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MANUFACTURING HOMEMADE ALCOHOL IN THE CITY OF TSHWANE, SOUTH AFRICA

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ABSTRACT

This study aimed to determine the prevalence of home-based manufacturing of alcoholic beverages in townships/peri-urban households and to examine whether certain characteristics (such as household, demographics and drinking behaviour of participants who reported brewing of alcohol in their homes) predicted home brewing of alcohol. The study utilized data from South African arm of International Alcohol Control study conducted in the city of Tshwane. A household survey used multi-stage stratified cluster random sampling. Homemade alcohol was defined as participants who reported home-based alcohol brewing at their homes. Stata Version 14.0 was used for analyses. Nine percent of the sample reported brewing of alcohol in their households. Race, employment of the main income earners and number of eligible members in the household have predicted home-based alcohol brewing. The study raised important questions about the prevalence of home brewing of alcohol in the city of Tshwane as it might be a common practice in other cities.

Keywords: Homemade alcohol, alcohol brewing, South Africa

INTRODUCTION

Brewing and consumption of alcohol in Southern Africa started during the pre-colonial period, long before the arrival of European settlers (Gumede, 1995; François Lyumugabe, Gros, Nzungize, Bajyana, & Thonart, 2012; Simatende, Gadaga, Nkambule, & Siwela, 2015). As part of traditional cultural practices alcohol has been used to celebrate military victories, to show hospitality, for joy and pleasure,

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to commemorate the dead, to celebrate births, and to "seal" a business deal (Bobrova, 2012). Currently it is difficult to imagine any special occasion without consumption of alcohol in South Africa.

Almost every South African ethnic group has found a way to manufacture alcohol. The type of alcohol brewed for consumption during cultural and traditional activities is mostly African traditional beer known as "Umqombothi". This beer is often brewed using locally grown foods such as maize, sorghum and yeast, and it takes about four to 14 days to manufacture (Manganyi, 2015; Setlalentoa, Pisa, Thekisho, Ryke, & Loots Du, 2010). The level of potent in traditional beer depends on fermentation period and no one knows level of absolute alcohol it has (Madlala, 2016). Also,lack of monitoring during fermentation process could lead to alcohol being contaminated (Morris, Levine, Goodridge, Luo, & Ashley, 2006). The World Health Organisation (WHO) as well has asserted that the tools used for preparing home-brewed alcohol are often not sterilised (Pitso, 2007; WHO, 2004).

Homemade distilling of alcohol for sale without a license is unlawful in South Africa. However, many who carry out this activity ignore these regulations to provide for themselves and their families in a context where jobs in the formal sector are scarce. Manufacturing alcohol for sale is therefore mostly carried out by poor, disadvantaged people (Makhubele, 2012). Consumers of home-brewed alcohol, on the other hand, purchase it as an alternative to buying expensive alcohol or sometimes due to personal preference. The price difference between commercially manufactured, branded alcohol and homemade alcohol is often substantial (Fieldgate et al., 2013).

Homemade alcohol is mostly harmful, especially in areas where brewers are inexperienced and use harmful ingredients when manufacturing. Reports about illnesses caused by home-brewed alcohol have been published in many countries. In some instances, home-brewed alcohol caused liver damage, feeling unwell, vomiting, blindness and even death. The harmful effects of consuming home-brewed alcohol fall more on the powerless sectors of society as well as older members of society who tend to be more likely to consume such products (Collins, 2013; Dadpour, Bagheri-Moghaddam, R., Arabi, & Tamijani, 2016; Radaev, 2015), and in South Africa among Black Africans (Laher, Goldstein, Wells, Dufourq, & Moodley, 2013).

The World Health Organization estimated that a quarter of all alcohol consumed globally is unrecorded, and manufactured or sold without government control (Makhubele, 2012; WHO, 2004, 2014a). In 2014 the World Health Assembly approved the WHO Global Strategy to Reduce the Harmful Use of Alcohol (WHO, 2014b). Among the strategies proposed was reducing the public health impact of illegal alcohol and informally produced alcohol. The long-term plan includes; to legalize unrecorded alcohol, with subsequent quality control and to instruct the producers of unrecorded alcohol on how to avoid the problems arising from manufacturing (WHO, 2010).

