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## Addictive Behaviors



## Prevalence of cannabis use in Brazil: Data from the I Brazilian National Alcohol Survey (BNAS)

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## ABSTRACT

**Aims:** To estimate the prevalence of cannabis use in the last 12 months in the Brazilian population and to examine its association with individual and geographic characteristics.

**Design:** Cross-sectional survey with a national probabilistic sample.

**Participants:** 3006 individuals aged 14 to 65 years.

**Measurements:** Questionnaire based on well established instruments, adapted to the Brazilian population.

**Findings:** The 12-month prevalence of cannabis use was 2.1% (95%CI 1.3–2.9). Male gender, better educational level, unemployment and living in the regions South and Southeast were independently associated with higher 12-month prevalence of cannabis use.

**Conclusion:** While the prevalence of cannabis use in Brazil is lower than in many countries, the profile of those who are more likely to have used it is similar. Educational and prevention policies should be focused on specific population groups.

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### 1. Introduction

Cannabis is the most widely abused illicit drug in the world (Hall & Solowij, 1998; Hall & Babor, 2000) and the world's third most-popular recreational drug, after alcohol and tobacco (Murray, Morrison, Henquet, & Di Forti, 2007). The UNODC report of 2008, based on data from 2006, estimated that around 4% of the world population, or close to 166 million persons, had used cannabis during the previous year, which accounted for the vast majority of illegal drug use (UNODC, 2008). According to that report, the absolute number of cannabis users has increased steadily from 1997/98 to 2006/07, but the stability of the prevalence suggests that the number of cannabis users has not outpaced overall population growth during the same period. However, in that period there were variations in prevalence estimates according to region of the World, with ongoing declines in North America and, for the first time, some decline in the largest cannabis markets of Western Europe. Cannabis use was also declining in the Oceania region. On the other hand, increases in cannabis use were estimated for Africa, several parts of South America, some parts of Asia (South-west Asia, Central Asia and South-Asia) and parts of Eastern and South-eastern Europe. A limitation of these UNODC estimates is the scarcity of good quality data about cannabis

consumption in low and middle income (LAMI) countries on which such estimates were based.

Experimentation of the drug by teenagers is common in Europe, the USA and Australia (Hall & Pacula, 2003). The best data on the prevalence of cannabis use and its correlates amongst youngsters come from English speaking countries, such as the United States, Canada and Australia, and from Europe, where rates of use among young people have been higher for longer than in most other developed countries (Hall & Pacula, 2003; ter Bogt, et al., 2006). In the United States, 34.2% of those aged 12 years and over have tried cannabis, and 8.3% have used it in the previous 12 months (SAMHSA, 2001). A study in New Zealand found that by the age of 21, over 10% of the sample met criteria for cannabis dependence (Fergusson & Horwood, 2000). However, it seems that the rise of cannabis use among teenagers is not restricted to those English speaking countries: a recent study in Mexico also showed the same trend of increased use among teenagers (Benjet et al., 2008). Such phenomenon may be reflecting changes in social norms, descriptive and injunctive, regarding substance use among youngsters in different societies, which in turn also contribute to spread their use even more (Elek et al., 2006). This is worrisome, because approximately 9% of those who have previously used marijuana meet criteria for dependence at some point (Anthony et al., 1994). Moreover, cannabis use is associated with rebelliousness, antisocial behavior, poor school performance, and affiliation with drug-using peers (Hall & Degenhart,

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2007). Similar behavior problems have also been reported among cannabis users in LAMI countries (Hall & Degenhart, 2007; De Micheli & Formigoni, 2004). As the use and abuse among teenagers and young adults are becoming more usual, the age of onset of cannabis use is declining, and the potency of tetrahydrocannabinol (THC, cannabis main psychoactive element), is rising (Murray et al., 2007).

Cannabis production takes place in practically all countries of South America and the Caribbean. The largest producers in South America are Paraguay, followed by Colombia, Brazil and the Caribbean region (UNODC, 2008). Declines of cannabis production in Colombia in recent years appear to have been offset by increases in other parts of South America, notably in Paraguay. Brazil is a large country, with a population of more than 180 million people (IBGE, 2008), and is currently considered one of the most prominent emerging economies in the world, occupying a vital position in South America. It also plays an important role for the drug traffic and consumption in the region, occupying the fourth position in the world in terms of the amount of cannabis herb seized, only behind Mexico, the USA and South Africa. (UNODC, 2008) Cannabis is the most commonly used illicit drug in the country (Carlini, Galduróz, Noto, & Nappo, 2002, 2006; Galduróz, Noto, Fonseca, & Carlini, 2005). In a household survey conducted in 107 Brazilian cities with more than 200,000 inhabitants, lifetime use among those aged between 12 and 65 years was 6.9% (Carlini et al., 2002), which is in the range of estimates from other South American countries, such as Colombia (5.4%), and most European countries, such as Germany (4.2%), but much lower than prevalence rates in the USA (34.2%) and United Kingdom (25.1%) (SAMHSA, 2001; 7, Galduróz et al., 2005; Ospina, 1997; CONACE, 2005; EMCDDA, 2005). In a second survey, conducted 3 years later (Carlini et al., 2006), cannabis lifetime use had raised to 8.8%. However, the samples of these 2 household surveys represented only 28% and 40% of the Brazilian population, respectively, concentrated in large urban centers, and therefore such estimates may not be generalized to smaller towns and less populated regions of the country.

