

Alcohol consumption patterns and  
association with the CAGE questionnaire  
and physiological variables in the  
Seychells Islands (Indian Ocean)

# S E Y C H E L L E S

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# Background

Drinking has been a long-standing public health problem in Seychelles. Previous reports based on sales data, which do not account for homebrew drinking, have shown high consumption of beer and spirits in Seychelles (Finnish Foundation for Alcohol Studies, 1977). High alcohol consumption in the country is consistent with a large proportion of the household budget being spent on purchasing alcoholic beverages [20% in the 1960s and 1970s (Benedict & Benedict, 1982) and 22% in 1983 and 1993 (Larue, 1996)] and high rates of alcohol-related admissions to hospital e.g., 33% of male admissions to medical wards, often for alcohol-related cardiomyopathy (Pinn & Bovet, 1991) and 38% of all admissions to psychiatric wards (Jeyakumar, In press). More generally, the population and the authorities are well aware of the large magnitude of the medical and social problems related to alcohol abuse. Several control and preventive programs have been taken by governmental and non-governmental organisations in this regard. However, while consumption based on sales data is readily available, little is known on homebrew drinking in the country as most of the production of these indigenous homemade drinks is unregistered and escapes control.

Two population-based health surveys were conducted in 1989 (Bovet *et al.*, 1991a) and in 1994 (Bovet *et al.*, 1997). Both surveys were first aimed at assessing levels of cardiovascular risk factors in the population (Bovet *et al.*, 1991b) as cardiovascular disease has become the major cause of mortality in the country, accounting for more than 35% of all deaths over the last years. Because it is an important factor associated directly with dilated cardiomyopathy and indirectly with ischaemic heart disease, alcohol consumption was assessed in the two surveys. The self-reported nature of the data and the population-based design gave unique opportunities to assess homebrew consumption in the general population. In addition, the survey in 1994 examined the performance of the four-question CAGE questionnaire, an easy-to-perform screening tool to detect heavy drinking (Stockwell *et al.*, 1979; Ewing, 1984). Finally, the surveys gave opportunity to examine the relation between alcohol intakes and various biochemical and physiological variables in the general

population, particularly with regards to serum lipids (Fontana *et al.*, 1999).

## The Seychelles

The Republic of Seychelles consists of 115 islands in the Indian Ocean, approximately 1800 kilometres east of Kenya and 1800 kilometres north of Mauritius. The climate is tropical with abundant rain and vegetation throughout the year. After having been administered by France until 1815, then by the United Kingdom, Seychelles gained political independence in 1976. According to a National census in 1994, the total population was 73,442 and 30.4% of the population was less than 15 years old, 49.3% less than 25 while only 5.6% was aged 65 or more. Thus the population aged 25-64 accounts for 45.1% of the total population. Around 89% of the total population live on the largest island, Mahé. Although intermarriage has blurred racial differences in many Seychellois, it is considered that approximately 65% of the population is of predominantly black African descent, 10% of predominantly Caucasian descent and 5% of predominantly Indian or Chinese descent, with the remaining 20% being mixed between these various groups. The standard of living has improved markedly in recent decades, which is concurrent with a dramatic increase in the tourism industry following the opening of the international airport in 1971. Gross domestic product (GDP) per capita increased from US\$ 600 in 1976 to US\$ 5,850 in 1994 and the World Bank considers Seychelles to be now a middle-income country.

## Social background

The islands had no indigenous population until French colons and African slaves settled in 1770. These settlers were joined over the next decades by African indentured labourers released from slave ships and later, by small numbers of Indian and Chinese immigrants (Fauvel, 1909). The African population came from East and Central Africa and Madagascar, but they were unable to retain any tribal organisation after arriving in the Seychelles under conditions of slavery and indenture (Fauvel,

1909). Due to economic reliance on cash crops (e.g., vanilla, cinnamon and copra to some extent) rather than food crops, it has been claimed that the Seychelles society has not developed long-standing traditions and has relied much on the exchange of goods, particularly money, to regulate interpersonal relations (Benedict & Benedict, 1982). These authors claim that the different earning capacities between genders (men earning wages and women taking care of children and doing housework) provide important clues for understanding the contrasted behaviours, including drinking habits, between men and women. Beginning with culture traits derived from France by way of Mauritius and to a lesser extent from Africa and the East, and later from Britain, the Seychellois have developed their own way of doing things and they share the same language, customs, religion and values (Benedict, 1966). This homogeneity and distinctiveness about the culture of Seychelles contrasts, for example, with the plural society of the neighbouring Mauritius island where French, English, Indian and Chinese cultural traditions have been maintained by various sections of the population (Benedict, 1961). The Seychelles has experienced dramatic socio-economic development over the two last decades, which is likely to have accelerated acculturation phenomena. In this respect, Seychelles may now more resemble other rapidly developing small tropical island states than continental Africa to which Seychelles geographically belongs.

## Alcohol beverages available in Seychelles

The common alcoholic beverages available in the Seychelles are commercially marketed beer, spirits and wines or indigenous homebrew produced at home or in (often unlicensed) semi-commercial plants. More than 90% of the beer consumed is produced locally (Lager, Guinness) while spirits and wines are imported. Of the homebrew, 'kalou' or palm toddy is made of fermented palm sap, 'baka' of fermented sugar-cane juice and 'lapire' of fermented juice of various vegetables (e.g., potatoes, lentils) or fruits. Baka and lapire tend to be considered together (consequently referred to as 'baka'). Commercial sugar is often added to boost their alcohol content and they have similar final

alcohol content. Homebrew is usually consumed within days of the fermentation being completed. A survey conducted in 1996 by the Seychelles Breweries Ltd. indicated that there were 544 outlets (1 for 137 inhabitants; all licensed) selling beer, wines and spirits and 1055 outlets (1 for 71 inhabitants; 22 licensed) selling homebrew (communication by M. Racombo, sales and distribution manager, Seychelles Breweries Ltd.). Availability and price of homebrew do not materially vary over time or across regions of the country.

## History of alcohol consumption

High alcohol consumption has been reported since the early history of Seychelles. In 1852, the Chief Civil Commissioner of Seychelles complained to the Colonial Secretary in Mauritius of the 'manufacture and consumption at almost every cottage of deleterious fermented drinks made from the sugar cane, pineapple and cocoa-nut' (Seychelles Archives B-31: 280). In 1903, the Governor wrote to the Secretary of State for the Colonies to report high numbers of police prosecutions for drunkenness. He believed that 'the great increase in drinking was due to the increasing amount of wages in circulation and higher wages being paid for all forms of indentured labour' and that 'more education was needed' (Seychelles Archives C/AM/8). Based on the number of licensed palm trees producing toddy, locally-produced beer and imported other drinks (but not counting baka and other homebrew), men over the age of 15 were reported to drink 3 litres of alcoholic beverages per day in 1972 (Benedict & Benedict, 1982). Another estimate in 1972 based on the consumption of wine spirits and beer (thus not counting homebrew) showed per capita consumption in Seychelles slightly smaller than that in France and Germany but higher than in Britain and much higher than in Barbados (Finnish Foundation for Alcohol Studies, 1977). Independence has not diminished government concern about drinking. Soon after independence, a leading article in the government paper proclaimed, for example, that 'the scourge of alcoholism must be fought by every means' (*Nation*, 1st October 1977, p2). Substantial efforts have been made over the last 20 years to curb drinking. These include the establishment of a national task force on alcohol

abuse, the broadcast of many educational and prevention programs on the mass media and, more recently, an Alcoholics Anonymous group, a telephone hot line for those affected by alcohol abuse and a day-care rehabilitation centre for alcoholics.

### **Traditional alcohol consumption patterns**

Male labourers traditionally often stop by the yard of a seller of toddy or baka, purchase a bottle, drain it and go their way. Men can also meet with neighbours or work mates near a shop, at a homebrew seller's, on the beach or on the road and have a few beers or some homebrew while chatting or playing dominoes. Men traditionally do not often bring alcohol beverages (particularly homebrew) to their own houses, as this is apt to engender disputes with their wives, much on the basis that alcohol consumption drains money from the household budget. However, alcoholic beverages are also consumed in large amounts, particularly by men, at parties held at home to celebrate important family events (e.g., first communions, confirmations, Christmas, New Year) or in community based social events (e.g., fancy fairs for the patron saint of a village or a church).

# Subjects and methods

## The Seychelles Heart Study II (1994)

### *Study sample*

The Seychelles Heart Study II was conducted from July to December 1994. Detailed methods have been described elsewhere (Bovet *et al.*, 1997) (full text available on <http://www.seychelles.net/smdj>). Sampling was done using a simple age- and sex-stratified random sample of all residents aged 25-64 years living on the island of. Using computed data from National census carried out in 1987 which were thereafter regularly updated by the administrative authorities, 160 subjects were selected randomly within each of the eight sex- and 10-year strata. Among the initial sample of 1280 eligible subjects, respectively 28 men and 26 women were dead or abroad at the time the study was carried out and were consequently excluded so that 1226 subjects were eligible to participate in the study. Overall, 1067 out of the eligible 1226 individuals attended the study, for a response rate of 87% (82.4% of men and 91.7% of women). Letters to invite participants to the study could not be delivered by the postal services and were returned unopened to the study centre for 38 out of the 159 eligible persons (24%) who did not participate in the study.

### *Questionnaire and physical examination*

All participants were administered a questionnaire in the local Creole language by three experienced Seychelles health nurses in a face-to-face interview lasting approximately 30 minutes. The questionnaire included 207 questions pertaining to socio-demographic context, educational level, occupation, cardiovascular risk factors and dietary habits, as well as knowledge and attitudes on health and lifestyles including alcohol drinking. A description of the current or last job was requested and occupation was categorised at the time of the interview. Weight and height were measured and body mass index (BMI) was calculated as body weight (kg) divided by height squared (m<sup>2</sup>). Blood pressure was determined on the basis of the average of the last two of three readings, taken with a mercury

sphygmomanometer after subjects had sat in a quiet environment for at least 30 minutes. Participants were also submitted to an electrocardiogram, an ultrasonography of the femoral and cervical arteries and an echocardiography.

### *Alcohol consumption*

Questions on alcohol drinking followed the questions on dietary habits. To filter regular drinkers, all participants were first asked a frequency question: 'How frequently, on average, do you usually drink any alcoholic beverage?' referred to hereafter as 'a drink'. Possible answers were:

- ♦ Never
- ♦ Only on some occasions but less than once a week on average
- ♦ Once or twice a week on average
- ♦ Every other day on average
- ♦ Almost every day or every day.

