

**Alcohol consumption in late-life – The first Brazilian National Alcohol Survey  
(BNAS)**

**Castro-Costa E<sup>1,2\*</sup>, Ferri CP<sup>2</sup>, Lima-Costa MF<sup>1</sup>, Zaleski M<sup>3</sup>, Pinsky I<sup>4</sup>, Caetano R<sup>5</sup>, Laranjeira R<sup>4</sup>**

1. Laboratório de Epidemiologia e Antropologia Médica, Instituto René Rachou da Fundação Oswaldo Cruz, Belo Horizonte, Minas Gerais, Brazil

2. King's College London, Institute of Psychiatry, Health Service and Population Research, Section of Epidemiology, UK.

3. Núcleo de Psiquiatria, Universidade Federal de Santa Catarina (UFSC), Florianópolis (SC), Brazil

4. Unidade de Pesquisa em Álcool e outras Drogas (UNIAD), Departamento de Psiquiatria, Universidade Federal de São Paulo, São Paulo, Brazil

5. University of Texas School of Public Health, Dallas Regional Campus, USA

**\* Correspondent author**

**Érico de Castro e Costa**

Laboratório de Epidemiologia e Antropologia Médica  
Instituto René Rachou da Fundação Oswaldo Cruz  
Av. Augusto de Lima, 1715. Belo Horizonte, Minas Gerais, CEP: 30190-002.  
E-mail: castro-costa@cpqrr.fiocruz.br

**Abstract:**

To investigate the alcohol consumption in later life in Brazil and its association with sociodemographic characteristics. This study was a cross-sectional analysis of nationally representative survey data. A multistage cluster sampling procedure was used to select 3,007 individuals of 14 years of age and older from the Brazilian household population. In this study we analyzed data from all 400 participants who were over 60 years old. Alcohol Abuse and Dependence Syndrome was established according to DSM-IV and Risky Drinking was defined in two ways: heavy drinkers (> 7 drinks/week) and as binge drinkers (> 3 drinks/week). Twelve percent of participants reported heavy drinking behavior while 10.4% and 2.9% were binge drinkers and alcohol dependent respectively. In the adjusted logistic regression only gender was associated with heavy drinking behavior. Males, the youngest and the wealthiest were more likely to report binge-drinking behaviors. In conclusion, alcohol related-problems are common but underrecognized among older adults. Health professionals should be aware that common definitions of alcohol abuse and dependence may not apply as readily to older people, who have had biological changes for alcohol tolerance and its effects on the Central Nervous System.

Key words: alcohol consumption, elderly, prevalence

## **Introduction**

The prevalence of alcohol abuse and dependence diagnoses peaks in early adulthood and decreases with age (Grant BF 2004). The prevalence of a heavy episodic (binge) drinking follows a similar pattern increasing in young adulthood, and decreasing with older age (Greenfield TK & Rogers JD 1999). Those patterns of alcohol consumption among the elderly tend to be less clinically expressed, with less public order offences, road traffic accidents and work related consequences (O'Connell H 2003). Nevertheless, there is growing evidence that alcohol use disorders are a significant public health problem for the elderly (O'Connell H 2003). They contribute to elevated mortality, morbidity and related health care costs (Moos RH 2004).

Recognition of alcohol abuse or dependence in the elderly provides a special challenge (Mersy DJ 2003). As the body ages, tolerance to alcohol decreases and its effect on the central nervous system increases. Therefore, recommended safe levels of alcohol intake for adults may be inappropriately used for the elderly (Johnson I 2000). Very few national representative samples have been conducted to study in detail patterns of alcohol consumption worldwide, particularly in developing countries (Medina-Mora ME 1998; Administration 2005; Hasin DS 2007). This study describes, for the first time, the pattern of alcohol consumption among elderly Brazilians using data from the first Brazilian National Alcohol Survey (BNAS).

## **Methods and Analysis**

### *Studied Population*

Brazil is the largest country in Latin America with a population of 169 million

([www.ibge.gov.br/censo/divulgacao.shtml](http://www.ibge.gov.br/censo/divulgacao.shtml)). It has experienced rapid urbanization with about 75.5% of the population currently living in cities. The average life expectancy is 71.3 years (75.2 for women and 67.6 for men). Those aged 60 years and over represents 8.6% of the total Brazilian population. They attended school in average for 2.7 years and receive in average 1.7 minimum wage per month.

