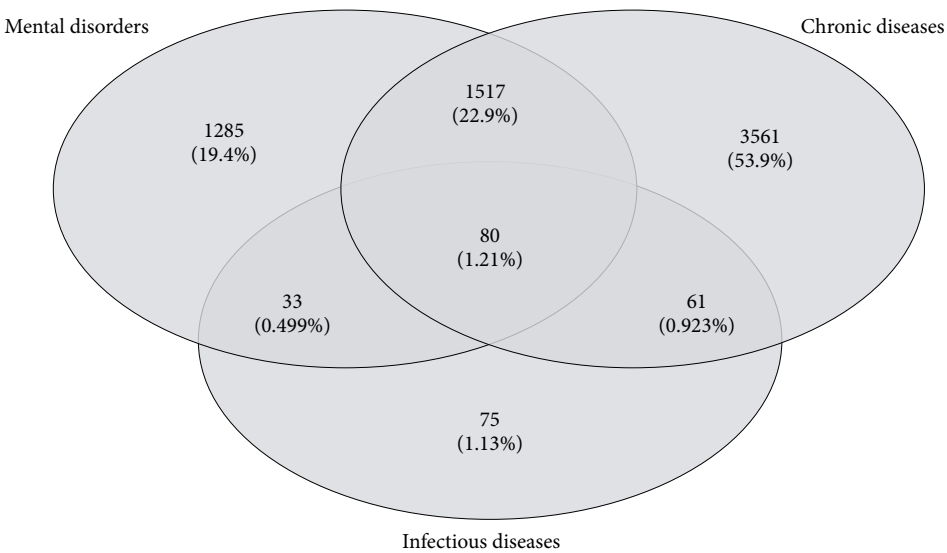
1.2-1.9), chronic diseases 30.5% (95%CI: 29.4-31.5), and mental disorders 17.6% (95%CI: 16.5-18.7). Considering the intersections between the groups (comorbidities), the sample for analysis consisted of 6,612 individuals who reported any infectious or chronic disease or mental disorder, which represent 52 million Brazilians (Graph 1 and Figure 1). Of these, an estimated two million reported some infectious disease, 40.5 million some chronic disease, and 23.5 million some mental disorder.

There was a high presence of comorbidities between subgroups. In the subgroup of individuals with infectious diseases, 59.8% also reported chronic diseases and 42.7% mental disorders. In the subgroup of individuals with chronic diseases, 3.1% reported infectious diseases and 30.1% mental disorders. In the subgroup with mental disorders, 3.8% reported infectious diseases and 52.1% chronic disorders (Table 1).

Table 1 shows the sociodemographic and health characteristics according to the subpopulations. In the subgroup of infectious diseases, 52.0% of the participants were males (95%CI: 45.0-59.0), while men were the minority in the subgroups that reported chronic diseases (42.9% [95%CI: 41.3-44.5]) and mental disorders (30.5% [95%CI: 28.3 -32.7]).

Prevalence of AUD in the subgroups was 12.4% (95%CI: 7.0-17.8) in individuals that reported infectious diseases, 8.4% (95%CI: 6.7-10.2) in individuals with mental disorders, and 7.5% (95%CI: 6.1- 8.7) in individuals with chronic diseases. Considering the overlapping confidence intervals, it is not possible to infer statistically significant differences between the subgroups.

Table 2 shows the characteristics of individuals with AUD in each subgroup and the result of the bivariate analyses. In all the subgroups, AUD was more frequent in men, in individuals 18 to 34 years of age, without fixed partners, with good/very good self-rated health, and that considered themselves heavy drinkers or alcoholics (p <



Graph 1. Intersection of subgroups of individuals 18 years or older reporting infectious diseases, chronic diseases, and mental disorders. 3rd National Survey on Drug Use by the Brazilian Population, n = 6,612, Brazil, 2015.

* The subgroup of individuals reporting infectious diseases is estimated at 2 million, chronic diseases 40 million, and mental disorders 23 million.

Source: Authors.