Persons reporting to have a drink less often than '*Once or twice a week*' but not '*Never*' were categorised as occasional drinkers and were not asked further questions about their detailed alcohol consumption. Persons reporting to have a drink at least as often as '*Once or twice a week on average*' were considered as regular drinkers. These were further systematically questioned using five separate semi-quantitative food frequency questions, about their weekly average consumption of bottles of beer, kalou, baka or lapire, glasses of wine and measures of spirits (e.g., 'On average, how many bottles of beer do you drink in a week, including the week-end?').

### *CAGE questionnaire*

The four-question CAGE questionnaire was submitted to the subset of regular drinkers. The questions are the following: Have you ever felt you ought to cut down on your drinking? Have people annoyed you by criticising your drinking? Have you ever felt bad or guilty about your drinking? Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (Eye-opener)? (Stockwell *et al.*, 1979; Ewing, 1984). These questions were translated into Creole as

follows: *Ou'n deza santi ki ou dwatet diminyen kantite ki ou bwar? Eski dimoun i'n deza annwiy ou an dizan ou bwar tro bokou? Eski ou'n deza santi anbarase akouz ou bwar? Eski ou'n deza bwar premyen keksoz bomaten?* The CAGE questions were asked without implying a time referent, thus possibly reflecting the life-long experience of respondents.

### *Blood lipids and other variables*

Serum was obtained within an hour of blood collection and immediately frozen at -20° Celsius and lipid analyses were performed less than 1 year after blood drawing. Lipid analyses were performed at the Lipid Laboratory, University Medical Policlinic, Lausanne, Switzerland with the exception of lipoprotein (a) which was determined at the Canton Institute of Haematology and Clinical Chemistry, St-Gallen, Switzerland and thiamine which was analysed at Pasteur Institute in Lyon, France. Methods used to measure total cholesterol, high-density lipoprotein (HDL) cholesterol, particles Lp AI, particles Lp AI:II; triglyceride, apoproteins apo A1 and apo B, lipoprotein(a), sex hormone binding globulin (SHBG), free testosterone, estradiol, growth hormone, albumin, thiamine and carbohydrate-deficient transferrin (CDT) have been described elsewhere (Bovet *et al.*, 1997; Fontana *et al.*, 1999).

## **The Seychelles Heart Study I (1989)**

### *Study sample*

The Seychelles Heart Study I was conducted from April to September 1989. Detailed methods have been described elsewhere (Bovet *et al.*, 1991a). The sampling was done using a simple age- and sex-stratified random sample of all residents aged 25-64 years living on the island of Mahé. Using computed data from a national census carried out in 1987, which were thereafter regularly updated by the administrative authorities, 130 to 171 subjects were selected randomly within each of the eight sex- and 10-year strata. Among the initial sample of 1251 eligible subjects (652 men, 657 women), 37 men and 21 women were dead or abroad at the time the study was carried out and were consequently excluded so that 1251 subjects were eligible to

participate in the study. Overall, 1081 (513 men and 568 women) attended the survey, for a response rate of 86% (83.4% for males and 89.3% for females). Letters to invite participants to the study could not be delivered by the postal services and were returned unopened to the study centre for 52.9% of the 170 eligible persons who did not attend the survey.

### *Questionnaire, physical examination and blood collection*

All participants were administered a questionnaire in the local Creole language by three experienced Seychelles health nurses in a face-to-face interview lasting approximately 25 minutes. The questionnaire included 130 questions pertaining to socio-demographic context, educational level, occupation, cardiovascular risk factors and dietary habits. All participants also underwent a short physical examination and a blood collection.

### *Alcohol consumption*

Questions on alcohol consumption followed those on dietary habits. All participants were systematically asked 12 semi-quantitative food frequency questions to assess their average consumption for all six available alcoholic beverages (beer, spirit, wine, kalou, baka and lapire) both from Mondays to Thursdays and from Fridays to Sundays. For beer for example, all participants were asked 'On average, how many bottles of beer do you drink from Mondays to Thursdays?' and, in a separate question, 'On average, how many bottles of beer do you drink from Fridays to Sundays?'. The same questions were asked for bottles of baka, kalou and lapire, and for glasses of wine and pegs of spirits.

## **Differences in the two population-based surveys**

Alcohol consumption was assessed slightly differently in the 1994 and 1989 surveys. In 1994, respondents were first asked a question on their overall drinking frequency patterns and only participants reporting weekly consumption had their

consumption further quantified (thus, drinking volume by 'occasional' drinkers was not quantified). In 1989, participants were not questioned on their overall drinking frequency patterns but were all systematically submitted to several questions assessing their drinking frequency and volume for each of the beverages available in Seychelles. Assessment of alcohol consumption in the 1994 survey also differed from that of the 1989 survey in the following ways: 1) In 1989 consumption of baka and lapire was assessed in two different questions while in 1994 baka and lapire were considered together in one question; 2) Two questions for each beverage were used in 1989 to distinguish between consumption during workdays and week-ends, while one question was used in 1994 to assess the weekly consumption for each beverage. In both surveys, no more than five persons did not provide answers to any of the questions pertaining to the variables under consideration in this report. Missing data from blood analyses result from shortage of serum. Because of these methodological differences, direct comparisons of consumption figures in 1989 and 1994 will not be drawn and most results presented in this report arise from the 1994 survey. Data from the 1989 survey were used only to estimate the per capita consumption and prevalence and volume of specific alcohol beverages. However, per capita consumption, prevalence and volume of specific alcohol beverages in 1994 were published separately (Perdrix J *et al.*, 1999).

## Measurements

### *Measures of alcohol consumption*

For both surveys, average daily intake of ethanol in regular drinkers was calculated from the frequency of weekly units of alcoholic beverages (i.e. bottles of beer, kalou and baka, glasses of wine and pegs of spirits) and ethanol content for each type of beverage (thus a multiplicative function of a frequency and a volume measures). Questions on drinking frequency referred to a 'normal week' without specified time period referent. Noticeably, beer, spirit, wine, kalou and baka are generally available in Seychelles in only one type of bottle for

each beverage. The following values were used for volume of beverage and alcohol content:

- ♦ Beer: 0.3 litre bottle, 5.45 volume %
- ♦ Spirits: 0.05 litre measure, 43 volume %
- ♦ Wine: 0.2 litre glass, 12 volume %
- ♦ Kalou: 0.75 litre bottle, 8 volume %
- ♦ Baka and lapire: 0.75 litre bottle, 9 volume %

The alcohol content of beer was weighted for the contribution of 'Guinness' and 'Lager', which amount respectively to about 20% and 80% of sales and contain 7.5 volume % and 4.9 volume % alcohol respectively. The alcohol content of homebrew was determined from eight samples of each of the three local brews, which were collected in 1996 at several semi-commercial plants throughout the country. Alcohol content of homebrew was determined at the Laboratory of Analytic Toxicology, Institute of Legal Medicine, University of Lausanne in Switzerland, less than two weeks after they were purchased. Analysis was performed using gas chromatography with flame ionisation detection, introduction by head-space and direct injection, and separation on either Carbowax 20 (partition chromatography) or Chromosorb 102 (adsorption chromatography). No significant amount of methanol or formaldehyde was detected. Previous analyses conducted in 1989 in a UK laboratory on fewer samples showed similar alcohol contents (Pinn & Bovet, 1991). Categories of drinking frequency appearing in the tables correspond to the original categories of the questionnaire. Drinking volume categories were arbitrarily defined (e.g., 1-60 ml/day, 61-150 ml/day, and more than 150 ml/day).

### *Per capita consumption*

The reported per capita alcohol consumption of the population aged 25-64 was adjusted for the actual distribution of the population in 1989. Extrapolation to the population aged more than 14 and to the total population was also performed to permit some comparison of figures in Seychelles with figures from other countries (sales data often use the population aged more than 14 or the general population as the denominator). The following assumptions were made for these extrapolations,

which are believed to be conservative in the context of Seychelles (thus, the resulting per capita estimates would be likely to indicate lower limits of the true figures). Consumption by persons aged 15-24 was assumed to be half that of persons aged 25-34. Noticeably, consumption by adolescents aged 15 to 17 years is likely to be low as more than 95% of adolescents of that age attended, at the time of the surveys, a 2-year boarding school (National Health Service) where alcohol was unavailable and relevant control enforced strictly. Consumption by persons aged less than 15 was assumed to be null. Consumption by persons aged less than 15 is indeed likely to be unsubstantial as drinking by children is socially not tolerated in Seychelles. Consumption by persons above 64 years was assumed, probably conservatively, to be equal to half of that of the age-adjusted consumption in the population aged 25-64. In order to permit direct comparison with international data, estimates were also adjusted to the European Standard Population (United Nations, 1991) as the population from Seychelles is much younger than that from Western countries. For overall consumption per capita, gender was weighted by assuming that males and females accounted each for 50% of the population.

### *Statistical tests*

The Chi-square test was used to test for differences between categorical variables. Cuzik's nonparametric test, an extension of the Wilcoxon rank-sum test, was performed to test for trends of continuous variables across ordered groups. Non-parametric Spearman correlation coefficients were used to test the association between categorical variables. Multiple regression was carried out to examine the effect of alcohol on selected continuous variables, after adjustment for age, body mass index and smoking status.

### *Validity of reported consumption estimates*

The validity of the surveys estimates was assessed by comparing, for beer, self-reported consumption extrapolated to the entire population to sales data in 1989 and in 1994. Sales of imported and locally produced beer are available from the Statistics Division of the Seychelles government. Sales to tourists were deducted on the assumption that each tourist drinks one bottle of beer per day of stay (overall approximately 10% of the total sales).

# Results

**Table 1** shows the prevalence and daily volume of drinking by gender, age and beverage type in Seychelles in 1989. Across all ages, 75% of men and 29% of women drink alcohol, for a total prevalence of drinking of 50%. Prevalence of drinking does not seem to vary according to age among men. Overall, 67% of men drank beer, 26% spirits, 6% wine, 26% kalou and 28% baka. Daily volume per drinker was substantially higher in the 40-64 than 25-39 years of age groups in both men and women. With respect to alcohol derived from various beverages, drinkers of beer had 33 ml ethanol per day, drinkers of spirit had 26 ml, drinkers of wine 45 ml, drinkers of kalou 61 ml and drinkers of baka 73 ml. The amount of ethanol derived from homebrew was approximately twice as large as the amount of ethanol which drinkers drinking only commercial beverages had from commercial beverages (99 ml compared to 48 ml). Persons aged less than 30 drank less often homebrew, baka and kalou than older persons.

