



Short communication

Unrecorded alcohol in Rio de Janeiro: Assessing its misusers through Respondent Driven Sampling



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ABSTRACT

Background: Around 20–30% of alcohol use in low and middle-income countries is estimated to come from unrecorded sources, but little is known about the characteristics of its consumers. The aim of this study was to obtain information about users of unrecorded alcohol and describe factors associated with its frequent use.

Method: A cross-sectional study, using Respondent Driven Sampling (RDS), was conducted in Rio de Janeiro, Brazil in 2010. Individuals aged 18–65 who reported binge drinking in the last 12 months were recruited to participate in a structured interview. Three sources of unrecorded alcohol use were assessed: home-made/unrecorded; perfumes/lotions; and “medicinal” products (compounds made of herbs and local spirits).

Results: 343 individuals were recruited and 303 were interviewed. The sample comprised mostly of men ($n = 256$) from low socioeconomic strata, with a mean age of 38.8 (± 12). Most individuals (71.8%) reported to have used more than one variety of unrecorded alcohol, which was found to be associated with: being older than 31 (OR 2.21; CI 95% 1.05–4.80), an AUDIT score >20 (OR 11.21; CI 95% 4.56–30.96), having used crack/cocaine (OR 2.29; CI 95% 1.02–5.21), and having received treatment for alcohol addiction in the last 12 months (OR 3.64; CI 95% 1.25–13.49).

Conclusion: Most unrecorded alcohol users were disadvantaged polysubstance users. Assessing unrecorded alcohol use has important clinical implications and should be screened for among crack/powder cocaine and alcohol-dependent patients.

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1. Introduction

The misuse of “unrecorded alcohol” has become a major health problem in different societies. According to Lachenmeier et al. (2011b), the international literature has conceptualized “unrecorded alcohol” in four different ways: non-beverage alcohols (not intended for human use, like perfumes), alcohol outside production data (i.e., from cross-border shopping), illegally produced alcohol, and homemade alcohol. Estimates from the World Health Organization indicate that around 20–30% of alcohol consumed in low and middle-income countries comes from illegally produced/homemade alcohol. South America ranks second

in unrecorded alcohol use directly after Eastern Europe (WHO, 2011).

Most recent studies from both the international and Brazilian literature are concerned with toxicological analyses of unrecorded alcohol (Lachenmeier et al., 2009b, 2011a) and its associated health hazards, including poisoning, cancer, and death (Nóbrega et al., 2009; Ferdinandis and De Silva, 2008). Previous studies conducted in Brazil have shown that traditional beverages distilled from Brazil’s iconic sugar-cane spirit, “cachaça,” may present high concentrations of ethyl carbamate (Andrade-sobrinho et al., 2002; Nóbrega et al., 2011), and that the Northeast Brazilian spirit “tiquira” (manioc spirit) may present cyanide in concentrations up to 150 times higher than those considered acceptable for drinking water (Furtado et al., 2007).

Very little is known about the characteristics of unrecorded alcohol consumers, and to the best of our knowledge, no paper has reported on the socio-demographic characteristics of such populations in Brazil. The absence of socio-demographic studies may

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be a result of the challenges associated with interviewing such hard-to-reach populations, who tend to engage in different illegal or socially unaccepted behaviors. In Brazil, as in many different settings, various illegal markets tend to overlap (Bastos, 2012).

Different sampling techniques have been used to assess and recruit hard-to-reach populations (MacKellar et al., 1996; Thompson and Collins, 2002; De Boni et al., 2012). Among these methods, Respondent Driven Sampling (RDS) has been used in many different settings, worldwide (Heckathorn, 1997). RDS is a chain-referral sampling method. Members from the population under study recruit their peers, incorporating – in contrast to classic snowballing – weighting procedures, aiming to obtain representative samples (Heckathorn, 2011).

Considering the absence of studies about consumers of unrecorded alcohol, as well as the high estimates of its use in South America, this study outlines a profile of users of various types of unrecorded alcohol in Rio de Janeiro, as well as describes factors associated with their use.

2. Methods

This cross-sectional study was conducted in Rio de Janeiro, between June and September of 2010. Individuals aged 18–65 were recruited and selected if they met the following inclusion criteria: (1) have drunk alcohol at least 3 days of the last 30 days; (2) have participated in binge drinking (5 or 4 doses in one occasion, for males and females, respectively) at least once in the last 15 days; (3) lived in Rio de Janeiro's metropolitan region; (4) presented a valid invitation for study participation; and, (5) provided written consent for participation in the study.