The objective of this paper is to investigate patterns of cannabis use in a Brazilian national probabilistic sample. This was possible due to the I Brazilian National Alcohol Survey (BNAS) (Laranjeira, Pinsky, Zaleski, & Caetano, 2007), where cannabis use in the previous 12 months was investigated. We estimated the 12-month prevalence of cannabis use in the Brazilian population and its association with socio-demographic and socio-economic individual characteristics, and compared the prevalence of cannabis use in metropolitan areas with the prevalence in other areas of the country.

## 2. Methods

### 2.1. Participants

The present study was conducted by the Alcohol and Drugs Research Unit – UNIAD, Federal University of Sao Paulo, Sao Paulo, Brazil, and is part of the I Brazilian National Alcohol Survey (BNAS) (Laranjeira et al., 2007). A multistage cluster sampling procedure was used to select a sample of individuals aged 14 years and older representative of the Brazilian household population. The strata were the Brazilian states. All metropolitan regions and capitals of each state entered with probability 1 in the sample, with number of interviews proportional to their population. For each stratum, probabilistic samples were selected, from conglomerates in many stages. The sampling involved 3 stages: 1) selection of 143 counties using probability proportional to size methods (PPS); 2) selection of 2 census sectors for each county, with the exception of the 14 largest selected counties, totaling 325 census sectors, also using PPS; 3) within each census sector, 8 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. Sample size was based on an expected prevalence of 50% of alcohol use, with a sampling error of 2% at 95% confidence interval. With these parameters, the number of participants to be included was 3000. (Laranjeira et al., 2007; Kish, 1965).

### 2.2. Assessments

In the present survey we used a standardized questionnaire with closed questions, applied in a face-to-face interview. The questionnaire included information on socio-demographic and socio-economic characteristics (age, gender, income and current working status, educational level, place of residence) and questions on the use of substances in the previous 12 months. For cannabis consumption, the question was: “How often did you consume cannabis in the last 12 months?”, with possible answers being “once per week or more”, “once every 2 or 3 weeks”, “once or twice per month”, “less frequently than that”, “never”, “I don't know”, and “refuse to answer”. The original questionnaire form may be viewed by accessing the UNIAD internet site at [www.uniad.com.br](http://www.uniad.com.br).

### 2.3. Procedures

One-hour face-to-face interviews were conducted in respondents' homes, by trained interviewers with previous experience in public opinion surveys. Checking of 20% of the completed questionnaires of each interviewer was carried out, with the aim of verifying rules of questionnaire application. All respondents granted their informed consent. For interviewees under 16 years of age, a formal consent from parents or guardian was obtained. The field work was conducted between November 2005 and April 2006.

### 2.4. Analysis

Analysis was conducted on data weighted to correct for the sampling probability and for non-response rates. Given that access to the unit selected into the sample was not gained in some cases, the age distribution of these individuals was not known. Therefore, post-stratification weights were calculated to adjust the sample to known census population distributions of socio-demographic variables. Due to the multistage sampling design, standard errors were expected to be larger than those observed with simple random samples. To take sampling design and non-response into account, all analyses were done with the STATA 9 svy commands. Prevalence rates with 95% confidence intervals (95%CI) were calculated, for the total sample, and by gender and age group. Associations of individual characteristics, area of residence (metropolitan or not) and country region with cannabis consumption were examined using logistic regression.

## 3. Results

The survey response rate was 66.4%. Non-response was mainly due to inability to reach the selected participants, especially in large urban areas in the Southeast of Brazil (e.g., Sao Paulo, Rio de Janeiro). Part of the non-response was due to refusals to participate in the study. A total of 2522 interviews were conducted with respondents aged 18 years and older, and 485 interviews were conducted with respondents aged 14 to 17 years (adolescent oversample), yielding 3007 participants for this analysis. Table 1 shows socio-demographic and socio-economic characteristics of the participants, the weighted proportion for each category, and absolute figures for any use of cannabis in the previous 12 months.