Data not displayed in the Table indicated that few homebrew drinkers did not consume commercial beverages as well (36 out of 249 [15%] in 1989). Drinkers of homebrew in the study sample had similar daily alcohol intake from commercial beverages than drinkers who did not drink homebrew (respectively 51.3 ml vs. 48.2 ml per day in 1994;  $p=0.8$ ) and this amount of alcohol derived from commercial beverages was not different (respectively 51.7 ml vs. 51.0 ml in 1994;  $p=0.9$ ) in drinkers who had high (>100 ml/day) or moderate (1-100 ml/day) amount of homebrew.

Due to small numbers of female drinkers, only broad categories ('commercial beverages' and 'homebrew') have been analysed for women. Smaller proportions of women drank homebrew but homebrew drinkers had higher alcohol amounts derived from homebrew. Higher proportions of women drank commercial beverages but had lower alcohol derived from these commercial beverages. Proportions of female drinkers tended to be lower in the 25-29 years category compared to the older age categories, particularly for homebrew.

**Table 2** shows per capita alcohol consumption estimates in the population aged 25-64 and estimates extrapolated to the population aged more than 14 and to the general population. Moderate

difference (often approximately 10%) was noticed when comparing age-adjusted estimates to unadjusted estimates for the population aged more than 14. For estimates in the entire population, unadjusted estimates were lower than adjusted estimates by up to 20-40%, consistent with the much younger population in Seychelles than in Europe. Based on the consumption in men aged 25-64, results indicate that more than half of the total alcohol intake was accounted by homebrew (55% [15.7% / 26.4%] in 1989) and that beer accounted for 66% [8.3% / 12.6%] of the total alcohol intake derived from commercial beverages. Self-reported consumption of beer extrapolated to the entire population corresponded to 62% of sales in 1989.

**Table 3** shows the association of drinking frequency with age and education among the participants of the 1994 survey. The small number of regular female drinkers precludes meaningful observation. In men, age did not relate strongly with the proportion of abstainers but older persons drank more often daily than young persons. The Spearman correlation coefficient between drinking frequency and age categories was weak and not statistically significant ( $r = 0.064$ ,  $p= 0.157$ ). Education was not associated with the proportion of abstainers but persons with lower education were more numerous to drink daily than persons with higher education (Spearman correlation coefficient between drinking frequency categories and education categories = - 0.141,  $p =0.005$ ).

**Table 4** shows the association of average daily drinking volume with age and education among participants of the 1994 survey. In this analysis, occasional drinkers (<1 drink per week) have been included in the 1-60 ml/day alcohol intake category. The small number of regular female drinkers precludes meaningful observation. For men, older persons drank higher volume than young persons (Spearman = 0.106;  $p=0.027$ ). Persons with little education drank higher volume than persons with higher education (Spearman = -0.290;  $p=0.000$ ).

**Table 5** shows that drinking frequency correlated strongly with volume of drinking in both genders (Spearman coefficient between these categories = 0.685,  $p=0.000$  for men and 0.584;  $p=0.000$  for women).

**Table 6** shows the response to the CAGE questionnaire by drinking frequency. Analyses related to the CAGE questionnaire are limited to regular drinkers and therefore do not include abstainers and occasional drinkers. The proportion of positive answers increased over drinking frequency categories for each separate CAGE question but the range of increase was modest for all questions (less than 25% range). The proportion of subjects with two or more positive answers to the CAGE also increased with drinking frequency, ranging from 53% to 74%.

**Table 7** shows the response to the CAGE questionnaire by volume of drinking. The largest increase in the range of response was observed for the 'Eye-opener' question that increased from 23% to 65% across the three considered categories of drinking. A CAGE score of at least two positive items had fairly high sensitivity since it detected approximately 90% of drinkers in the highest volume category. However the specificity was low with approximately 50% of the drinkers in the lowest volume category also answering positively to at least two CAGE items.

**Table 8** shows the univariate association between drinking volume and several blood lipids, thiamine, CDT, hormones, blood pressure, body mass index and smoking habits in men aged 25-64. Dose-dependent relationships with alcohol were found for all serum lipids examined except for triglycerides. For example, HDL-cholesterol increased by 38% from the lowest to the highest drinking volume. Blood pressure and smoking were also strongly associated with alcohol intake but body mass index was not. Thiamine was significantly lower in the highest drinking volume category compared to other drinking categories. Sex hormone binding globulin and free testosterone were associated with alcohol but not estradiol and growth hormone. Expectedly, carbohydrate deficient transferin was strongly associated with alcohol.

**Table 9** shows the regression coefficients of alcohol volume on selected variables in men aged 25-64, after adjustment for age, body mass index and smoking status. Such coefficients can be interpreted, for example, as follows: for HDL-cholesterol, consumption of >150 ml/d of alcohol is associated with an increase of 0.45 mmol/l compared to non-drinkers, independently of age, body mass index and smoking status. Dose-dependent independent relationships were found for blood pressure, LDL-cholesterol, HDL-cholesterol, apo A, LpAI:All, and CDT. A non-dose dependent decrease was found for SHBG and free testosterone. Heaviest drinkers tended to have low thiamine levels (the small number precludes statistically powerful analysis).

## Discussion

Using the same 25-64 age groups and similar methods, self-reported annual alcohol consumption was 26.4 litres per man and 3.2 litres per woman in Seychelles in 1989, compared to 9.4 litres per man and 3.3 litres per woman in Switzerland (Schmid & Gmel, 1996). Per capita estimates in Seychelles in 1994, not accounting for drinking by occasional drinkers, were consistent with 1989 findings with 20.7 litres per man and 1.2 litres per woman aged 25-64 years (Perdrix *et al.*, 1999). Considering that Switzerland has among the highest alcohol sales per capita in Western countries, this may indicate a high or very high alcohol consumption in Seychelles. The self-reported beer consumption corresponded to respectively 52% and 62% of the actual sales in 1994 and in 1989. With this approximately 50% underestimate in mind, the reported consumption per capita of total population in Seychelles (10.3 l in 1989, after adjustment to the European population) seems high compared to per capita sales in selected other countries, e.g., 11.4 litres in France, 9.7 litres in Switzerland, 7.5 litres in the United Kingdom, 3.8 litres in Cuba, or 1.6 litres in Singapore (World Drink Trends, 1995). As mentioned in the introduction, high consumption of alcohol in Seychelles is supported by the findings that alcohol accounted for a large proportion of the household budget of a labouring family (Benedict & Benedict, 1982; Larue, 1996) and a high frequency of hospital admissions related to alcohol (Pinn & Bovet, 1991; Jeyakumar, In press). Interestingly, very high alcohol consumption was also reported in Guadeloupe (Moutet *et al.*, 1989), a Caribbean island sharing with Seychelles a tropical climate and a Creole culture. In contrast, alcohol consumption seemed lower in the neighbouring Mauritius island with 17.6% of men and 0.7% of women reporting drinking at least 3 standard drinks per day (Pereira, 1998), which may relate to the Indian cultural background shared by large segments of the Mauritius population.

It is noticeable that more than half of the total alcohol intake in the population of Seychelles was derived from homebrew (55% in 1989). Although homebrew was consumed only by a minority of the population (38% of men; a few percents of women), mostly of low socio-economic status, homebrew drinkers had particularly high alcohol amount derived from these home made beverages.

Noticeably, toddy drinking volume decreased while that of baka increased in 1994 compared to 1989, which suggests a shift in consumption patterns from toddy to baka. This is consistent with a recent obvious decrease in the availability of palm sap toddy, possibly partly because toddy production requires that somebody climbs up to the top of palm trees to collect the palm sap every day, while baka can be produced more easily. The much lower cost per alcohol unit of homebrew, compared to beer or spirits (currently a 1:6 ratio), is however likely to be an important factor to further maintain homebrew drinking in segments of the population.

Standardised questionnaires for investigating weekly consumption, as that used in this study have been shown to be reliable instruments for measuring alcohol intake (Babor, Stephens & Marlatt, 1987). For example, a food-frequency questionnaire has been shown to measure alcohol-intake by regular drinkers as reliably and validly as a reference method consisting of repeated 7-day dietary records (Ferraroni *et al.*, 1996). In addition, our study showed a dose-dependent relation of reported alcohol intake with classical indicators of alcohol consumption, such as CDT or HDL-cholesterol. However, the self-reported consumption of beer estimated from the 1989 survey, extrapolated to the entire population, amounted to 62% of annual sales in these same years, respectively. The magnitude of underestimation between self-reported and sales data in Seychelles does however compare with that found in other surveys assessing self-reported consumption, which typically ranged from 40% to 60% (Midanik, 1982; Pernanen, 1974; Gmel, 1996). Causes for underreporting alcohol consumption in surveys assessing self-reported data are numerous. First, the design of the survey in 1994 did not permit to quantify drinking by occasional drinkers. This is the main reason why data from the 1989 survey were used to estimate prevalence of drinking in the Seychelles. Second, surveys based on self-reporting cannot account for drinking denial whereby drinking quantity and frequency are often under-estimated. Third, regular drinkers often deny or overlook binge drinking and its extent is underestimated by questions on average weekly consumption. This may be relevant to Seychelles data as many people drink mostly during the end-of-the-month period. Fourth, social

desirability is likely to occur whereby subjects interviewed by health professionals tend to underreport the amount they consume. This may have occurred in 1994 more than in 1989 in view of the launching of several alcohol awareness campaigns in the mass media in the interval. It is conceivable that such causes of underestimation may apply more to women than men in this study considering the larger social tolerance for men's than women's drinking in Seychelles. Overall, it is likely that the data correctly rank the distribution of alcohol consumption but underestimate the true alcohol consumption, possibly by half.

Drinking, mainly by men, is not a recent problem in Seychelles and various underlying factors can be mentioned. Alcohol is widely available throughout the country and homebrew can be purchased at low price at any time of the year. Benedict & Benedict (1982) emphasised that alcohol drinking is an important aspect of the male role in Seychelles. These authors emphasise that, while drinking is an integrated part of men's recreational activities and social network, women who drink have been exceptions and are generally regarded as playing an inappropriate male role or considered a kind of social failure, condemned by men and women. In their investigations of the Seychelles society of the 1970s and early 1980s, Benedict and Benedict (1982) also describe how monetary and social demands from wives, mistresses, children, parents and friends press upon older men (particularly those likely to earn lower income as they get older e.g., labourers) and how men can be caught in a system of expectations and demands over which they have little control. Drinking also results from considerable peer pressure. Though adolescents receive some introduction to drinking at home, the habit becomes ingrained in the company of their peers and drinking is part of the camaraderie that helps bring young males peer groups together. For example, males who fish together usually drink together after they have sold their catch.

The relation between socio-economic status and alcohol consumption was found to depend on which type of beverage is considered. The much higher alcohol consumption by persons of low socio-economic status could be entirely attributed to homebrew drinking which is a habit found in 51% of

labourers but in only 1% of white-collar workers. However, the frequency and volume of drinking of commercial alcoholic beverages was at least as high in persons with white-collar as in those with blue-collar occupations. Noticeably, homebrew drinkers also drank commercial beverages in amounts similar to drinkers of commercial beverages who did not drink homebrew.