2.1. Sampling

The sample was recruited through RDS and two individuals from the target population were selected as “seeds.” Each seed received three unique coupons to distribute to their peers. The number of coupons was controlled over time using a bar code scanner and a coupon e-manager. Individuals who arrived at the study assessment center, located in Rio de Janeiro's downtown area, with a valid coupon (i.e., recognized by the barcode scanner and respective software as generated by the e-manager) and met the inclusion criteria were considered eligible and defined as the first wave of the study. These procedures were repeated until the sample had putatively reached equilibrium, which, according to the literature, requires a minimum of 6 recruiting waves. The actual study progressed over 10 waves. No calibration procedures were necessary.

2.2. Measurements

Demographics, risk behaviors and HIV risk perceptions were assessed with the help of a previously validated questionnaire used in a 2005 national survey (Bastos et al., 2008).

Unrecorded alcohol use was evaluated using questions regarding lifetime use of three varieties of unrecorded alcohol: (1) use of home-made/craft-made products without a standard label/registration number or with labels/registration numbers that do not comply with the Brazilian legislation; (2) use of perfumes/mouthwash as beverages; and (3) “medicinal” products (compounds of herbs and sugar-cane spirit “cachaça”).

Alcohol use disorders were assessed by the AUDIT questionnaire (Babor et al., 2001), previously validated in Brazil (Mendez, 1999).

Illicit drug use was assessed through a series of yes/no questions on the use in the last 12 months of: crack cocaine, inhaled cocaine, amphetamines, ecstasy, marijuana, LSD and hallucinogens, injected drugs, and benzodiazepines (not medically prescribed).

Previous treatment for alcohol/drug use was assessed using the question “Have you ever received treatment for stopping or reducing your alcohol/drug use?”

2.3. Statistical analysis

Contingency tables and respective statistics were used to assess the association between covariates and the amount/varieties of unrecorded alcohol. Covariates included: sex, age, education level, monthly income, occupation, AUDIT scores, consumption of other substances, history of detention/imprisonment, and HIV testing, sex traded for money/substances.

Logistic regression models fitted the data, taking as the outcome the use of more than one variety of unrecorded alcohol (vs. one variety/none). Covariates found to be associated with the outcome at the level of 0.10, as well as sex and age, were entered into the full model and then removed backwards, up to the most parsimonious model. In addition, a random effects logistic regression model was fitted in an attempt to incorporate the RDS network structure, but including the network

random effects led to no statistical gain. The statistical analyses were implemented using R (R Core Team, 2013).

2.4. Ethical aspects

The study was approved by ENSP FIOCRUZ IRB (CAAE: 0043.0.031.000-09).

3. Results

Starting with two seeds, 343 individuals were recruited after 10 waves. Of those, 305 were defined as eligible for participation by the screening process. Two interviewees were excluded from the analysis due to incomplete answers respecting key variables.

Most ($n = 256$) interviewees were male, with a mean age of 38.8 years old (± 12 years), and a monthly income below US \$200.00. No statistical difference was found between the socio-demographic characteristics of those who did and did not report to have used unrecorded alcohol.

Among those interviewees who reported to have ever used unrecorded alcohol, the ingestion of alcohol without a label/registration was the most frequently used variety (80.1%; multiple answers allowed). The ingestion of “medicinal” cocktails (locally known as “garrafadas”) was reported by 193 individuals (66.1%), and the ingestion of alcohol solutions not designed for drinking, such as perfumes/lotions and mouthwash, was reported by 173 interviewees (50.4%).

Only 25 individuals (8%) reported that they have never used any variety of unrecorded alcohol, 19.3% ($n = 57$) have used a single variety, 34% ($n = 102$) two varieties, and 39.0% ($n = 119$) all three varieties of unrecorded alcohol under analysis. Socio-demographic information as well as behavioral data, stratified by unrecorded alcohol consumption, is summarized in Table 1.

Factors associated with the use of more than one variety of unrecorded alcohol are presented in Table 2. Individuals older than 31, an AUDIT score higher than 20, and who reported the use of other drugs, showed increased odds of using more than one variety of unrecorded alcohol.