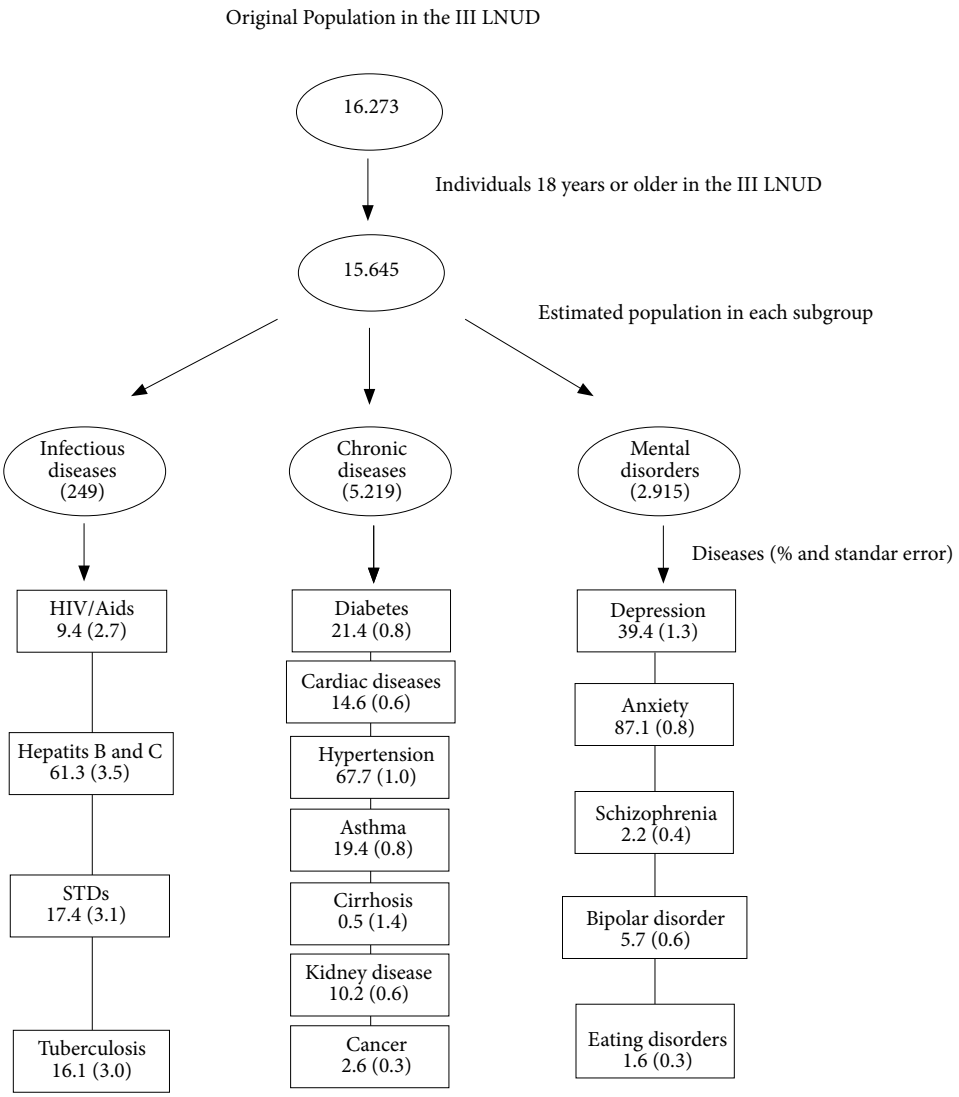


Figure 1. Flowchart of inclusion of subgroups with prevalence of diseases (% and standard error) in individuals 18 years or older that reported infectious diseases (n = 249), chronic diseases (n = 5,219), and mental disorders (n = 2,915) in a representative Brazilian sample estimated at 52 million individuals, Brazil, 2015.

STDs: sexually transmissible diseases

Source: Authors.

0.05). In the subgroups with chronic diseases and mental disorders, AUD was also more frequent among individuals without a religion.

Table 3 shows the factors associated with AUD in the three subgroups. Male sex was associated with higher odds of AUD in the three subgroups, and the odds of AUD decreased with age. In subgroups of chronic diseases and mental disorders, belonging to an Evangelical, Protestant, or other religion appeared as a protective factor against AUD.

In the subgroup of individuals that reported mental disorders, not having a partner was associated statistically with AUD. No evidence was found of a statistically significant association between presence of comorbidities and AUD.