In many South African rural areas, women who are aged between 20 to 51 and more, have been found to be the manufacturers of homemade alcohol (Manganyi, 2015). Homemade alcohol is produced in needy rural villages and homes, prompting researchers to conclude that most manufacturers are

illiterate and without formal education (Manganyi, 2015). Mostly, studies have focused on the use of homemade alcohol in rural areas of South Africa (Manganyi, 2015; Onya, Tessera, Myers, & Flisher, 2012; WHO, 2010), while such practices in townships and peri-urban and urban areas have received less attention. Unrecorded and non-commercial alcohol, however, remains a concern that needs special attention because of large number of the population believed to consume such alcohol, and the harms associated with the use of such products that surface periodically (Platt, 1955). The purpose of this study was to determine the prevalence of home-based manufacturing of alcoholic beverages in townships/peri-urban households and to examine whether certain characteristics (such as household, demographics and drinking behaviour of participants who reported brewing of alcohol in their homes) predicted home brewing of alcohol.

METHOD

Sample

The data used in this study is from the South African arm of the multi-country International Alcohol Control (IAC) study (Casswell et al., 2012). This cross-sectional study was conducted in 2014 in the City of Tshwane Metropolitan Municipality, located around South Africa's executive capital. The study used a multi-stage stratified cluster random sampling design, which involved selecting communities, i.e. wards (municipal voting districts) consisting of formal communities, informal communities, and townships; census enumeration areas (EAs) within selected communities; and then households within selected EAs. From the selected households, we randomly selected one adult. Eligible, participants had to have consumed alcohol in the past 6 months and be 18 to 65 years old. When no participants were available at the randomly selected households, the households were replaced with the next available one. The target sample size of adults was determined by the IAC study (Casswell et al., 2012). The overall response rate was 78% (Parry, Trangenstein, Lombard, Jernigan, & Morojele, 2018).

Measures

The IAC survey (Casswell et al., 2012) was adapted for use in South Africa. The standard English IAC questionnaire was translated into the most commonly spoken languages (seTswana and Afrikaans) in the city of Tshwane (Parry et al., 2018). This paper used the following measures:

Home-based manufacturing of alcohol:

In addition to the core questions in the IAC questionnaire, various supplementary questions about behaviours that are important for South Africans were included. Supplementary questions relevant to this study was: "Do you or anyone else in your household manufacture/brew your/their own alcohol beverages?" Some items (such as "don't know" or "refused to answer") were deleted. The dichotomous variable (yes/no) was analysed.

Demographics of participants who reported alcohol brewing in their homes:

Demographic characteristics included: *Gender:* male or female. *Age:* participants' ages were categorized as '18-19', '20-24', '25-34', '35-44', '45-54', and '55-65' years. *Marital status:* marital status included categories such as 'never married',

'married' and 'marital status other' (cohabiting, divorced, separated, widowed).

Drinking behaviour of participants who reported alcohol brewing in their homes:

Primary drinking location: The primary drinking location was defined as the location that the participants had reported drinking most regularly. For the participants who reported drinking in more than one location with the same maximum frequency, the location where the participant consumed a greater quantity of absolute alcohol was selected. Due to low participants' response and a lack of participants drinking at theaters, on planes, at workplaces, hotels, or sports events primarily, the locations were categorized into alcohol consumption at own home; someone else's home, nightclub, outdoors, bars/pubs/taverns and other locations.

Primary beverage: The primary beverage was defined as alcoholic beverages which were consumed at the primary drinking location. The beverage types were selected by determining the beverage that the participant drank with maximum quantity of absolute alcohol at the primary drinking location. The primary beverage variable had 13 beverage types: beer; low alcohol beer; home brew beer; stout; wine; spirits; cocktails; liqueur; shooters; sherry, port, or vermouth; cider; and alcopops. Given the low response for some beverage types, primary beverage types were categorized into beer, wine, spirits, cider and other drinks.

Beverage container size: Beverage container size is defined as the usual container size of the primary beverage at the primary drinking location, and was categorized into below average, average and above average. Average container size was defined as the container size closest to a standard drink (i.e., 330 ml for beer; 330 ml for low alcohol beer; 500 ml for home brew beer; 330 ml for stout; 150 ml for wine; 30 ml for spirits; 30 ml for cocktails; 50 ml for liqueur; 25 ml for shooters; 50 ml for sherry, port, or vermouth; 330 ml for cider; 330 ml for alcopops; and 330 ml for other alcohols) (Trangenstein, Morojele, Lombard, Jernigan, & Parry, 2018).

Household characteristics predicting home brewing of alcohol:

Race: South African official race categories were used: 'black African' (of African descent), 'White' (of European descent), and 'Coloured' (mix of African, European and/or Asian descent).