### *Sample and Data Collection*

The BNAS was conducted by the Federal University of Sao Paulo's - Unidade de Estudos de Alcool e Outras Drogas (UNIAD), between November 2005 and April 2006. A multistage cluster sampling procedure was used to select 3,007 individuals of 14 years of age and older from the Brazilian household population. The sampling involved 3 stages: Stage 1: selection of 143 counties using probability proportional to size methods (PPS). Stage 2: selection of 02 census sectors for each county, with the exception of the 14 biggest selected counties, totaling 325 census sectors, also using PPS. Stage 3: within each census sector 08 households were selected by simple random sampling, followed by the selection of a household member to be interviewed using the "the closest future birthday" technique. One-hour face to face interviews were conducted in the respondents home by trained interviewers using a standardized closed questionnaire. A total of 3007 interviews were carried out. The survey response rate was 66.4%. In this study we analyzed data from all 400 participants who were over 60 years old. The Ethics Committee of the UNIFESP approved the project. All respondents granted their informed consent.

### *Measures*

Alcohol Abuse and Dependence Syndrome was established according to DSM-IV using the alcohol section of the Brazilian version of Composite International Diagnostic Interview (CIDI version 2.1)(World Health Organization-Alcohol 1987; Quintana MI 2004). Risky Drinking:

participants were classified according to their pattern of drinking as **heavy drinkers** (> 7 drinks/week) and as **binge drinkers** (> 3 drinks/week). These drinking patterns are considered Risky Drinking according to the Clinical Guideline for alcohol use disorders in older adults by the American Geriatrics Society (The American Geriatrics Society 2003) and by National Institute on Alcohol Abuse and Alcoholism (National Institute on Alcohol Abuse and Alcoholism 1998). Detailed information on patterns of alcohol drinking and type of beverages was also obtained. Socio-demographic characteristics: information on gender, age, education level, monthly personal income and living in cities (Carlini EA 2007). Depression was assessed using the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff LS 1977), which is a freely available and widely used 20-item self-report scale with Portuguese validation. The defined cut off point was 16 (Zich JM 1990; Fleck MPA 2002).

### *Statistical analysis*

Statistical analyses were conducted using STATA (version 9.2, College Station, TX, USA). Given the multi-stage stratified sampling design, all analyses were weighted to take account of differing selection probabilities at each stage. All estimates of prevalence and association were made using the appropriate STATA survey commands to generate robust standard errors. Unadjusted and adjusted odds ratios (OR) with 95% confidence intervals (CI) were calculated for the associations between the socio demographics and depression with risky drinking and alcohol dependence.

## **Results**

### **Sample characteristics and drinking**

The mean age of participants was 67.9 yrs (CI 95%: 67.2-68.7) most were women (55.8%), and married (59%). The mean age of drinking onset was 29.2 yrs (CI 95%: 24.2-34.0). Regarding patterns of alcohol consumption, 12% were heavy drinkers, 10.4% binge drinkers and 2.9% had

an alcohol dependence diagnosis. Beer and spirits were more frequently consumed than wine (table 1).

**Please insert, Table 1**

In the univariate analysis (not displayed), both heavy and binge drinking were more frequent among males. Binge drinking was more common among the young age groups (OR: 0.28; CI 95%: 0.11-0.68), those with higher educational level (OR: 3.00, CI 95%: 1.25-7.17) and with higher income (OR: 13,66, CI 95%: 4.23-44.10). Heavy drinking was also more common among single (OR: 0.13, CI 95%: 0.02-0.63). Participants with alcohol dependence were all men aged between 60 and 69 years and wealthier (OR= 9.98; CI 95% 1.35-73.57 comparing those earning 3 or more minimum wages against those with less than one).