Table 1, Socioeconomic and health characteristics of individuals 18 years and older that reported infectious and chronic diseases and mental disorders, 3rd National Survey on Drug Use by the Brazilian Population, n = 6,612, Brazil, 2015,

Variable	Category	Infectious diseases n = 249			Chronic diseases n = 5,219			Mental disorders n = 2,915		
		N x 1,000	%	SE	N x 1,000	%	SE	N x 1,000	%	SE
Sex	Male	1,090	52.0	3.6	17,354	42.9	0.8	7,144	30.5	1.1
	Female	1,007	48.0	3.6	23,090	57.1	0.8	16,250	69.5	1.1
Gender	Heterosexual	1,909	91.0	2.2	39,088	96.6	0.3	22,448	96.0	0.5
	LGBTQ+	124	6.0	2.0	301	0.7	0.2	273	1.2	0.3
	Doesn't know/Doesn't want to answer	63	3.0	1.1	1,055	2.6	0.3	673	2.9	0.4
Age group (years)	18 to 24	196	9.4	2.4	3,248	8.0	0.6	2,667	11.4	0.7
	25 to 34	449	21.4	3.4	5,013	12.4	0.5	4,533	19.4	0.8
	35 to 44	388	18.5	3.0	7,789	19.3	0.7	5,681	24.3	0.8
	45 to 54	504	24.1	3.8	11,147	27.6	0.7	5,774	24.7	0.9
	55 or more	557	26.6	3.2	13,245	32.7	0.7	4,736	20.2	0.9
Monthly income*	None/Up to BRL 1,500,00	1,156	55.1	4.2	20,602	50.9	1.2	12,055	51.5	1.5
	More than BRL 1,501,00	941	44.9	4.2	19,842	49.1	1.2	11,339	48.5	1.5
Color	White	1,055	50.3	5.3	18,620	46.0	1.2	11,865	50.7	1.5
	Nonwhite	1,042	49.7	5.3	21,824	54.0	1.2	11,529	49.3	1.5
Fixed partner	Yes	1,412	67.3	4.2	29,206	72.2	0.8	16,196	69.2	1.2
	No	685	32.7	4.2	11,238	27.8	0.8	7,198	30.8	1.2
Religion	None	197	9.4	2.3	2,558	6.3	0.4	1,401	6.0	0.5
	Catholic	1,177	56.1	3.8	25,187	62.3	1.0	14,395	61.5	1.3
	Evangelical/Protestant	589	28.1	3.1	10,848	26.8	0.9	6,415	27.4	1.2
	Other	134	6.4	1.9	1,850	4.6	0.3	1,182	5.1	0.5
Schooling	None to incomplete primary	752	35.9	3.8	17,087	42.2	1.1	8,527	36.4	1.3
	Complete primary to incomplete secondary	454	21.7	3.8	7,355	18.2	0.7	4,610	19.7	1.0
	Complete secondary or more	890	42.4	3.8	16,002	39.6	1.1	10,257	43.8	1.3
Self-rated health	Very Good/Good	1,019	48.6	3.9	18,743	46.3	1.0	10,660	45.6	1.3
	Fair/Bad/Very bad/Doesn't know	1,078	51.4	3.9	21,701	53.7	1.0	12,734	54.4	1.3
How do you view yourself in relation to t alcohol use?	Abstemious/doesn't drink/ former drinker/occasional drinker/light drinker/social drinker	1,606	96.5	1.4	27,452	98.1	0.3	16,496	97.0	0.6
	Heavy drinker or alcoholic	58	3.5	1.4	540	1.9	0.3	508	3.0	0.6
Infectious disease	Yes	-	-	-	1,253	3.1	0.5	894	3.8	0.5
	No				39,191	96.9	0.5	22,500	96.2	0.5
Chronic disease	Yes	1,253	59.8	4.6	-	-	-	12,184	52.1	1.5
	No	844	40.2	4.6				11,210	47.9	1.5
Mental disorder	Yes	894	42.6	3.6	12,184	30.1	1.0	-	-	-
	No	1,203	57.3	3.6	28,260	69.9	1.0			

Note: The population groups are not mutually exclusive. N = estimated population. SE = standard error. *Considering a typical month (in BRL). LGBTQA+ = lesbians, gays, bisexuals, transgenders.