Total annual household income: total annual household income was categorized into 'low' (R30,000 or less), 'medium' (greater than R30,000 but less than or equal to R200,000), and 'high' (greater than R200,000) (1 US dollar is approximately 15 South African Rands).

Employment status of main income earner: Employment status of main income earner was categorized as 'employed' (any paid employment), 'self-employed' (any self-employment) and 'unemployed' (unemployed, students, pensioner/retired).

Number of eligible members in the household: all household members who were eligible to participate in the survey (aged 18-65 years old, and consumed alcohol in the last six months).

Procedures

After obtaining informed consent, participants were interviewed in their homes

by trained interviewers. This approach was adopted due to the complexity of the questionnaire.

Interviews were administered on a tablet. After the interview, participants received a resource card for alcohol-related problems as well as a shopping or a cellular recharge voucher worth R30 ($2). The Research Ethics Committee of the South African Medical Research Council approved the study protocol, measures and procedures.

Survey Design and Analysis

Data were weighted to consider the complex sampling design. At Stage 1, wards were the primary sampling unit of the survey. Wards were stratified by region and majority race group and this resulted in three strata and selected proportional to the population size (18 to 65 years) within each stratum. The population information from the 2011 census was used.

Post hoc stratification weighting was therefore applied to have the approximate census distribution in the sum of the weights across the 16 strata plus the total weight approximately equal to the census population of 2.9 million people of the Tshwane study area. Finite sampling correction information for each stage was setup for the survey design to improve precision.

Taylor series linearization approximations (Wolter, 2007) were used to account for the complex multi-stage sampling as implemented in the "svy" prefix in Stata version 14.0 (StataCorp, 2015). Bivariate analyses were performed using cross-tabulation and chi-squared tests to assess percentages and the significance of differences between participants/ households who reported brewing their own alcohol and those who did not. Variables which were found in bivariate analyses to be significantly associated (at $p<0.05$) with home-based alcohol brewing were entered into multiple logistic regression. This was done in order to identify associations between all selected variables (demographics, drinking behaviour and household characteristics) and home-brewed alcohol. The multivariate approach was chosen to allow us to examine the specific effects of single predictors when others were controlled for (Møller, Haustein, & Prato, 2015). Multicollinearity was assessed by examining correlations between predictors. No two predictors had a correlation of more than 0.5. P-values less than 0.05 were considered statistically significant.

RESULTS

Sample characteristics

The sample included 1918 adults. The mean age was 33 years (SD = 12). Nine percent (95% CI: 7.8%, 10.3%) of participants aged 18 - 65 years (n=174) had reported the brewing of alcohol in their homes. A greater proportion of participants who reported brewing of alcohol at their homes were more likely to be single (never married) as compared to those who did not report brewing (72.8 vs. 53.8). Beer was a primary beverage for participants who reported alcohol brewing at their household (44.1%). In terms of racial breakdown, a large proportion of households that brewed alcohol were of black African descent (98.3%) (See Table 1), and the majority of main income earners in such households were employed (78.2%). Forty-seven percent

of the alcohol-brewing households had 3 to 4 members who were eligible to participate in the survey. Alcohol brewing did not differ by gender (X^2=1.0, p=0.602), age (X^2=18.4, p=0.075), primary drinking location (X^2=21.5, p=0.192), beverage container size (X^2=13.0, p=0.124) and total annual household income (X^2=7.5, p=0.322).

Multiple logistic regression

Table 2 summarizes the results from multiple logistic regressions, i.e. the odds of alcohol manufacturing on various variables related to demographics, drinking behaviour and household characteristics while controlling for other variables included in the model. Participants who drank other drinks (such as low alcohol

Table 1. Manufacturing of homemade alcohol by demographics

	Manufacture Homemade alcohol	
	(n=174) N (%)	**(P-Value) (F-statistic)**
Gender		(p=0.602)
Male	111 (59.0)	(F=0.28)
Female	63 (41.0)	
Age		(p=0.075)
18-19	9 (5.8)	(F=2.19)
20-24	44 (32.8)	
25-34	55 (30.3)	
35-44	32 (17.3)	
5-54	18 (6.8)	
55-65	16 (7.1)	
Race/Ethnicity		(p<0.001)
Black African	165 (98.3)	(F=16.90)
Coloured	6 (0.8)	
White	3 (0.9)	
Marital Status		(p=0.002)
Married	45 (22.3)	(F=8.68)
Never married	8 (3.1)	
Marital status other	116 (74.6)	
Total Annual Personal Income		(p=0.311)
Low	117(71.3)	(F=1.14)
Medium	30 (24.2)	
High	6 (4.5)	
Education		(p=0.439)
Primary	25 (9.1)	(F=0.83)
Secondary	101 (72.2)	
Tertiary	27 (18.8)	
Occupation		(p=0.062)
Unemployed	79 (48.5)	(F=3.06)
Students	20 (13.3)	
Employed	75 (38.2)	