Table 2 shows the prevalence of cannabis use in the 12 months previous to the interview by age and gender. The overall prevalence of cannabis use in the previous 12 months was 2.1% (95%CI 1.3 to 2.9). Men were more likely than women to have consumed cannabis, and in terms of age, the highest prevalence of use in the previous 12 months was among those aged between 18 and 30 years, followed by the youngsters between 14 and 17 years of age.

We conducted a logistic regression with the variables mentioned above (Table 3). In the bivariate analysis being male, having between 18 and 30 years of age, having higher levels of education, being unemployed,

**Table 1**  
Cannabis use in the last 12 months stratified according to demographic characteristics of the sample with weighted proportion.

Variables	n	Use of cannabis in the last 12 months					Weighted proportion	
		Once per week or more	Once every 2 or 3 weeks	Once or twice per month	Less frequently than monthly	Never		
Gender	Female	1721	4	2	1	9	1705	0.52
	Male	1285	14	2	5	14	1250	0.48
Age group	14–17	661	6	1	0	8	646	0.10
	18–30	748	10	1	3	9	725	0.32
	31–50	936	1	1	2	6	926	0.35
	51 or more	661	1	1	1	0	658	0.23
Educational level	0–3	692	0	0	0	1	690	0.23
	4–8	1197	11	1	2	8	1175	0.39
	9–11	949	4	2	4	10	929	0.28
	12+	168	3	1	0	4	160	0.09
Marital status	Single	1156	14	1	4	13	1124	0.33
	Other	1850	4	3	2	10	1831	0.66
Occupational status	Other	2897	13	3	6	19	2856	0.96
	Unemployed	109	5	1	0	4	99	0.04
Social class	a	65	0	0	0	1	64	0.03
	b	390	4	1	1	9	375	0.15
	c	976	5	2	4	9	956	0.34
	d	1259	5	1	1	4	1248	0.39
	e	316	4	0	0	0	312	0.09
Monthly Personal Income (US\$)	No income	998	6	1	0	8	983	0.28
	243 or less	1296	8	2	3	8	1275	0.44
	244–405	324	2	0	2	3	317	0.13
	406–649	203	0	0	1	0	202	0.09
Region	650 or more	106	2	1	0	4	99	0.05
	North	208	1	0	0	0	207	0.08
	Center west	236	1	0	1	3	231	0.06
	Northeast	884	3	0	1	1	879	0.27
	Southeast	1275	11	3	3	13	1244	0.44
Metropolitan area	South	404	2	1	1	6	394	0.15
	No	1946	9	1	1	14	1921	0.63
	Yes	1060	9	3	5	9	1034	0.37

having better income and living in the South and Southeast regions were associated with the probability of having used cannabis in the last 12 months. Living in urban areas was also associated with higher likelihood of using cannabis, as compared to living in rural areas. When a multiple logistic regression was performed, the variables that remained independently associated with cannabis use in the previous 12 months at a statistically significant level were being male, having better educational level, being unemployed and living in the regions South and Southeast (Table 3).

#### 4. Discussion

This is the first Brazilian survey that estimated the 1-year prevalence of cannabis use in a sample representative of the Brazilian household population aged 14 years and older, and that investigated the association between use of cannabis, socio-demographic and socio-economic individual characteristics in that population. The estimated 1-year prevalence of cannabis use for the Brazilian population was 2.1%. Factors associated with higher probability of cannabis use were male gender, age between 18 and 30 years, being single, being unemployed, and living in the South and Southeast regions. Higher income and living in a metropolitan area were statistically significant only before adjustment for the variables above.

**Table 2**  
Prevalence (95% confidence interval) of cannabis use in the previous 12 months, by age group, gender and total.

Age	Male	Female	Total
14–17	2.5 (0.8; 4.2)	1.7 (0.3; 3.2)	2.1 (1.0; 3.2)
18–30	7.1 (3.3; 10.8)	1.6 (0.0; 3.1)	4.4 (2.3; 6.4)
31–50	1.8 (0.4; 3.3)	0.4 (0.0; 0.8)	1.1 (0.3; 1.8)
51 or more	0.9 (0.0; 2.3)	0.6 (0.0; 1.8)	0.8 (0; 1.7)
Total	3.4 (2.1; 4.8)	0.9 (0.4; 1.5)	2.1 (1.3; 2.9)

The present study has some limitations. Non-participation was high, and may have contributed for an underestimation of the true prevalence of cannabis use. Information on cannabis use was based on self-report, which may also have led to an underestimation of the true prevalence of cannabis consumption (Rouse, Kozel, & Richards, 1982; Del Boca & Noll, 2000). Moreover, the method of data collection was face-to-face interviews, which could further contribute to an underestimation of the prevalence of cannabis use. However, these limitations are common to most household surveys on this topic. Another limitation is the low precision of the estimates of prevalence and of association. The sample size was based on the expected prevalence of abuse of alcohol, leading to a small number of participants who reported cannabis use, despite the large number of participants overall.