Source: Authors.

Table 2. Characteristics of individuals 18 years or older with alcohol use disorder in the subgroups that reported infectious and chronic diseases and mental disorders. 3rd National Survey on Drug Use by the Brazilian Population, n = 463, Brazil, 2015.

Variable	Category	Infectious disease and AUD			Chronic disease and AUD			Mental disorder and AUD		
		n = 30; N = 260,632			n = 336; N = 2,999,680			n = 220; N = 1,971,900		
		%	95%CI	p value	%	95%CI	p value	%	95%CI	p value
Sex	Male	19.0	9.6-28.5	0.002	12.1	9.7-14.4	0.000	15.6	11.8-19.5	0.000
	Female	5.3	1.2-9.3		3.9	3.0- 4.8		5.3	3.7- 6.8	
Gender	Heterosexual	12.8	6.9-18.6	0.790	7.5	6.2- 8.8	0.066	8.4	6.6-10.1	0.088
	LGBTQ+	10.2	0.0-22.7		13.2	3.2-23.2		18.8	4.9-32.7	
	Doesn't know/ Doesn't want to answer	6.9	0.0-20.5		3.3	0.2- 6.5		6.3	1.1-11.5	
Age group (years)	18 to 24	23.7	3.18-44.1	0.099	11.7	6.5-16.8	0.000	11.4	6.3-16.5	0.014
	25 to 34	18.2	3.2-33.2		11.1	7.3-14.8		10.6	7.5-13.8	
	35 to 44	17.0	5.9-28.1		8.7	6.4-11.0		7.4	4.7-10.0	
	45 to 54	9.1	1.4-16.7		7.7	5.5-9.9		9.7	6.3-13.0	
	55 or older	3.6	0.0-8.8		4.0	2.9-5.2		4.4	2.3-6.6	
Monthly income	None/ Up to BRL 1,500.00	15.0	7.0-23.0	0.253	6.9	5.5- 8.4	0.325	8.3	6.2-10.4	0.879
	More than BRL 1,501.00	9.2	3.0-15.5		7.9	6.2- 9.7		8.5	6.3-10.8	
Color	White	9.7	3.0-16.4	0.307	6.7	4.9- 8.4	0.27	8.7	6.6-10.8	0.728
	Nonwhite	15.2	7.2-23.1		8.0	6.3- 9.8		8.2	5.9-10.4	
Fixed partner	Yes	8.7	3.2-14.1	0.034	6.7	5.2 - 8.2	0.037	7.3	5.5- 9.1	0.009
	No	20.2	9.6- 30.8		9.2	7.1-11.3		10.9	8.1-13.7	
Religion	None	16.1	0.6-31.6	0.177	10.6	6.7-14.6	0.000	13.6	7.0-20.2	0.000
	Catholic	16	7.7-24.4		8.8	7.1-10.6		10.3	7.8-12.7	
	Evangelical/ Protestant	5.4	0.0-11.0		3.5	2.1- 4.9		3.6	2.1- 5.2	
	Other	6.4	0.0-18.9		6.6	2.3-11.0		6.0	1.6-10.4	
Schooling	Less than 8 years	14.3	6.6-21.9	0.637	5.8	5.0- 8.1	0.112	7.8	6.1-10.1	0.852
	8-12 years	10.2	2.8-17.5		8.4	6.8-11.5		8.8	6.4-11.5	
	12 years or more	9.3	0.0-20.2		8.7	4.5-10.6		8.8	3.8-12.8	
Self-rated health	Very good/Good	18.7	9.5-27.9	0.007	8.8	7.1-10.6	0.01	10.2	7.8-12.6	0.015
	Fair/ Bad/ Very bad	6.5	2.0-11.0		6.2	4.8- 7.6		6.9	5.0- 8.9	
How do you view yourself in relation to alcohol use?	Abstemious/ doesn't drink/ former drinker/ occasional drinker/ light drinker/social drinker	14.2	7.4-20.9	0.005	9.6	7.7-11.4	0.00	9.7	7.5-12.0	0.000
	Heavy drinker or alcoholic	57.0	16.9-97.0		69.1	55.7-82.4		71.8	55.1-88.5	
Infectious disease	Yes	-	-	-	9.4	3.6-15.2	0.434	13.5	4.7-22.3	0.161
	No				7.3	6.1-8.6		8.2	6.4-10.0	
Chronic disease	Yes	9.4	3.6-15.2	0.145	-	-	-	7.4	5.6-9.4	0.939
	No	16.9	7.7-26.1					9.5	6.8-12.1	
Disease mental	Yes	13.5	4.7-22.3	0.714	7.5	5.5-9.4	0.940	-	-	-
	No	11.6	5.4-17.8		7.4	5.9-8.9				