Table 2. Multiple logistic regression of homemade manufacturing of alcohol

	Homemade Alcohol Manufacture			
	AOR	**Test statistic**	**95% CI**	**P-Value**
Gender				
Male	(ref)	-	-	-
Female	0.89	-0.22	0.32, 2.52	0.827
Age				
18-19	4.84	1.50	0.53, 44.06	0.151
20-24	0.84	-0.29	0.24, 2.90	0.774
25-34	0.72	-0.54	0.20, 2.57	0.595
35-44	0.84	-0.31	0.25, 2.79	0.761
45-54	0.14	-2.77	0.03, 0.62	0.012
55-65	(ref)	-	-	-
Race/Ethnicity				
Black African	(ref)	-	-	-
Coloured	0.16	-3.12	0.05, 0.55	0.006
White	0.04	-3.16	0.01, 0.34	0.005
Marital Status				
Married	(ref)	-	-	-
Never married	1.97	1.38	0.71, 5.52	0.182
Marital status other	1.69	0.83	0.45, 6.35	0.415
Total Annual Personal Income				
Low	(ref)	-	-	-
Middle	1.90	1.60	0.82, 4.39	0.125
High	1.40	0.46	0.30, 6.50	0.648
Education				
Primary	(ref)	-	-	-
Secondary	0.91	-0.21	0.38, 2.19	0.833
Tertiary	1.15	0.29	0.42, 3.14	0.774
Occupation				
Students	(ref)	-	-	-
Employed	0.36	-2.00	0.12, 1.05	0.060
Unemployed	0.50	-1.35	0.17, 1.47	0.193
Primary Location				
Home	(ref)	-	-	-
Someone Else's Home	0.47	-1.11	0.11, 1.96	0.282
Nightclub	0.29	-1.36	0.04, 1.95	0.189
Outdoors	8.71	2.44	1.56, 55.85	0.025
Pub	0.47	-1.39	0.15, 1.47	0.180
Other locations	0.22	-1.62	0.03, 1.55	0.122
Primary Beverage				
Beer	(ref)	-	-	-
Wine	1.27	0.22	0.13, 12.28	0.831
Spirits	0.16	-2.18	0.03, 0.93	0.042
Cider	2.22	1.66	0.81, 6.06	0.113
Other drinks	4.06	2.74	1.39, 11.85	0.013
Primary Container				
Below Average	(ref)	-	-	-
Average	0.24	-2.21	0.06, 0.93	0.039
Above Average	0.65	-0.77	0.21, 2.07	0.451
Frequency of Drinking				
Daily drinking	(ref)	-	-	-
More than daily	1.10	0.26	0.51, 2.40	0.797
Heavy Drinking				
No	(ref)	-	-	-
Yes	1.63	1.32	0.75, 3.51	0.202
Symptoms of Alcohol Problems				
No	(ref)	-	-	-
Yes	1.06	0.16	0.47, 2.41	0.878

beer, home brew beer, stout, cocktail, shooters, sherry/port/vermouth and alcopops) were 4 times more likely to report alcohol brewing in their homes as compared to participants who drank beer (AOR: 4.33; 95% CI: 1.08-17.35; p=0.040). Being coloured and being white was less likely to be associated with alcohol brewing as compared to being black African (AOR: 0.11; 95% CI: 0.03-0.37; p = 0.001), (AOR: 0.03; 95% CI: 0.00-0.33; p=0.006). Unemployed main income earners were also predictive of home-based alcohol brewing, as compared to employed main income earners (AOR: 2.47; 95% CI: 0.99-6.20; p=0.049). The households with 5 or more members who were eligible to participate in the survey were 5 times more likely to brew alcohol, as compared to households with 1 to 2 eligible members. Marital status was not significantly associated with home-based brewing of alcohol.

DISCUSSION

Brewing of alcohol in South African peri-urban and township households is under researched, and there is larger proportion of the total sample who reported such practice in their homes (9%). Studies show that home-brewing of alcohol is a very important activity throughout Africa and is a key aspect of some households' economies (François Lyumugabe et al., 2012; Simatende et al., 2015). However, many African brewers have used unorthodox and poisonous ingredients to fasten fermentation and to make their brews more potent, without taking into consideration the health aspects of the consumers (Makhubele, 2012; Pitso, 2007). Our study investigated prevalence of home-based brewing of alcohol in general, without looking at the production, type of alcohol and people who consume them.