4. Discussion

Individuals recruited for this study were mostly men, older than 31, and from a low socioeconomic background. Although there are few studies describing illicit alcohol users, studies from Russia (Leon et al., 2007) and Turkey (Kalkan et al., 2003) reported that an important proportion of deaths related to unrecorded alcohol have occurred among socially disadvantaged men. Even though RDS has been criticized for biasing results by disproportionately selecting impoverished/socially deprived individuals (McCreesh et al., 2012), it served as an efficient and pivotal tool in our effort to recruit such marginalized populations. RDS has allowed us to approach a reasonable number of individuals in a short period of time, which would have been impossible using a probability sample.

An AUDIT score above 20 (indicative of alcohol dependence) was the most important factor associated with the use of more than one variety of unrecorded alcohol. Alcohol dependent individuals who have economic restrictions may seek cheaper sources of alcohol and end up using alternative beverages. Another possibility is that they seek beverages with higher ethanol concentration than the recorded/legal ones, and some studies have suggested that illicit alcohol may contain more ethanol (Lachenmeier et al., 2011a). High concentrations of ethanol, combined with various contaminants (Polastro et al., 2001; Lachenmeier et al., 2009a) may be associated with an increased chance of developing liver disease (Narawane et al., 1998) and cancer (Lachenmeier et al., 2010). Furthermore, the association of alcohol dependence and the use of unrecorded alcohol could be mediated by a low risk perception, in addition to

Table 1Characteristics of individuals who consumed or not one or more sources of unrecorded alcohol, Rio de Janeiro, 2010 ($n = 303$).

	No illicit alcohol $N = 25$ $N (%)$	1 source of illicit alcohol $N = 57$ $N (%)$	2 sources of illicit alcohol $N = 102$ $N (%)$	3 sources of illicit alcohol $N = 119$ $N (%)$	P^*
Male	21 (84)	46 (80.7)	84 (82.3)	105 (88.2)	0.49
Age bracket					0.29
18–31 years old	9 (36)	24 (42.9)	35 (34.3)	32 (26.9)	
32–45 years old	6 (24)	19 (33.9)	33 (32.3)	49 (41.2)	
>45 years old	10 (40)	13 (23.2)	34 (33.3)	38 (31.9)	
Schooling					0.11
None	0 (0)	4 (7.0)	3 (2.9)	12 (10.1)	
Until high school	22 (88)	42 (73.7)	78 (76.5)	94 (78.9)	
High school and over	3 (12)	11 (19.3)	21 (20.6)	13 (10.9)	
Occupation					0.49
Employee/civil servant	1 (4)	1 (1.7)	10 (9.8)	6 (5.1)	
Self-employed/employer	12 (48)	29 (50.9)	54 (52.9)	61 (51.3)	
Unemployed	12 (48)	27 (47.4)	38 (37.2)	52 (43.7)	
Had a HIV test lifetime	18 (72.0)	35 (61.4)	72 (70.6)	88 (73.9)	0.40
Have been in jail lifetime	10 (40.0)	16 (28.6)	38 (37.2)	61 (51.3)	0.02
IDU last 12 months	0 (0)	2 (3.5)	5 (4.9)	17 (14.4)	0.01
Received money/drugs in exchange of sex last 12 months	2 (8.0)	16 (28.1)	39 (38.2)	65 (54.3)	<0.001
AUDIT score > 20	15 (60)	42 (73.7)	95 (93.1)	119 (100)	<0.001
Use marijuana in the last 12 months	15 (60.0)	36 (63.1)	67 (65.7)	94 (78.9)	0.05
Use of powder/crack cocaine in the last 12 months					0.01
Never	6 (24)	18 (32.1)	24 (23.5)	17 (14.3)	
Cocaine powder OR crack	7 (28)	26 (42.4)	34 (33.3)	41 (34.4)	
Cocaine powder AND crack	12 (48)	12 (21.4)	44 (43.1)	61 (51.3)	
Use of ecstasy/non-prescribed medicines in the last 12 months					0.001
Never	23 (92)	49 (85.9)	69 (67.6)	69 (57.9)	
Ecstasy OR medicines	2 (8)	7 (12.3)	25 (24.5)	36 (30.2)	
Ecstasy AND medicines	0 (0)	1 (1.74)	8 (7.8)	14 (11.7)	
Have been treated for alcohol dependence in the last 12 months	1 (4)	4 (7.1)	20 (20.0)	21 (17.8)	0.053

* chi-square.

dependence itself, psychiatric comorbidities and/or social exclusion.