It may be anticipated that a future reduction in homebrew drinking will be an important factor to lower the overall per capita consumption. However, factors favouring an increase in alcohol consumption include the fact that increasing socio-economic development enables more persons to buy commercial alcoholic beverages. Similarly, Seychelles women, who had traditionally little economic purchasing power and very low alcohol consumption, are likely to increase their alcohol consumption as many of them become economically active. When anticipating further trends in alcohol consumption, the role of alcohol in the Seychelles society should be taken into account. If drinking has often served as a means for Seychelles men to evade responsibility vis-à-vis their significant others or reflects limited opportunities for upward social mobility (Benedict & Benedict, 1982), rapid socio-economic development and subsequently rising expectations are also likely to impose increased pressure with drinking as a possible response, including homebrew in segments of the population with low purchasing power.

In Western countries, the CAGE questionnaire, which is widely used for alcohol-abuse screening in hospital and outpatient settings has been shown to have a sensitivity of 0.76 to 0.85 and a specificity of 0.95 to 0.97 for a cut-off score of two positive questions (Bush *et al.*, 1987; King, 1986). In Seychelles, the CAGE showed good sensitivity but low specificity (admittedly that the CAGE was not tested in abstainers or occasional drinkers in this study). The positive predictive value (the probability that someone who tests positive is a heavy drinker) would be consequently low, despite a high prevalence of heavy drinkers, which undermines the usefulness of the CAGE as a screening instrument in this population. The question on 'guilt' was not a very good discriminator (increasing only from 40.2% to 66.1% from lowest to highest drinking volume category) that is consistent with large social

acceptability of male drinking in the local culture. Such culture dependency of the CAGE questions has also been demonstrated in Malaysia, where Muslim Malays scored high on the question 'Guilty' in contrast to Chinese and Tamils for whom alcohol is not taboo (Indran, 1995). On the other hand, the question 'Annoyed' scored consistently higher (increase from 37.4% to 83.9%), which may relate to the locally wide recognition that drinking does cause social problems. The 'Eye-opener' question appeared the most discriminative question in this population (increase from 23.4% to 69.4%), possibly because this question is less sensitive to socio-cultural influences. These findings suggest that screening questionnaires such as the Alcohol Use Disorder Identification Test (AUDIT), a short multicultural screening tool for the early detection of problem drinking (Babor & Grant, 1989) and the Severity of Alcohol Dependence Questionnaire (SADQ) (Stockwell *et al.*, 1979), which rely on symptoms of physical and psychological addiction more than issues related to the socio-cultural context, could have better performance in a cross-cultural setting.

Not unexpectedly, alcohol intake was associated with several classical indicators in a dose-dependent manner, such as CDT, which is a reliable biological marker of alcohol consumption in clinical settings (Yersin *et al.*, 1995; Kapur *et al.*, 1989; Stibler, 1991) and HDL-cholesterol (Hulley & Gordon, 1981; Hartung *et al.*, 1990). It was found that one-half of the reduction of coronary risk related to alcohol consumption was mediated through its effect on HDL-cholesterol (Criqui, 1994). Two types of HDL particles can be distinguished: Lp AI:All particles (containing apo A-I and apo A-II) and Lp A-I particles (which contain apo A-I but not apo A-II). Because apo A-II is an antagonist of cholesterol efflux, Lp A-I but not Lp A-I:A-II mediates the translocation of cholesterol from its intracellular pools toward the cell membrane, thus the former but not the latter may have anti-atherogenic properties (Fruchart & Ailhaud, 1993). The lower increase in Lp A-I than Lp AI:All associated with alcohol consumption in our data, which was also found in other studies (Puchois *et al.*, 1990), may suggest only limited benefit from a coronary risk point of view. The apparently favourable inverse relationship between alcohol and lipoprotein (a), an independent risk factor for coronary heart

disease, is consistent with other studies (Huang *et al.*, 1992; Paasilta M *et al.*, 1998). In a separate study, we show that this relation is not related to the size of the apo(a) gene isoforms, the synthetic function of the liver and the sex hormone biochemical status (Fontana *et al.*, 1999). LDL-cholesterol, a strong risk factor for coronary heart disease, related inversely with alcohol consumption, irrespective of age and weight. Expectedly, the prevalence of smoking was much higher in drinkers than abstainers. Blood pressure increased substantially with alcohol intake, as repeatedly demonstrated in epidemiological studies (Wallace *et al.*, 1981; Beilin & Puddey, 1992; Klag *et al.*, 1993). Consistent with a large body of evidence (Tallaksen & Bohmer, 1992), high alcohol consumption was associated with low levels of blood thiamine (Bovet *et al.*, 1998), which put heavy drinkers at increased risk for dilated cardiomyopathy and polyneuropathy. Thus, the unfavourable changes in smoking prevalence, blood pressure and blood thiamine levels associated with alcohol consumption oppose the possibly apparently beneficial effects of alcohol on lipid levels.

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## Conflict of interest

None.

# References

- Anonymous. *World Drink Trends*, Henley on Thames, NTC Publications, 1995.
- Babor TF & Grant M. (1989) From clinical research to secondary prevention: International collaboration in the development of the Alcohol Use Disorder Identification Test (AUDIT). *Alcohol Health and Research World*, 13: 371-374.
- Babor TF, Stephens RS & Marlatt GA. (1987) Verbal report methods in clinical research on alcoholism: response bias and its minimization. *Journal of Studies on Alcohol*, 48: 410-424.
- Beilin MJ & Puddey IB. (1992) Alcohol and hypertension. *Clinical and Experimental Hypertension*, 14(1-2): 19-138.
- Benedict B. (1961) *Indians in a Plural Society: a Report on Mauritius*. (London, H.M.S.O.).
- Benedict B. (1966) *People of the Seychelles*. (London, H.M.S.O., Overseas Research Publication No.14).
- Benedict B & Benedict M. (1982) *Men, Women and Money in Seychelles*. (Berkeley, University of California Press).
- Bovet P *et al.* (1991, a) The Seychelles cardiovascular diseases survey 1989. *Sozial und Praeventiv Medizin [Social and Preventive Medicine]*, 36: 3-7.
- Bovet P *et al.* (1991, b) High prevalence of cardiovascular risk factors in the Seychelles (Indian Ocean). *Arteriosclerosis & Thrombosis*, 11: 1730-1736.
- Bovet P *et al.* (1997) The Seychelles Heart Study II. Methods and selected basic findings. *Seychelles Medical and Dental Journal*, 5: 8-24 (full text on [www.seychelles.net/smdj](http://www.seychelles.net/smdj)).
- Bovet P *et al.* (1998) Blood thiamin status and determinants in the population of Seychelles (Indian Ocean). *Journal of Epidemiology and Community Health*, 52: 237-242.
- Bush B *et al.* (1987) Screening for alcohol abuse using the CAGE questionnaire. *American Journal of Medicine*, 82: 231-235.
- Criqui MH. (1994) Alcohol and the heart: implications of present epidemiologic knowledge. *Contemporary Drug Problems*, 21: 125-142.
- Ewing JA. (1984) Detecting alcoholism, the CAGE questionnaire. *Journal of the American Medical Association*, 252: 1905-1907.
- Fauvel AA. (1909) *Unpublished Documents on the History of the Seychelles Anterior to 1810*, (Victoria, Seychelles, Government Printing Office), pp112-115.
- Ferraroni M *et al.* (1996) Validity and reproducibility of alcohol consumption in Italy. *International Journal of Epidemiology*, 25: 775-782.
- Finnish Foundation for Alcohol Studies. (1977) *International statistics on alcoholic beverages: production, trade and consumption 1950-1972*, 27: 209-222.
- Fontana P *et al.* (1999) Dose-dependent inverse relationship between alcohol consumption and serum Lp(a) levels in Black African males. *Arteriosclerosis, Thrombosis & Vascular Biology*, 19: 1075-1082.
- Fruchart JC & Ailhaud G. (1993) Apolipoprotein A-containing lipoprotein particles: physiological role, quantification, and clinical significance. *Clinical Chemistry*, 38: 793-797.
- Gmel G. (1996) Antwortverhalten bei Fragen zum Alkoholkonsum – non-response – bias in schriftlichen. Nachbefragungen. *Swiss Journal of Sociology*, 22: 285-301.
- Hartung GH *et al.* (1990) Effect of alcohol dose on plasma lipoprotein subfractions and lipolytic enzyme activity in active and inactive men. *Metabolism Clinical & Experimental*, 39: 81-86.
- Huang CM *et al.* (1992) The effect of alcohol withdrawal on serum concentrations of Lp(a),

- apolipoproteins A-1 and B, and lipids. *Alcohol: Clinical and Experimental Research*, 16: 895-898.
- Hulley SB & Gordon S. (1981) Alcohol and high-density-lipoprotein cholesterol. *Circulation*, 64(Suppl 3): III-57-III67.
- Indran SK. (1995) Usefulness of the "CAGE" in Malaysia. *Singapore Medical Journal*, 36: 194-196.
- Jeyakumar R. (In press) An analysis of the admissions to the psychiatric department of Victoria Hospital in 1996. *Seychelles Medical and Dental Journal*.
- Kapur A et al. (1989) Carbohydrate deficient transferrin: a marker for alcohol abuse. *British Medical Journal*, 299:427-431.
- King M. (1986) At risk drinking among general practice attenders: Validation of the CAGE questionnaire. *Psychological Medicine*, 16: 213-217.
- Klag NJ et al. (1993) Alcohol use and blood pressure in an unacculturated society. *American Journal of Epidemiology*, 22: 365-370.
- Larue D. (1996) Food consumption patterns in the Seychelles between 1983 and 1993. *Seychelles Medical and Dental Journal*, 4: 16-19.
- Midanik L. (1982) The validity of self-reported alcohol consumption and alcohol problems: A literature review. *British Journal of Addiction*, 83: 1019-1029.
- Moutet JP et al. (1989) Alcohol consumption in Guadeloupe. *Alcohol and Alcoholism*, 24: 55-61.
- Paasilta M et al. (1998) Social alcohol consumption and low Lp(a) lipoprotein concentrations in middle aged Finnish men: population based study. *British Medical Journal*, 316: 594-595.
- Perdrix J et al. (1999) Patterns of the alcohol consumption in the Seychelles islands. *Alcohol & Alcoholism*, 34: 773-785.
- Pereira MA et al. (1998) Occupational status and cardiovascular disease risk factors in the rapidly developing, high-risk population of Mauritius. *American Journal of Epidemiology*, 148: 48-159.
- Pernanen K. (1974) Validity of survey data on alcohol use. In Gibbins RG. et al. (Eds): *Research Advances in Alcohol and Drug Problems*, 2: 355-374.
- Pinn G & Bovet P. (1991) Alcohol-related cardiomyopathy in the Seychelles. *Medical Journal of Australia*, 155: 59-532.
- Puchois P et al. (1990) Effect of alcohol intake on human apolipoprotein A-I containing lipoprotein subfractions. *Archives of Internal Medicine*, 150: 1638-1641.
- Schmid H & Gmel G. (1996) Alcohol consumption trends in Switzerland 1975-1992. *Schweizerische Medizinische Wochenschrift*, 126: 1099-1106.
- Seychelles Archives. Vols. B-31:280, C/AM/8. (Victoria, Seychelles).
- Stibler H. (1991) Carbohydrate-deficient transferrin in serum: a new marker of potentially harmful alcohol consumption reviewed. *Clinical Chemistry*, 37: 2029-2037.
- Stockwell T et al. (1979) The development of a questionnaire to measure severity of alcohol dependence. *British Journal of Addiction*. 74: 79-87.
- Tallaksen CM & Bohmer T. (1992) The concentration of thiamin and thiamin phosphate esters in patients with alcoholic liver cirrhosis. *Alcohol Alcoholism*, 27:523-30.
- Wallace RB et al. (1981) Alcohol and hypertension: Epidemiologic and experimental considerations. *Circulation*, 64 (Suppl III):III-41-III47
- Yersin B et al. (1995) Screening for excessive alcohol drinking – comparative value of carbohydrate deficient transferrin, gamma-glutamyltransferase, and mean corpuscular volume. *Archives of Internal Medicine*, 155:1907-1911.