The 12-month prevalence of cannabis use varies widely across countries (CICAD, 2005; EMCDDA, 2005; SAMHSA, 2006). Our results show a 1-year prevalence of cannabis consumption in Brazil that is in the lower range of prevalence estimates for several Latin American (CICAD, 2005) and European countries (EMCDDA, 2005), and is also much lower than estimates for the United States of America (SAMHSA, 2006). Reasons for such low prevalence in Brazil are not clear. A recent multicentre study compared lifetime use prevalence of alcohol, tobacco and illegal substances in 17 countries, and found wide variations for cannabis use between countries, the USA and New Zealand with the higher estimates (42% in both centers), and China (0.3%) and Japan (1.5%) with the lowest estimates (Degenhart et al., 2008). The authors found that such variations were not associated with drug policies adopted by each participating country. Our prevalence estimate is also lower than those reported in previous studies in Brazil (Carlini et al., 2002, 2006). Such surveys focused only on medium to large urban centers (those with more than 200 thousand inhabitants), and our study showed that the use of cannabis tends to be higher in large urban centers, as compared to smaller towns and rural areas. This may happen because in large cities access

**Table 3**  
Crude and adjusted odds ratios and 95% confidence intervals for cannabis use in the previous 12 months according to socio-demographic and socio-economic characteristics (n = 2927).

		Crude			Adjusted		
		OR	95%CI	P	OR	95%CI	p
Gender	Male	0.26	0.14; 0.49	<0.001	0.30	0.16; 0.56	<0.001
Age	14–17	1.37	0.33; 5.59	0.66	0.92	0.19; 4.41	0.92
	18–30	5.88	1.98; 17.5	0.002	2.84	0.69; 11.7	0.15
	31–50	2.78	0.76; 10.2	0.12	2.22	0.49; 10.1	0.30
Education	Trend	1.46	1.23; 1.73	<0.001	1.33	1.00; 1.76	<b>0.05</b>
Marriage status	Single	3.05	1.67; 5.57	<0.001	1.47	0.67; 3.24	0.33
Occupation	Unemployed	4.57	1.81; 11.6	0.001	3.57	1.21; 10.6	<b>0.02</b>
Class	B	3.32	0.40; 27.3	0.26	0.99	0.57; 1.71	0.99
Income	US\$ 243 or less	5.77	1.80; 18.5	0.003	1.18	0.81; 1.72	0.38
Region	Center west	5.74	0.69; 47.7	0.11	3.04	0.37; 24.8	0.29
	Northeast	6.38	0.79; 51.4	0.08	4.70	0.60; 36.9	0.14
	Southeast	15.4	2.24; 105.5	0.006	9.20	1.38; 61.5	<b>0.02</b>
	South	15.7	2.19; 111.9	0.006	11.72	1.55; 88.8	<b>0.02</b>
Living in a Metropolis		2.31	1.10; 4.86	0.03	1.79	0.81; 3.95	0.15

to the drug is easier (Grant & Pickering, 1998) and its use is part of the culture of some groups in these settings. In a recent survey, cannabis was reported to be the easiest drug to be found (Carlini et al., 2006). While the prevalence of cannabis use in Brazil seems to be lower than in other countries, the profile of those who are more likely to have used it is similar: young male, single adults, the unemployed (Fergusson & Boden, 2008). The positive association between 12-month prevalence of cannabis use and income found in our study is in accordance to the findings of the 17 countries multicentre study (Degenhart et al., 2008), but is opposite to that observed in a population survey in New Zealand (Wells et al., 2009).

Our data yields empirical estimates of cannabis use nationwide, which can then help in monitoring population consumption along time. Use of drugs seems to be related to countries' and individuals' wealth (Degenhart et al., 2008). Therefore, as Brazil continues its development and economic growth, one can expect a progressive increase in cannabis use. Our results indicate that there are specific groups in the population for whom preventive strategies and treatment efforts should be targeted, focusing particularly on those more vulnerable of cannabis use, the young. Future research should aim at contextual factors related to cannabis use and on tailoring and testing simple and effective preventive and treatment strategies.

### Conflict of interest

None.

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