AUD = alcohol use disorder. LGBTQA+ = lesbians, gays, bisexuals, transgenders. p-value = chi-square with Rao-Scott correction. N = sample size. N = estimated population. Proportions and 95%CI refer to N.

Source: Authors.

Table 3. Factors associated with alcohol use disorders among individuals 18 years or older who reported infectious and chronic diseases and mental disorders. 3rd National Survey on Drug Use by the Brazilian Population, n = 6,612, Brazil, 2015.

Variables	Subgroup infectious diseases	Subgroup chronic diseases	Subgroup mental disorders
	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)
Male vs. Female sex	**5.58 (1.85-16.79)**	**3.50 (2.63-4.65)**	**3.15 (2.10-4.73)**
Age (for each additional year)	**0.95 (0.91-0.98)**	**0.97 (0.96-0.98)**	**0.99 (0.97-1.00)**
No fixed partner	-	-	**1.44 (1.02-2.04)**
No religion vs. Catholic	-	0.85 (0.53-1.39)	1.02 (0.54-1.92)
Evangelical/Protestant vs. Catholic	-	**0.36 (0.23-0.57)**	**0.32 (0.19-0.53)**
Other Religion vs. Catholic	-	0.76 (0.35-1.65)	0.56 (0.24-1.30)
Infectious disease	-	1.22 (0.62-2.42)	1.80 (0.85-3.82)
Chronic disease	0.78 (0.29-2.14)	-	0.91 (0.59-1.41)
Mental disorder	2.20 (0.78-6.20)	1.32 (0.95-1.83)	-

AOR = adjusted odds ratio. 95%CI = 95% confidence interval.

Source: Authors.

Discussion

In this article, prevalence of alcohol use disorder ranged from 7.5% (95%CI: 6.1- 8.7) in individuals that reported chronic diseases to 12.4% (95%CI: 7.0-17.8) in those that reported infectious diseases, while the difference between point prevalence rates cannot be considered statistically significant. The main factors independently associated with AUD were male sex and young age. We found no evidence that the presence of comorbidities was associated with higher odds of AUD.

Prevalence of AUD in all the groups resembled that of the general population in the III LNUD (8.6%; 95%CI: 7.7-9.7), which in turn was higher than the WHO estimate (4.2%) (3). The comparison of prevalence rates with national and international studies is challenging, mainly for three methodological reasons. The first is the way AUD is measured: most of the studies use screening tools rather than diagnostic tools, which may underestimate the results. The second reason is the non-probabilistic design of most of the studies, which introduces a selection bias. Finally, when the objective is to assess the prevalence of AUD among individuals with some comorbidity, most of the studies do so in a clinical setting, where there is also a selection bias. Our findings are counter to those of Manthey *et al.*[36] and Nalwadda *et al.*[37], pertaining to Europe and Uganda, in which the AUD prevalence rates were higher in users of primary care than in the general population. In both, the data were collected in health services and in the general population, and there was no specification of the type of condition that was being treated in primary care. In general, chronic diseases are treated in primary care, and the literature in this context is vast. In Russia, for example, a country with one of the highest AUD prevalence rates in the world, AUD prevalence in primary care was estimated at 12.2% for both sexes (95%CI: 10.8-13.6%), or 6.1% in women and 19.5% in men[38].