# Table 1

Prevalence (%) and daily volume (ml) of drinking by gender, age and beverage type, SHS 1989

	AGE (YEARS)				
	25-29	30-39	40-49	50-64	TOTAL
<b>M E N ( n )</b>	<b>54</b>	<b>121</b>	<b>140</b>	<b>198</b>	<b>513</b>
<b>ALL DRINKS</b>					
Percent drinkers	74.1	75.2	77.1	73.7	74.9
Daily amount per drinker	81.9	85.7	121.8	113.3	96.5
<b>ALL COMMERCIAL DRINKS</b>					
Percent drinkers	72.2	72.7	72.9	66.1	71.2
Daily amount per drinker	38.4	65.0	38.4	41.3	48.4
<b>ALL HOMEBREW</b>					
Percent drinkers	33.0	17.3	66.0	56.3	37.9
Daily amount per drinker	89.0	67.4	142.3	128.0	98.5
<b>BEER</b>					
Percent drinkers	66.7	71.9	66.4	60.1	67.1
Daily amount per drinker	30.4	43.9	25.6	25.4	33.3
<b>SPIRITS</b>					
Percent drinkers	31.5	24.8	21.4	22.3	25.5
Daily amount per drinker	21.3	35.8	45.6	40.1	34.4
<b>WINE</b>					
Percent drinkers	5.6	7.4	5.7	6.0	6.3
Daily amount per drinker	19.7	91.2	20.6	17.8	44.7
<b>KALOU</b>					
Percent drinkers	29.6	19.0	30.0	28.8	25.8
Daily amount per drinker	51.5	45.4	86.1	78.7	60.9
<b>BAKA</b>					
Percent drinkers	29.6	15.7	37.1	36.9	27.5
Daily amount per drinker	59.7	55.1	108.3	91.1	72.8
<b>W O M E N ( n )</b>	<b>72</b>	<b>134</b>	<b>137</b>	<b>225</b>	<b>568</b>
<b>ALL DRINKS</b>					
Percent drinkers	30.6	29.1	23.4	30.2	28.8
Daily amount per drinker	19.4	21.5	58.4	37.3	31.4
<b>ALL COMMERCIAL DRINKS</b>					
Percent drinkers	30.6	27.6	21.9	27.1	27.3
Daily amount per drinker	17.6	13.7	35.7	17.2	19.5
<b>ALL HOMEBREW</b>					
Percent drinkers	4.2	4.5	8.0	11.2	6.8
Daily amount per drinker	13.0	55.2	72.5	57.0	46.9

## Table 2

Per capita alcohol consumption (litres per year), by gender, age, and beverage type, SHS 1989

	AGE (YEARS)				
	25-64	15 AND MORE	15 AND MORE (ESP*)	ALL	ALL(ESP*)
<b>MEN (n)</b>	<b>12 820</b>	<b>21 515</b>	–	<b>33 490</b>	–
All drinks	26.4	20.5	23.7	13.2	18.3
All commercial drinks	12.6	9.6	10.1	6.1	7.8
All homebrew	15.7	12.1	16.2	7.7	12.6
Beer	8.3	6.4	6.5	4.1	5.0
Spirits	3.1	2.4	2.7	1.5	2.1
Wine	1.1	0.8	0.7	0.5	0.6
Kalou	5.9	4.8	5.7	3.1	4.4
Baka	7.9	6.2	7.9	4.0	6.1
<b>WOMEN (n)</b>	<b>12 082</b>	<b>19 215</b>	–	<b>30 776</b>	–
All drinks	3.2	2.4	2.8	1.5	2.3
All commercial drinks	1.9	1.5	1.6	1.0	1.3
All home brews	1.3	0.8	1.2	0.5	1.0
<p>ESTIMATES IN THE CATEGORIES 25-64, 15 AND MORE AND ALL ARE ADJUSTED FOR AGE, ASSUMING THAT CONSUMPTION FOR PERSONS AGED 0-14 IS NULL, CONSUMPTION FOR PERSONS AGED 15-24 IS HALF THAT OF PERSONS AGED 25-29 AND CONSUMPTION FOR PERSONS AGED MORE THAN 64 IS HALF THAT OF PERSONS AGED 50-64.</p> <p>ESP : ADJUSTED TO EUROPEAN STANDARD POPULATION (UNITED NATIONS WORLD POPULATION PROSPECTS, 1990, NEW YORK, UNITED NATIONS, 1991).</p>					

# Table 3

Drinking frequency (%) by gender, age and education, SHS 1994

	MEN						WOMEN					
	n	ABSTAINERS	<1/WEEK	1-2/WEEK	3-4/WEEK	DAILY	n	ABSTAINERS	<1/WEEK	1-2/WEEK	3-4/WEEK	DAILY
<b>AGE (YEARS)</b>												
25-29	<b>59</b>	10.2	52.5	18.6	11.9	6.8	<b>67</b>	43.3	50.7	1.5	3.0	1.5
30-39	<b>127</b>	11.8	34.6	12.6	11.8	29.1	<b>141</b>	48.2	44.7	0.7	2.1	4.3
40-49	<b>131</b>	16.8	29.8	6.1	11.5	35.9	<b>139</b>	45.3	51.1	0.0	0.7	2.9
50-64	<b>187</b>	17.1	31.0	7.5	10.2	34.2	<b>216</b>	45.4	48.1	1.4	0.5	4.6
<b>EDUCATION (YEARS)</b>												
0	<b>35</b>	17.1	20.0	8.6	8.6	45.7	<b>30</b>	33.3	53.3	3.3	3.3	6.7
1-6	<b>223</b>	15.7	29.1	7.6	13.0	34.5	<b>250</b>	47.6	46.8	1.2	0.8	3.6
7-9	<b>136</b>	13.2	35.3	8.1	9.6	33.8	<b>200</b>	45.0	49.0	0.5	2.0	3.5
10-12	<b>84</b>	14.3	48.8	16.7	7.1	13.1	<b>74</b>	50.0	47.3	0.0	0.0	2.7
13 and more	<b>22</b>	13.6	40.9	18.2	18.2	9.1	<b>8</b>	12.5	75.0	0.0	0.0	12.5
<b>TOTAL</b>	<b>504</b>	14.9	34.1	9.7	11.1	30.2	<b>563</b>	45.8	48.3	0.9	1.2	3.7

## Table 4

Average daily drinking volume (%) by gender, age and education, SHS 1994

	MEN				WOMEN		
	n	1-160 ML	61-150 ML	150+	n	1-160 ML	61+ ML
<b>AGE (YEARS)</b>							
25-29	53	90.6	3.8	5.7	38	97.4	2.6
30-39	112	64.3	17.9	17.9	73	95.9	4.1
40-49	109	59.6	20.2	20.2	76	98.7	1.3
50-64	155	63.2	21.9	14.8	118	94.1	5.9
<b>EDUCATION (YEARS)</b>							
0	29	41.4	24.1	34.5	20	90.0	10.0
1-6	188	57.4	20.7	21.8	131	95.4	4.6
7-9	118	66.9	21.2	11.9	110	96.4	3.6
10-12	72	87.5	8.3	4.2	37	100.0	0.0
13 and more	19	94.7	5.3	0.0	7	100.0	0.0
<b>TOTAL</b>	<b>429</b>	<b>66.0</b>	<b>18.2</b>	<b>15.9</b>	<b>305</b>	<b>96.1</b>	<b>3.9</b>
OCCASIONAL DRINKERS HAVE BEEN CLASSIFIED IN THE CATEGORY 1-60 (ML/DAY)							

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## Table 5

Drinking volume (%) by drinking frequency, male regular and occasional drinkers, SHS 1994

	MEN					WOMEN				
	n	<1/WEEK	1-2/WEEK	3-4/WEEK	DAILY	n	<1/WEEK	1-2/WEEK	3-4/WEEK	DAILY
1-60 ml/day	283	60.8	13.4	12.7	13.1	293	92.8	1.4	1.4	4.4
61-150 ml/day	78	0.0	7.0	14.0	57.0	8	0.0	12.5	25.0	62.5
150+ ml/day	68	0.0	5.9	8.8	85.3	4	0.0	0.0	25.0	75.0
<b>TOTAL</b>	<b>451</b>	<b>38.1</b>	<b>10.9</b>	<b>12.4</b>	<b>33.7</b>	<b>305</b>	<b>89.2</b>	<b>1.6</b>	<b>2.3</b>	<b>6.9</b>
OCCASIONAL DRINKERS HAVE BEEN CLASSIFIED IN THE CATEGORY 1-60 (ML/DAY)										