The individuals who have used more than one variety of unrecorded alcohol had a higher prevalence of using other drugs such as cocaine, amphetamines and non-prescribed medicines, injecting drugs, and exchanging sex for money. Previous studies have reported on the frequent association between alcohol and cocaine misuse (Martin et al., 1996), but the use of unrecorded alcohol and cocaine has not been described to the best of our knowledge. Polysubstance users are often vulnerable populations with many different health and social harms and risks: they are at higher risk for HIV infection (Wei et al., 2012), and once infected, they have

a worse prognosis than people who do not use different substances (Kapadia et al., 2005; Mayer et al., 2012). They also have a higher prevalence of mental health diseases and suicide (Smith et al., 2011; Hakansson et al., 2011).

Crack use has increased in Brazil and is currently the cheapest variety of cocaine available in Rio de Janeiro's drug scenes. The concurrent use of cocaine and unrecorded alcohol may be associated with serious risks and harms since cocaethylene – a metabolite resulting from the simultaneous use of cocaine and alcohol – is highly toxic (Snozek et al., 2012). The increased odds of using more than one variety of unrecorded alcohol among individuals who used cocaine and crack also reinforces that the more deprived the

Table 2Covariates found to be associated with the use of more than one variety of unrecorded alcohol by logistic regression. Rio de Janeiro, 2010 ($n = 343$).

	Unadjusted OR (CI 95%)	Adjusted OR (CI 95%)
Male	1.33 (0.66–2.58)	0.75 (0.31–1.74)
Age bracket		
18–31 years old	1	1
32–45 years old	1.61 (0.87–3.00)	2.21 (1.05–4.80)
>45 years old	1.54 (0.82–2.91)	2.67 (1.23–5.94)
Occupation		
Employee/civil servant	1	1
Self-employed/employer	0.37 (0.05–1.41)	0.41 (0.05–1.90)
Unemployed	0.31 (0.04–1.17)	0.22 (0.03–1.04)
AUDIT score > 20	13.06 (5.61–34.55)	11.21 (4.56–30.96)
Use of powder/crack cocaine in the last 12 months		
Never	1	1
Cocaine powder OR crack	1.33 (0.69–2.55)	1.06 (0.49–2.27)
Cocaine powder AND crack	2.55 (1.30–5.03)	2.29 (1.02–5.21)
Use of ecstasy/non-prescribed medicines in the last 12 months		
Never	1	1
Ecstasy OR medicines	3.48 (1.70–7.92)	4.05 (1.74–10.47)
Ecstasy AND medicines	10.06 (2.05–242.87)	16.65 (2.31–390.21)
Have been treated for alcohol dependence in the last 12 months	3.42 (1.41–10.37)	3.64 (1.25–13.49)

individual, the higher his/her chance of using unrecorded alcohol. The association between the use of unrecorded alcohol, ecstasy, and other unprescribed medications should be evaluated by future studies. Our sample was too small to better assess the concomitant use of such substances, as can be noted by the large confidence intervals.

Despite the severity of alcohol misuse, only 13.4% (46/343) of participants had received any treatment for alcohol dependence in the 12 months preceding the interview. Receiving any treatment was associated with higher odds of using more than one variety of unrecorded alcohol. It is important to note that the cross-sectional design of the study precludes inference about the directionality of associations and this finding is likely to be associated with the identification of alcohol problems. One could speculate that only those individuals with extremely severe conditions had received diagnosis and interventions to address alcohol misuse. This situation may reflect the lack of addiction treatment services, the lack of screening services for less severe cases, and the underdiagnosis of alcohol disorders (Mitchell et al., 2012).

This study's limitations include: (1) inclusion criteria were very restrictive and only individuals with harmful alcohol use were recruited; (2) beverages smuggled across the country's borders and special unrecorded "cachaças" were not evaluated, so data cannot be used to estimate the size of this illicit market; (3) there was no objective measures of alcohol/drug use, so it is possible that memory bias or social desirability bias may underestimate the actual prevalence of alcohol/drug use.

This study has shown that unrecorded alcohol users in Rio de Janeiro are a marginalized, polysubstance-using population. Despite the severity of their health and socioeconomic situation, these individuals had restricted access to health treatment. Interventions are sorely needed to reach such populations and link them to proper care.

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Contributors

RDB conducted preliminary analysis and wrote the first draft of the manuscript. NB and FIB designed the study and supervised data collection. LB conducted statistical analysis. All authors contributed to and have approved the final manuscript.

Conflict of interest

The authors declare no conflict of interest.

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