Results from the adjusted logistic regression models showed that only gender was associated to heavy drinking behavior (Table 2) Gender, age and income were independently associated to binge drinking. Males, the youngest and the wealthiest were more likely to report binge-drinking behaviors. Interestingly, depression was not independently associated to any risk drinking behaviors. Regarding alcohol dependence, there is an association with income equal or higher than 3.00 minimum wages (OR: 33.11; CI 95%: 1.26-86.45) and depression (OR: 6.97; CI 95%: 1.09-44.47)

**Please insert table 2, here**

**Discussion**

This study shows that there is a high prevalence of alcohol dependence among Brazilians 60 years of age or older, and a substantial proportion of those in this age group engage in patterns of alcohol consumption that exceed suggested guidelines (The American Geriatrics Society

november 2003). Binge drinkers were more common among those aged 60 to 69 compared to those aged 70 and over and also among those with a better income. Interestingly, depression was associated with alcohol dependence but not associated with those engaged in risky drinking.

Prevalence of alcohol dependence in this study was higher than that found in recent epidemiological surveys in other countries, using either the ICD-10 or DSM-IV. These studies reported similar prevalence figures for countries as different as Ethiopia (Kebede D 1999), United States (Hasin DS 2007) and Finland (Pirkola SP 2006), 1.4%, 1.5% and 2.1% respectively.

About binge drinking, the prevalence was 3.1% in the US (Naimi TS 2003) and 15.4% and 5.7% in a Brazilian study comparing urban and rural areas (Prais HAC 2008). Our study supports Prais' findings(Prais HAC 2008) compared to the findings of the US survey (Naimi TS 2003). However, there are important differences between our study and the two others (Naimi TS 2003; Prais HAC 2008). Naimi and Prais defined binge drinking as the consumption of more than 5 drinks on one occasion rather than more than 3 drinks on one occasion suggested by the American Geriatrics Society (The American Geriatrics Society 2003) and by the National Institute on Alcohol Abuse and Alcoholism (National Institute on Alcohol Abuse and Alcoholism 1998) and applied in our study. However, comparing to a recent study of the American Medicare Current Beneficiary Survey (MCBS)(Merrick EL 2008), which used the same definition of binge drinking (more than 3 drinks on one occasion), the prevalence was lower(2.2%) than reported in this study.

Regarding associations with any alcohol behaviors, previous studies have strongly demonstrated that male gender is associated with heavy drinking(Guerrini I 2006) and binge

drinking(Naimi TS 2003) in the elderly. On the other hand, age is inversely correlated with binge drinking. The present study supports this trend. Association with other socio-economic indicators and binge drinking seems to be inconsistent among the elderly(Dawson DA 1995; Ruchlin HS 1997; Moore AA 1999). Ruchlin et al. (1997) and (Ruchlin HS 1997) observed that living in a large metropolis and having high level of schooling were positively associated with binge drinking among the elderly in the US. Although, depression can be a result of drinking in elderly people(Benshoff J 2003), findings about correlation with risky drinking behaviour are varied(Kirchner JE 2007; Merrick EL 2008).

Alcohol related-problems are common but underrecognized among older adults. It can mimic symptoms of normal aging processes and exacerbate those that are part of age, such as difficulty in memory, social impairment and mental health concerns about anxiety and depression. Measures to increase detection of the problem in clinical setting are necessary. Health professionals should be aware that common definitions of alcohol abuse and dependence may not apply as readily to older people, who have had biological changes for alcohol tolerance and its effects on the Central Nervous System.

### **Acknowledgments**

This work was supported by the Secretaria Nacional Anti-Drogas. E Castro-Costa is supported by the Fundação de Amparo à Pesquisa do Estado de Minas Gerais(FAPEMIG)