More specifically, our findings show that Whites and Coloureds had lower odds of reporting home-based brewing of alcohol, as compared to black African. This finding mirrors previous research which demonstrate the prevalence of brewing alcoholic beverages by black Africans in South African rural areas. Over 90% percent of households in Bushbuckridge (Limpopo province) have collected marula fruit mainly to make homemade beer (Shackleton & Shackleton, 2002). "Umqombothi" is also commonly made in many black African communities in South Africa (Katongole, 2008; Novellie, 1966). The only distinguishing characteristics of these products are the differences in the quality of ingredients, utensils used, and preparation times (Simatende et al., 2015). In this study, the dominance of black South African brewers is also seen in townships/peri-urban areas.

There are many reasons for brewing alcohol in black South African communities, lack of jobs, money and poverty are the key elements affecting the whole country (Makhubele, 2012). Our results confirm that unemployed main income earner had higher odds of reporting alcohol brewing than employed main income earner in the household. Manganyi (2015) indicated that brewers of home-based alcohol have been in the forefront in pushing back the boundaries of poverty lines within their communities (Manganyi, 2015). Additionally, poverty could lead to certain attitudes, behaviours, and life conditions which contribute to home-based alcohol production.

In a systematic review, Lyumugabe et al. (2012) identified eighty studies that

looked at main African traditional sorghum beers and how they are brewed (François Lyumugabe et al., 2012). These traditional beers were "Ikigage" from Rwanda (F. Lyumugabe, Kamaliza, Bajyana, & Thonart, 2010), "Tchokoutou" from Benin (Polycarpe Kayodé, Adegbidi, Hounhouigan, Linnemann, & Robert Nout, 2005), "Bili bili/Amgba" from Chad (Maoura, Mbaiguinam, Nguyen, Gaillardin, & Pourquie, 2005), "Burkutu" from Nigeria and Ghana (van der Aa Kühle, Jesperen, Glover, Diawara, & Jakobsen, 2001), "Pito" from Ghana (Sefa-Dedeh, Sanni, Tetteh, & Sakyi-Dawson, 1999), "Dolo" from Burkina Faso (Sawadogo-Lingani et al., 2007), and "Doro/Chibuku" from Zimbabwe (Jespersen, 2003; Togo, Feresu, & Mutukumira, 2002). Even though most African countries have similar way of brewing alcohol, the difference is on the type sorghum and the micro-organisms involved in the fermentation. None of the studies have looked at the specific reasons for brewing, however, this serves as an evidence that various African countries are brewing their own traditional beers. Contrary to other studies, our results have shown that households with five or more members (18-65 years old) are more likely to brew alcohol than households with fewer members. Also, this suggests that home-brewed alcohol might be manufactured for supporting family members (through selling).

This study had various limitations. The data are specific to the Tshwane Metropolis, and it is unknown whether the findings are generalizable to other South African cities. It is possible that there are some households brewing homemade alcohol, but the interviewed participants were afraid to disclose. Therefore, the data may not represent all persons who manufactured alcohol and thus our findings could under-estimate the true extent of home-based brewing of alcohol. We also did not include people who are over 65 years old in the study and thus our findings may not be representative of all brewers of alcohol. Furthermore, survey questions about home-brewed alcohol did not cover the types of alcohol brewed, and also did not look at the content quality or possible contaminants. Such assessment should be a topic for future research, directly evaluating the home-brewed products to assess their alcohol levels and contaminants.

CONCLUSION

This was one of the first studies in South Africa to investigate home-brewing of alcohol in townships/urban households. It showed that unemployment of the main income earners and number of household members can be associated with home-based alcohol brewing. Importantly, it raises questions about the percentage of households believed to brew alcohol. In the present study, a single question assessment was used to ask home-based brewing of alcohol and further research is needed to investigate the types and consumers of such alcohol. Furthermore, it also showed that black Africans were more likely to brew alcohol at their homes. The intervention of government in terms of poverty reduction (through job creation) could possibly reduce the need for black Africans to be involved in the illegal practice such as home-brewing of alcohol. Alternatively, the government should review its alcohol laws and determine whether other interventions are needed to ensure that there

are certain safeguards in place. This study raises important questions about the prevalence of home brewing of alcohol in the city of Tshwane as it might be a common practice in other cities.

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CONFLICT OF INTEREST

Nil.

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