**Table 6****Responses to the CAGE questionnaire (%) by drinking frequency among male regular drinkers, SHS 1994**

DRINKING FREQUENCY	1-2/WEEK (n=47)	3-4/WEEK (n=54)	DAILY (n=152)	P-VALUE
<b>RESPONSE TO SPECIFIC ITEMS</b>				
Cut down	66.0	81.5	82.9	0.039 <sup>a</sup>
Annoyed	44.7	42.6	61.8	0.016
Guilty	31.9	50.0	54.6	0.025
Eye-opener	25.5	27.8	40.1	0.088
<b>NUMBER OF POSITIVE ITEMS ON THE CAGE</b>				
None	27.7	9.3	9.9	–
1	19.1	33.3	15.8	–
2	19.1	14.8	22.4	–
3	25.5	31.5	28.9	–
4	8.5	11.1	23.0	–

**Table 7****Response to the CAGE questionnaire (%) by average daily drinking volume, male regular drinkers, SHS 1994**

DRINKING VOLUME (ML/DAY)	1-60 (n=107)	61-150 (n=78)	150+ (n=68)	P-VALUE
<b>RESPONSE TO SPECIFIC ITEMS</b>				
Cut down	68.2	84.6	91.2	0.000
Annoyed	37.4	56.4	79.4	0.000
Guilty	40.2	50.0	63.2	0.012
Eye-opener	23.4	24.4	64.7	0.000
<b>NUMBER OF POSITIVE ITEMS ON THE CAGE</b>				
None	24.3	7.7	1.5	-
1	26.2	20.5	10.3	-
2	17.8	29.5	13.2	-
3	19.6	33.3	38.2	-
4	12.1	9.0	36.8	-

# Table 8

## Mean clinical and physiological measures by drinking volume, men, SHS 1994

DRINKING VOLUME	ABSTAINER	OCCASIONAL	1-60 ML/D	100-150 ML/D	>150 ML/D	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE (%)	P (TREND)
<b>CLINICAL VARIABLES (n)</b>	<b>75</b>	<b>172</b>	<b>111</b>	<b>78</b>	<b>68</b>			
Body mass index (kg/m <sup>2</sup> )	24.0	24.6	23.8	25.4	23.3	-0.7	-2.9	0.591
Systolic blood pressure (mmHg)	130.8	135.6	137.9	147.9	141.1	10.3	7.9	0.000
Diastolic blood pressure (mmHg)	84.6	90.1	89.5	96.2	93.3	8.7	10.3	0.000
Smoking (%)	25.3	25.6	40.5	55.1	67.6	42.3	167.2	0.000
<b>LIPIDS (n)</b>	<b>74</b>	<b>169</b>	<b>110</b>	<b>77</b>	<b>68</b>			
Total cholesterol (mmol/l)	5.41	5.40	5.41	5.35	5.24	-0.17	-5.57	0.000
LDL-cholesterol (mmol/l)	3.46	3.28	3.18	3.00	2.78	-0.68	-3.96	0.000
Apo B (mg/l)	1.18	1.15	1.14	1.15	0.97	-0.21	-17.8	0.000
HDL-cholesterol (mmol/l)	1.36	1.45	1.53	1.57	1.88	0.52	38.2	0.000
Apo A (mg/l)	1.14	1.19	1.28	1.29	1.45	0.31	27.2	0.000
Lipoprotein(a) [median] (mg/l)	298	297	290	203	229	-69.0	-23.2	0.000
Triglyceride (mmol/l)	1.32	1.47	1.57	1.74	1.28	-0.04	-3.0	0.214
LpAI (mg/l)	0.48	0.51	0.52	0.52	0.59	0.11	22.9	0.000
LPAI:All (mg/l)	0.27	0.31	0.35	0.36	0.39	0.12	44.4	0.000
<b>HORMONES AND OTHER VARIABLES (n)</b>	<b>32</b>	<b>94</b>	<b>60</b>	<b>47</b>	<b>48</b>			
Sex hormone binding globulin (mmol/l)	55.4	44.4	36.4	37.8	43	-12.40	-22.4	0.013
Free testosterone (nmol/l)	22.6	19.4	15.8	17.1	17.8	-4.80	-21.2	0.002
Estradiol (nmol/l)	0.16	0.15	0.12	0.14	0.14	-0.02	-12.5	0.264
Growth hormone (U/l) [n]	1.53 [24]	NA	NA	1.64 [30]	1.85 [39]	0.32	20.9	0.162
Albumin (g/l)	44.8	45.2	49.9	45.9	45.8	1.00	2.2	0.331
Carbohydrate deficient transferin (U/l)	20.6	23.1	30.5	31.2	40.8	20.20	98.1	0.000
Thiamin (nmol/l) [n]	76.1 [19]	92.7 [33]	83.8 [15]	74.0 [14]	65.5 [16]	-0.14	10.3	0.138

# Table 9

## Adjusted regression coefficients of alcohol intake on selected variables, men, SHS 1994

DRINKING VOLUME	ABSTAINER	OCCASIONAL	1-60 ML/D	100-150 ML/D	>150 ML/D
<b>CLINICAL VARIABLES (n)</b>	<b>75</b>	<b>172</b>	<b>111</b>	<b>78</b>	<b>68</b>
Systolic blood pressure (mmHg)	-	7.44 *	9.92 **	17.4 **	13.7 **
Diastolic blood pressure (mmHg)	-	6.14 **	6.04 **	11.1 **	10.2 **
<b>LIPIDS (n)</b>	<b>74</b>	<b>169</b>	<b>110</b>	<b>77</b>	<b>68</b>
Total cholesterol (mmol/l)	-	-0.04	0.06	-0.11	0.00
LDL-cholesterol (mmol/l)	-	-0.20	-0.21	-0.49 *	-0.50 *
Apo B (mg/l)	-	-0.04	-0.02	-0.06	-0.15 *
HDL-cholesterol (mmol/l)	-	0.10	0.14 *	0.22 **	0.45 **
Apo A (mg/l)	-	0.05	0.12 **	0.14 **	0.29 **
Lipoprotein(a) (mg/l)	-	-13.5	17.2	-102 *	-21.8
Triglyceride (mmol/l)	-	0.11	0.30	0.36 *	0.11
LpAI (mg/l)	-	0.03	0.04	0.04	0.10 **
LPAI:All (mg/l)	-	0.05 **	0.08 **	0.09 **	0.13 **
<b>HORMONES AND OTHER VARIABLES (n)</b>	<b>32</b>	<b>94</b>	<b>60</b>	<b>47</b>	<b>48</b>
Sex hormone binding globulin (mmol/l)	-	-9.26 **	-17.9 **	-15.6 **	-12.0 **
Free testosterone (nmol/l)	-	-3.55 **	-6.93 **	-5.04 **	-4.84 **
Estradiol (nmol/l)	-	-0.004	-0.041	-0.026	-0.023
Growth hormone (U/l) [n]	- [32]	NA	NA	0.06 [30]	-0.10 [39]
Albumin (g/l)	-	0.49	4.38	1.61	1.45
Carbohydrate deficient transferin (U/l)	-	2.38	9.24 *	11.5 **	17.9 **
Thiamin (nmol/l) [n]	- [19]	14.9 [33]	5.92 [15]	1.24 [14]	-12.8 [16]
*: <0.05 & >0.01; **: <0.001 REGRESSION MODELS INCLUDE THE VARIABLE OF INTEREST, AGE, BODY MASS INDEX AND SMOKING STATUS. ABSTAINERS CONSTITUTE THE REFERENCE GROUP.					

# Biography

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Sketching the diversity of drinking  
and planning the palette  
for the future

# C O N C L U S I O N

Andrée Demers  
Robin Room  
Chantal Bourgault

## Varying patterns of drinking, different rates of reported problems

These monograph reports on the drinking patterns and problems in seven developing countries from different regions of the world, based on surveys conducted in the 1990s or in the late 1980s. It is impossible to compare the drinking patterns and the rate of alcohol-related problems across those countries systematically, since different measures and different methodology had been used to gather the data. Nevertheless, it is apparent from these studies that there is a lot of variation in drinking patterns, and thereby in the drinking cultures, among developing countries. These differences go further than the extent to which drinking is spread over the population, as indicated by the prevalence of drinkers. These differences also concern who is socially allowed to drink, and who is not, as well as how it is socially acceptable to drink. Some crude image of those differences can be drawn.

For instance, in India, drinking is exclusively a male behaviour; less than 3% of the Indian women reported drinking on some occasion in a period of one month. But even for men, drinking appears as a marginal behaviour, with between 21% and 38% of them, according to the region, reporting drinking in a one-month period. On the other hand, among Indian men who do drink at all, most are at least occasionally heavy drinkers and display a high rate of alcohol-related problems. According to the data presented in this monograph, Indians seem to be either abstainers or heavy drinkers, moderate drinking remaining an abstract idea. In India, a drink does not go without few others. Nevertheless, this image may be slightly distorted, as the detailed questions of drinking excluded the occasional drinkers who drink less than monthly.

This dual pattern of drinking is also observed in Nigeria. The prevalence of male drinking is higher than in India (54%), but this rate refers to a one-year period (drinking rate in the last month: 52%). As in India, Nigerians seem to be either abstainers or heavy drinkers: 46% of the Nigerian men did not drink at all in the preceding year, while 43% drank 3 times or more a week; of these latter, more than 70% could be considered heavy drinkers. The rate of alcohol-related problems among drinkers also

appears to be quite high. Unfortunately, no data were available on Nigerian women. However, we learn from other sources that "*it was considered an absurdity for a woman to drink, and female intoxication was unheard of. Only in very special circumstances, such as traditional religious festivals, christenings, and similar social functions where alcohol was considered culturally appropriate for all present to partake, could women be administered a measured quantity*" (Ikuesan, 1994, p.941).

In other African countries, like Namibia or Seychelles, drinking patterns appear to be quite different. In Namibia, drinking is not a male prerogative. Close to 50% of adult women and 61% of men reported drinking in the last year, and among both men and women most of the drinkers are regular weekly drinkers. The rate of heavy drinking is not as high as in Nigeria or India (26% of male drinkers in Namibia reported heavy drinking at least once a month and 15% of female drinkers), but the rate of alcohol-related problems is far from trivial, particularly for men. For instance, over a three-month period, 40% of men drinkers reported being unable to stop drinking and 37% needing a drink first in the morning. In Seychelles, even if 54% of adult women reported drinking (compared to 85% among men), most of them (89%) do not drink on a weekly basis, a pattern also observed to some extent for Namibian women.

In China, Mexico and Costa Rica, drinking appears to be mainly a man's privilege, with respectively 86%, 70% and 55% of the male adult population reporting drinking. Notwithstanding, female drinking is not as strongly socially disapproved as it is in India – in these three countries, between 26% and 36% of adult women reported drinking once in a while. Chinese, Mexican and Costa Rican male drinking patterns seem to be more heterogeneous than in India, Nigeria or Namibia, with relatively large proportions of occasional drinkers. Nevertheless, 44% of the Mexican and 34% of the Costa Rican male drinkers reported drinking a large quantity at least once a month (not available for the Chinese sample). Interestingly, the rate of reported alcohol-related problems is relatively low in China.