## References

- Administration, S. A. a. M. H. S. (2005). "Results from the 2004 National Survey on Drug Use and Health: National Findings[NSDUH series H-28, DHHS Pub No. (SMA) 05-4062]." Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Benshoff J, H. L. (2003). "Substance abuse and the elderly: Unique issues and concerns." J Rehabil **69**: 43-48.
- Carlini EA, G. J., Noto AR, Fonseca AM, Carlini CM, Oliveira LG, Nappo SA, Moura YG, Sanchez ZM (2007). 2 Levantamento Domiciliar sobre o uso de drogas Psicotrópicas no Brasil - Estudo envolvendo cidades do país 2007. Brasilia, Secretaria Nacional Antidrogas.
- Dawson DA (1995). "Subgroup variation in U.S. drinking patterns: results of the 1992 National Longitudinal Alcohol Epidemiologic Study." J of Substance Abuse **7**: 331-44.
- Fleck MPA, L. A., Louzada S, Schestasky G, Henriques A, Borges VR, Camey S, Grupo Lido, (2002). "Associação entre sintomas depressivos e funcionamento social em cuidados primarios a saude." Rev Saude Publica **36**(4): 431-8.
- Grant BF, D. D., Stinson FS, Chou SP, Dufour MC, Pickering RP, (2004). "The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991-1992 and 2001-2002." Drug Alcohol Depend **74**(3): 223-234.
- Greenfield TK & Rogers JD (1999). "Who drinks most of the alcohol in the US? The policy implications." J Stud Alcohol **60**: 78-89.
- Guerrini I, G. C., Guazzelli M, (2006). "Alcohol consumption and heavy drinking: a survey in three Italian villages." Alcohol Alcoholism **41**(3): 336-340.
- Hasin DS, S. F., Ogburn E, Grant BF (2007). "Prevalence, correlates, disability and comorbidity of DSM-IV alcohol abuse and dependence in the United States - Results from the National Epidemiologic Survey on Alcohol and related conditions." Archives of General Psychiatry **64**(7): 830-842.
- Johnson I (2000). "Alcohol problems in old age: a review of recent epidemiological research." International Journal of Geriatric Psychiatry **15**: 575-81.
- Kebede D, A. A. (1999). "The epidemiology of alcohol dependence and problem drinking in Addis Ababa, Ethiopia." Acta Psychiatr Scand **100**: 30-34.
- Kirchner JE, Z. C., Cody M, (2007). "Alcohol consumption among older adults in primary care." J Gen Intern Med **22**: 92-97.
- Medina-Mora ME, C. P., Villatoro J, (1998). "El consumo de alcohol en la poblacion urbana de Mexico." Encuesta nacional de adicciones. Mexico: Secretaria de Salud.
- Merrick EL, H. C., Hodgkin D, Garrick DW, Houghton SF, Panas L, Saitz R, Blow FC, (2008). "Unheathy drinking patterns in older adults: Prevalence and associated characteristics." JAGS **56**: 214-223.

- Mersy DJ (2003). "Recognition of alcohol and substance abuse." American Family Physician **67**(7): 1529-32.
- Moore AA, H. R., Greendale GA, Damesyn M, Reuben DB, (1999). "Drinking habits among older persons: findings from the NHANES I Epidemiologic Follow-up Study (1982-1984)." JAGS **47**: 412-416.
- Moos RH, B. P., Schutte KK, Moos BS (2004). "High-risk alcohol consumption and late-life alcohol use problems." Am J Public Health **94**(11): 1985-1991.
- Naimi TS, B. R., Mokdad A, Denny C, Serdula MK, et al, (2003). "Binge drinking among US adults." JAMA **289**(1): 70-75.
- National Institute on Alcohol Abuse and Alcoholism. (1998). "Alcohol alert no. 40." Retrieved 28 Jan, 2008, from [www.niaaa.nih.gov/publications/aa40.htm](http://www.niaaa.nih.gov/publications/aa40.htm).
- O'Connell H, C. A., Cunnungham C, Lawlor B (2003). "Alcohol use disorders in elderly people-redefining an age old problem in old age." BMJ **327**: 664-667.
- Pirkola SP, P. K., Lonnqvist JK, (2006). "Currently active and remitted alcohol dependence in a nationwide adult general population - results from the Finnish Health 2000 Study." Alcohol Alcoholism **41**: 315-320.
- Prais HAC, L.-F. A., Firmo JOA, Lima-Costa MFF, Uchoa E, (2008). "A population-based study on Binge drinking among elderly Brazilian men: evidences from the Belo Horizonte and Bambui Health Surveys." Revista Brasileira de Psiquiatria **in press**.
- Quintana MI, A. S., Jorge MR, Gastal FL, Miranda CT, (2004). "The reliability of the Brazilian version of the Composite International Diagnostic Interview (CIDI 2.1)." Braz J Med Biol Res **37**(11): 1739-1745.
- Radloff LS (1977). "The CES-D scale: a self-reported depression scale for research in the general population." Appl Psychol Measurement **1**: 385-401.
- Ruchlin HS (1997). "Prevalence and correlates of alcohol use among older adults." Preventive Medicine **26**: 651-657.
- The American Geriatrics Society ( 2003) "Clinical Guideline for Alcohol Use disorders in Older Adults." available at: [http:// www.a  
mericangeriatrics.org/products/positionpapers/alcohol.shtml](http://www.americangeriatrics.org/products/positionpapers/alcohol.shtml) **Volume**, DOI:
- The American Geriatrics Society (november 2003) "Clinical Guideline for Alcohol Use disorders in Older Adults." available at: [http:// www.a  
mericangeriatrics.org/products/positionpapers/alcohol.shtml](http:// www.a<br/>mericangeriatrics.org/products/positionpapers/alcohol.shtml) **Volume**, DOI:
- World Health Organization-Alcohol, D. a. M. H. A. (1987). "Composite International Diagnostic Interview (CIDI) - Core Version 2.1- 12 month version." World Health Organization Geneva.
- Zich JM, A. C., Greenfield TK (1990). "Screening for depression in primary care clinics: the CES-D and BDI." Int J Psychiatry Med **20**(3): 259-77.