The type of condition is determinant for planning treatment strategies, including harm reduction strategies. In the context of infectious diseases, for example, harmful alcohol use is associated with lower risk perception, thereby increasing the odds of unprotected sex and STDs[39,40]. Likewise, among individuals living with HIV/AIDS, alcohol use is associated with higher odds of poor adherence to antiretroviral therapy (ART)[20] and losses to follow-up[41]. Individuals with mental disorders show increased risk of aggressive behaviors, suicide, and higher odds of homelessness[42]. Finally, among individuals with chronic diseases, AUD can increase both the risk of hospitalizations and readmissions, as well as length of hospital stay[43], thus increasing the costs for the health system and the level of complexity for patients in the system. This is particularly relevant in Brazil, which is experiencing a period of epidemiological transition, with increasing prevalence of chronic noncommunicable diseases[44]. Our results thus highlight the importance of considering any healthcare encounter as an opportunity to screen for AUD, where the lack of screening is a missed

opportunity for counseling and treatment[45], since most individuals with AUD do not seek care for the condition until more advanced stages of the disease (when prognosis is usually worse)[46].

As for factors associated with AUD, our results corroborate the national and international literature. Male individuals have higher odds of AUD than females[10,47]. Despite biological differences between men and women that influence the absorption and effects of alcohol on their bodies, it is believed that differences in consumption patterns result mainly from cultural variations, where alcohol use is associated with gender roles (bolstering men's masculinity and maintaining the female caregiver role, since women are often in charge of moderating alcohol consumption by other family members)[48]. Unfortunately, due to the sample size, it was not possible to extend the analysis of possible differences in consumption patterns according to sexual orientation. This is a relevant question for future studies, and considering the theories on stress in minorities and self-medication, it is possible that individuals from vulnerable populations use alcohol and other substances as a way of coping with the serious adversities they suffer[49].

As in other studies[47,50], younger adults also showed higher odds of harmful alcohol consumption. Younger individuals may have greater expectations in relation to alcohol consumption (leading them to drink more frequently and increasing the risk of abusive use)[51], but there may also be a survival bias (since alcohol is a leading cause of premature death)[52], especially since we are analyzing individuals that already present some health problem.

In this study, we observed two differences between the groups in the factors associated with AUD. The lack of a fixed partner was only associated with higher odds of AUD in individuals that reported mental disorders, which may be related to greater difficulties in interpersonal relations caused by such disorders. We also found that Evangelical or Protestant religion was only associated with lower odds of AUD in individuals with chronic diseases or mental disorders, but it is possible that the sample of individuals with infectious diseases was not sufficiently robust to detect an association in this group. Although not statistically significant in the final model, it is important to note that in all the groups, most of the individuals with AUD considered themselves "heavy drinkers" or "alcoholics". This perception may be a cue for health professionals to recommend interventions for diminishing/ceasing alcohol consumption (according to the severity of the clinical condition and patients' motivation). It is thus essential for health professionals to be properly trained. This need for training is consistent with the proposal by the WHO in the SAFER initiative, consisting of a set of five strategies aimed at reducing alcohol consumption. One of the interventions is encouragement for screening, brief intervention, and treatment of substance abuse[53].

Our approach to the definition of population subgroups, which indicates the high prevalence of multiple simultaneous diagnoses, can back the importance of patient-centered health approaches rather than focusing on one specific disease[54-63]. Future studies with larger samples of individuals seen at healthcare services are necessary to assess whether there are clusters of conditions in which harmful alcohol consumption and/or AUD are more frequent.

The study has some limitations that should be addressed when interpreting the findings. The first is that the diagnoses of infectious and chronic diseases and mental disorders were self-reported. This may underestimate the real prevalence of these conditions (or, less frequently, overestimate them, especially if individuals believe, even erroneously, that they may derive some secondary benefit from an exaggerated list of conditions[64]), whether because they decline to report or lack access to health services. In addition, by dividing subgroups for analytical purposes, the events necessarily become sparse, which may not allow distinguishing between lack of association and lack of statistical power or precision [65] to assess certain strata. Third, the study design does not allow making causal inferences (which, at any rate, is not the purpose of population-based studies). Finally, the data were collected in 2015, before the COVID-19 pandemic, and it is essential to consider the possible effect of the health crisis on alcohol consumption patterns in populations, especially clinical populations.

Despite these limitations, specifically the high prevalence of self-reported comorbidities, which include AUD, in a representative sample of the Brazilian population, the results are relevant and unprecedented and can serve to back health services planning.

Collaborations

All authors contributed significantly to the manuscript.

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