Many factors may contribute to these differences in drinking cultures and patterns. Women's role and the social control of women, including of female

drinking, is obviously one of such factor. Religion is probably also at play. For instance, alcohol is prohibited in the Moslem religion and, as can be seen from the Nigerian data, 73% of the Moslems reported being abstainers, compared to 30% of the Christians. The role of education is more ambiguous. No general rule can be derived from the studies presented in this monograph. In some countries (for instance in China and Costa Rica), drinking seems to increase with education but in other countries (for instance Nigeria, Seychelles, Namibia and Mexico) no clear trend emerges.

Chinese and Nigerian's surveys also asked about reasons for drinking. In China, reasons related to sociability are clearly the most important, whereas the response pattern in Nigeria seems to be more ambivalent, and mood-related reasons seem to be as important as sociability.

Such differences in culturally situated motivations for drinking may explain, at least in part, the difference in the drinking patterns and in the rates of alcohol-related problems in the two samples. But other factors are also likely to be involved in such differences. These include the accessibility and availability of alcohol, including its price (Edwards *et al.*, 1994). In developing countries, homebrewed beverages may be particularly important in this regard, as they may represent a large part of the alcohol consumed (see Bovet, in this monograph) and are often ingrained in the local tradition. Finally, it is notable that India and Nigeria, the two countries who display the lower prevalence of drinking but high prevalence of heavy drinking and alcohol-related problems, are also the two countries among the seven in this monograph who display the lowest level of development according to the Human Development Index. Hence, macro socio-economic factors may also be at play.

Obviously, more research, including ethnological research, needs to be done to understand drinking cultures, patterns and alcohol-related problems and their interrelations in developing countries, and to understand the role of social and economic development in this regard.

## Implications for future epidemiological surveys

To be effective, alcohol policies need to be based on data and responsive to changes and trends in the society. Many different sources can contribute to the necessary data, but periodic surveys of the general population provide information that is hard to get any other way. As noted in the introduction, this includes information on the extent of alcohol consumed that is not reported in official statistics. Surveys are also a primary means of obtaining information on the distribution of patterns of drinking and of abstaining in the society, including the extent and social location of both sporadic and long-term heavy drinking. With questions about problems related to drinking, a population survey can contribute information not otherwise available on the impact of alcohol on family relations and other aspects of everyday life. Analyses of the relation between drinking patterns and particular alcohol-related problems are potentially crucial information in designing prevention and intervention measures. For all these reasons, we may expect more attention to alcohol issues in future general-population surveys oriented to public health and order in developing countries.

A survey questionnaire for use in a particular society needs to be attuned not only to the research and policy questions important to that society but also to its particular social customs and patterns. Nevertheless, it can also be helpful to draw on international experience in constructing the questionnaire. Besides taking advantage of others' experience, this gives an opportunity for cross-national comparisons, which are of considerable research significance, and can also be helpful to policy (Room, 1988). The recently published international guide for monitoring alcohol consumption and related harm by the WHO (2000) also recommends standardized methodologies to improve data collection and comparability and can be helpful when planning surveys on alcohol consumption.

Recently, there has been considerable convergence among those involved in drinking surveys on priorities in asking questions about the pattern and amount of drinking (Dawson & Room, forthcoming).

At a minimum, researchers are advised to ask about the frequency of drinking – to what extent drinking is a regular part of the respondent's life – and also about the intensity of drinking – whether and how often the respondent drinks above a potential threshold for intoxication (e.g., 60 gm. of ethanol, or about 5 or 6 drinks). In addition, asking a question about usual quantity of drinking on an occasion also allows computation of a measure of volume of drinking. Such questions will allow analyses in terms of the two most basic dimensions that have been put forward for characterising the role of alcohol in a culture (Room and Mäkelä, 2000).

There is yet less agreement on what to ask concerning alcohol-related problems (Dawson & Room, forthcoming). A common practice in surveys in developing societies has been to use screening measures for alcoholism, such as the MAST (Selzer, 1971), CAGE (Ewing, 1984), or AUDIT (Saunders *et al.*, 1993). But the MAST and CAGE were developed and validated for clinical populations in particular cultural contexts and their applicability in the general population (Bisson *et al.*, 1999) and in the very different contexts of many developing societies is questionable (Klausner and Foulks, 1982). Furthermore, asking questions on a lifetime basis, as both these measures do, seriously reduce the utility of "risk curve" analyses cross-tabulating current drinking patterns with problems. The AUDIT is less problematic since it was developed in a cross-cultural study and confines its questions to the current year (Saunders *et al.*, 1993). But it combines answers on drinking patterns and alcohol-related problems in a single score and its coverage of social problems from drinking is minimal. An alternative or additional measure, which might be considered for use, asks about harm to different life-areas from the respondent's drinking (Rehm *et al.*, 1999).

An alternative approach is to ask questions about problems from drinking in the frame of psychiatric epidemiology. This involves using a quite extended series of questions in a diagnostic interview schedule. Such methods have been used in developing societies (Helzer & Canino, 1992), and have shown acceptable test-retest reliability (Üstün *et al.*, 1997). But such analyses are usually at the level of just one or two alcohol-specific diagnoses –

diagnoses, which may not always be suited to the developing-country circumstances (Room *et al.*, 1996). And from the perspective of a closer understanding of patterns for policy purposes, it can be argued that it is usually more productive to analyse alcohol-related problems at the level of specific items or smaller groups of items. Such items should extend beyond the limits of the diagnoses to include social problems from drinking.

A third approach, which has not so far been well-developed in the alcohol field, is to ask questions about the impacts of other people's drinking on the respondent (Dawson & Room, forthcoming; Room, forthcoming-a). Just as surveys of the victims of crime (see Greenfield, 1998) have become an important part of monitoring trends in crime and criminal policy, survey items on the adverse impacts of the drinking of others may make an important contribution in the future to alcohol problems monitoring.

Besides patterns of drinking and the occurrence of alcohol-related problems, several further areas of questioning should be considered in constructing future alcohol surveys in developing societies. Mapping the contexts of drinking and the association of different contexts with particular patterns of hazardous drinking or alcohol-related problems may make an important contribution to context-specific prevention strategies (e.g., Demers, 1997). Asking about attitudes and norms to drinking and their change over time (e.g., Greenfield & Room, 1997) can contribute greatly to an understanding of shifts in popular sentiments, which underlie shifts in drinking practices. In addition, questions about attitudes toward policies and other strategies for preventing alcohol problems and their changes over time (e.g., Giesbrecht & Greenfield, 1999) can yield information on public opinion essential to adopting sustainable and effective policies. Future surveys should also be designed to capture the role of the social environment on drinking, of how drinking is shaped at the family and the community level (e.g. Rice *et al.*, 1998; Twigg *et al.*, 2000). It is obvious from the data presented in this monograph that there are also important variations related to community characteristics that should be measured. These areas of questioning, of course, go beyond the focus of the present monograph.

# References

- Bisson J, Nadeau L & Demers A. (1999) The validity of the CAGE scale to screen for heavy drinking and drinking problems in a general population survey. *Addiction*, 94: 715-722.
- Dawson DA & Room R. (forthcoming) Towards agreement on ways to measure and report drinking patterns and alcohol-related problems in adult general population surveys: the Skarpö conference overview, *Journal of Substance Abuse*.
- Demers A (1997) When at risk? Drinking contexts and heavy drinking in the Montreal adult population. *Contemporary Drug Problems*, 24: 449-471.
- Edwards G et al.(1994). *Alcohol Policy and the Public Good*. Oxford: Oxford University Press.
- Ewing JA. (1984) Detecting alcoholism. The CAGE questionnaire. *JAMA*, 252: 1905-07.
- Giesbrecht N & Greenfield TK. (1999) Public opinion on alcohol policy issues: a comparison of American and Canadian surveys. *Addiction*, 94: 521-531.
- Greenfield LA. (1998) *Alcohol and Crime: An Analysis of National Data on the Prevalence of Alcohol Involvement in Crime*. Washington, DC: Bureau of Justice Statistics.
- Greenfield T & Room R. (1997) Situational norms for drinking and drunkenness: trends in the U.S. adult population, 1979-1990. *Addiction*, 92: 33-47.
- Helzer JE & Canino GJ, eds. (1992) *Alcoholism in North America, Europe and Asia*. New York: Oxford University Press.
- Ikuesan BA. (1994). Drinking problems and the position of women in Nigeria. *Addiction* 89(8): 941-944.
- Klausner SZ & Foulks EF. (1982) *Eskimo Capitalists: Oil, Politics and Alcohol*. Totowa, New Jersey: Allenheld, Osmun.
- Rehm J, Frick U & Bondy S. (1999) Reliability and validity analysis of an alcohol-related harm scale for surveys. *Journal of Studies on Alcohol*, 60: 203-208.
- Rice N et al.(1998). The influence of households on drinking behaviour: A multilevel analysis. *Social Science & Medicine*, 46(8): 971-979.
- Room R (1988) Cross-cultural research in alcohol: research traditions and analytical issues. Pp. 9-40 in: T. Harford and L. Towle, eds., *Cultural Influences and Drinking Patterns: A Focus on Hispanic and Japanese Populations*. NIAAA Research Monograph No. 19, Rockville, MD: National Institute on Alcohol Abuse and Alcoholism.
- Room R. (forthcoming-a) Concepts and items in measuring social harm from drinking, *Journal of Substance Abuse*.
- Room R & Mäkelä K. (2000) Typologies of the cultural position of drinking. *Journal of Studies on Alcohol*, 61: 475-483.
- Room R et al.(1996) WHO cross-cultural applicability research on diagnosis and assessment of substance use disorders: an overview of methods and selected results. [with comments and a response] *Addiction*, 91: 199-230.
- Saunders JB et al.(1993) Development of the Alcohol Use Disorders Identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption II. *Addiction*, 88: 791-804.
- Selzer ML. (1971) The Michigan Alcoholism Screening Test: the quest for a new diagnostic instrument. *American Journal of Psychiatry*, 127: 161653-8.
- Twigg L, Moon G & Jones K. (2000). Predicting small-area health-related behaviour: a comparison of smoking and drinking indicators. *Social Science & Medicine*, 50: 1109-1120.
- Üstün TB et al. (1997) WHO study on the reliability and validity of the alcohol and drug use disorder instruments: overview of methods and results. *Drug and Alcohol Dependence*, 47: 161-169.