**Table 1: Characteristic of participants aged 60 and over (BNAS, 2006)**

<b>Variables</b>	<b>N(%)</b> <b>(n=400)</b>
<b>Socio demographic</b>	
<b>Sex</b>	
Male	161(44.1)
Female	239(55.8)
<b>Age (years)</b>	
60-69	245(63.5)
70 and over	155(36.5)
<b>Marital status</b>	
Single	30(6.1)
Married	196(59.8)
Widow	122(24.8)
Separated/divorced	52(9.3)
<b>Education level</b>	
Illiterate/Primary school	353(87.3)
Secondary school and above	47 (12.7)
<b>Income (minimum salary)*</b>	
< 1.00	188(73.6)
1.00 to 2.99	137(21.0)
≥ 3.00	41(5.4)
mv=36	
<b>Cities (inhabitants)</b>	
< 200.000	327(81.0)
≥ 200.000	73(19.0)
<b>Depression (CES-D)</b>	
< 16	183(48.3)
≥16	202(51.7)
mv=15	
<b>Patterns of alcohol consumption</b>	
<b>Risky Drinking</b>	
<u>Heavy</u> drinker	44(12.4)
Binge drinker	34(10.4)
Alcohol dependency	10.(2.9)
<b>Patterns of specific-beverage consumption (at least once a week)**</b>	
Beer	35(9.5)
Wine	19(5.6)
Spirit	23(7.2)

\* Minimum salary (R\$:380.00), mv: missing value;

\*\* at least once or twice per week

**Table 2: Adjusted logistic regression between risky drinking and socio-demographic characteristics and depression among participants aged 60 and over, (BNAS, 2006)**

	<b>Risky drinking*</b>	
	<b>Heavy drinking</b>	<b>Binge drinking</b>
<b>Sex</b>		
Female	1.00	<b>1.00</b>
Male	<b>6.66(2.40-18.44)</b>	<b>3.22(1.29-8.03)</b>
<b>Age (years)</b>		
60-69	1.00	1.00
≥ 70	0.69(0.29-1.62)	<b>0.34(0.12-0.96)</b>
<b>Marital status</b>		
<b>Single</b>	1.00	1.00
<b>Married</b>	1.14(0.33-3.92)	0.89(0.17-4.73)
<b>Widow</b>	0.26(0.04-1.38)	0.43(0.06-2.89)
<b>Divorced/separated</b>	0.86(0.19-3.90)	0.47(0.07-3.08)
<b>Educational level</b>		
Illiterate/Primary school	1.00	1.00
Secondary school and above	1.82(0.43-7.57)	2.22(0.60-8.15)
<b>Income (minimum wage)</b>		
<1.00	1.00	1.00
1.00 to 2.99	0.70(0.21-2.31)	1.13(0.31-4.17)
≥ 3.00	4.32(0.83-22.26)	<b>12.83(2.66-61.87)</b>
<b>Depression (CES-D) ≥ 16</b>		
No	1.00	1.00
Yes	0.59(0.27-1.31)	1.72(0.69-4.28)
<b>City (habitants)</b>		
< 200.000	1.00	1.00
≥ 200.000	1.07(0.33-3.49)	1.68(0.51-5.52)

\*Both heavy and binge drinking were adjusted mutually by gender, age, educational level, personal income, depression