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# SURVEYS OF DRINKING PATTERNS AND PROBLEMS IN SEVEN DEVELOPING COUNTRIES



World Health Organization

Department of Mental Health and Substance Dependence

# **WHO Monograph on Alcohol Epidemiology in Developing Countries**



**World Health Organization**

**Department of Mental Health and Substance Dependence**

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Surveys of drinking patterns and  
problems in developing countries

# I N T R O D U C T I O N

Robin Room  
Andrée Demers  
Chantal Bourgault

## Survey research on drinking in developing societies

Though earlier examples can be found, the modern tradition of survey research on drinking patterns and problems in general populations is a product of the second half of the 20th century. By the mid-1970s, surveys of adult drinking behaviour had been carried out in at least 10 European and English-speaking countries (Room, forthcoming-b). By 2000, such studies have been carried out in most other developed countries; indeed, many countries have established a tradition of repeated surveys, allowing trends and developments to be monitored in the whole society and in subgroups of the population. Such studies typically include detailed questions about amounts and patterns of drinking and often about contexts of drinking. Often, questions are also asked about the respondent's experience of problems related to drinking, as well as questions from measures for screening or diagnosis of alcohol dependence and other disorders (Room, forthcoming-a).

Such surveys have contributed important information on the demography of drinking – where different patterns of drinking (or abstention) are distributed by subgroups of the population formed by differentiations such as gender, age, socio-economic status, and region of residence. They have become a way of gathering information on alcohol consumption not recorded in official statistics (e.g., Österberg, 2000). They have also given a picture at the population level of the extent and distribution of alcohol-related problems – a broader picture than can be gained by statistics on cases in treatment systems or police activity. As a society builds up a tradition of such surveys, they also become tools for monitoring trends in different social groups, and sometimes for evaluating the effects of policy interventions in the society (e.g., O'Malley and Wagenaar, 1991). They thus become an important tool for alcohol policymaking in a public health perspective.

Survey research on drinking patterns and problems in developing societies has been much less common. The Mexican tradition, already established in the 1970s, is a clear exception (Medina Mora and Borges, forthcoming). Other developing societies

with relatively well developed traditions of such research include Costa Rica (Miguez, 1983) and India (Singh, 1989). Otherwise, there have been single surveys in a number of countries, including the Nigerian and Namibian surveys included in this monograph. Also relevant here are surveys which have been carried out in what has been called the “fourth world” – surveys of aboriginal minorities within developed countries (e.g., Hunter et al., 1991; Klausner and Foulks, 1982).

Alongside the tradition of surveys dedicated specifically to alcohol have been surveys carried out for other or broader purposes, which have included some questions about drinking. The Mexican and Indian survey traditions actually straddle this divide: while the international political dynamics which resulted in and often financed the surveys were focused on illicit drugs, national researchers in Mexico and India steadfastly insisted that substantial questioning on alcohol be included too, in view of the substantial health and social problems related to drinking. Alcohol questions have also been included in general-population surveys with a variety of other topical emphases besides illicit drugs: e.g., psychiatric epidemiology, tobacco smoking, psychoactive medications and nutrition. As an example, nutrition was the primary focus of the Seychelles study analysed in this book. Increasingly, general medical epidemiological surveys have also been including questions about drinking, although the particular questions included are often problematic for describing drinking patterns (Rehm, 1998).

## Reasons to undertake surveys on drinking in developing societies

Survey research on drinking practices and problems is of course not the only approach to collecting data relevant to alcohol policy and programming in developing societies. At least limited data on production and consumption of commercial alcohol beverages, and on alcohol-related mortality, is available for nearly every country (WHO, 1999). There is a long tradition of ethnographic studies of drinking (Heath and Cooper, 1981; Heath, 1993; Marshall, 1979), and ethnographers have increasingly moved beyond describing drinking from

presumptively tradition-bound societies to studies set in the modern world of intercultural influences and major social changes (e.g., Eber, 1995; Marshall & Marshall, 1990; Colson and Scudder, 1988).

But survey data offer important advantages in a developing-country context. In the first place, there is a way to measure, however imperfectly, the alcohol consumption, which is not recorded in official statistics – which in many countries constitutes the greater part of alcohol consumption. Second, survey data can give a picture of the social location of drinking in a society, and also allows a direct focus on charting the distribution and correlates in the population of the patterns of drinking most likely to be associated with harm – intoxication episodes, and long-term heavy drinking. Third, a survey offers a way to measure directly alcohol-related problems, which do not show up in police or health statistics: problems in family life, for instance, or in work performance. Fourth, analyses of survey data can explore directly the relationship between patterns and contexts of drinking and the occurrence of social and health problems. Fifth, when surveys are repeated over time, they can be used to monitor the situation in the society and to evaluate policy initiatives.

## The background of this manuscript

Analyses of surveys on drinking patterns and problems in developing countries have not been widely available. There are a variety of reasons for this. A full report on a survey study is a sizeable and unwieldy document, not suitable for publication as a journal article, so such reports tend to stay in the “grey literature” of reports from research institutes and groups. Also, for obvious reasons, the reports are published in the national language. Researchers have often not had the time or incentives to go on to a further stage of publishing articles on the results in internationally accessible journals. Furthermore, as we have noted, the alcohol items are often collected as a side issue in a survey mostly oriented in another direction, so that they have often had a lower priority in researchers’ analysis strategies.

The present manuscript’s aim is to start on a remedy for this situation, by putting together survey

analyses from a variety of developing societies. It is an outgrowth of the project on Alcohol Policy in Developing Societies, initiated in 1996 by a group of scholars under the auspices of the World Health Organization (WHO). The central aim of the project was to produce a review of the available empirical data on drinking practices and problems in developing societies and on the diversity and effectiveness of treatment, prevention, policy and other societal responses to alcohol problems in such societies (Room et al., forthcoming). The work for the project looked in several directions in developing material for its review, starting with the compilation of a bibliography of relevant research (Ialomiteanu, 1998). One initiative was to develop a series of case studies on alcohol and public health particularly in developing countries (Riley and Marshall, 1999). A related WHO activity was the preparation of a *Global Status Report on Alcohol* (WHO, 1999), gathering and reporting available data for each country of the world on per-capita alcohol consumption, on alcohol-related morbidity and mortality, and on alcohol policies. A third initiative was to look for existing survey data from adult populations on drinking patterns and, where available, alcohol-related problems. The criteria for inclusion in this initiative were such the study include enough questions on drinking to analyse drinking patterns (frequency of drinking, drinking high quantity on an occasion, etc.), include interviews with at least 1000 adults from a defined population, identified for interview with similar probability sampling, and that the data was collected in 1988 or more recently.

Study directors of studies fitting these criteria were invited to prepare analyses of their data in accordance with a specified plan, to maximize comparability. At a meeting in Mexico City on 13-15 August 1998, hosted by the Mexican Institute of Psychiatry, the study directors and WHO staff and consultants met to discuss their drafts and prepare a plan for revising them for the present publication. At the meeting, Andrée Demers agreed that, with Chantal Bourgault, she would take on the task of editing the reports into the present manuscript. The report on Namibia was added after the Mexico City meeting.

## **The countries included in this manuscript**

The availability of suitable data, and not any consideration of country size, world region, or level of development thus dictated the choice of countries for inclusion in this project. Happily, however, the countries included in this manuscript provide a good range of cases on all of these dimensions (Table 1). On size, they range from the most populated country (China) to a small island nation (Seychelles). In terms of WHO's regional groupings, Namibia, Nigeria and Seychelles are from the African Region; Costa Rica and Mexico from the Americas; India from the South-East Asian Region; and China from the Western Pacific Region. In terms of level of development, Costa Rica, Mexico and the Seychelles are classified among the 64 "high human development" countries in the 1998 *Human Development Report* (UNDP, 1998), China and Namibia are among the 66 "medium human development" countries, and India and Nigeria are among the 44 "low human development" countries. Overall, we may say that the range of included countries is characterised more by diversity than by commonality.

There is also wide variation between countries in the recorded per-capita alcohol consumption. To some extent, this probably reflects differences in the degree of unrecorded consumption. Nigeria's true consumption level, for instance, is undoubtedly considerably higher than the recorded level, although Nigeria includes a large abstemious Moslem population. India may well have the lowest actual alcohol consumption of the countries included in the manuscript, although India is nowhere near the bottom of the global range in terms of recorded consumption. The other five countries are all in the upper half of countries for which a consumption figure is available (WHO, 1999), although Costa Rica's reported consumption is less than half of the 11-15 litres per adult reported by the countries, mostly developed, at the top of the range globally (WHO, 1999). But as the survey data results, which follow demonstrate, in countries like Namibia and the Seychelles, the reported consumption may be only half the story.

# Table 1

Some statistics on the countries from which studies are reported in this manuscript (all data are for 1995 unless indicated)

	POPULATION (MILLIONS, ROUNDED)	HUMAN DEVELOPMENT INDEX		LIFE EXPECTANCY AT BIRTH	ADULT LITERACY RATE (%)	RECORDED ADJUSTED REAL PER-CAPITA GDP	PER-ADULTA ALCOHOL CONSUMPTION 1996
		RANK	LEVEL				
Costa Rica	3	34	0.889	76.6	94.8	5969	5.72
Mexico	94	49	0.855	72.1	89.6	6046	5.04
China	1221	106	0.65	69.2	81.5	2935	5.39
India	935	139	0.451	61.6	52	1422	0.99
Seychelles	b0	56	0.845	72	88	6073	c4.84
Namibia	2	107	0.644	55.8	76	4054	d3.60
Nigeria	112	142	0.391	51.4	57.1	1270	0.66

a) Per adult = per person aged 15 and over

b) Population 73,000

c) 1989 data

d) Early 1990s, beer only

Sources: Alcohol consumption, population: WHO, 1999; all else: UNDP, 1998.

# References

- Colson E & Scudder T. (1988) *For Prayer and Profit: The Ritual, Economic and Social Importance of Beer in Gwembe District, Zambia 1950-1982*. Stanford, CA: Stanford University Press.
- Eber C. (1995) *Women and Alcohol in a Highland Maya Town: Water of Hope, Water of Sorrow*. Austin: University of Texas Press.
- Heath D. (1993) Anthropology. Pp.29-43 in M. Galanter, ed., *Recent Developments in Alcoholism*. New York, Plenum.
- Heath DB & Cooper AM. (1981) *Alcohol Use and World Cultures: A Comprehensive Bibliography of Anthropological Sources*. Toronto: Addiction Research Foundation.
- Hunter E, Hall W & Spargo R. (1991) *Distribution and Correlates of Alcohol Consumption in a Remote Aboriginal Population*. Sydney: National Alcohol and Drug Research Centre, University of New South Wales.
- Ialomiteanu A. (1998) *Alcohol in Developing Societies: A Bibliography with Selected Annotations*. ARF Research Document No. 144. Toronto: Addiction Research Foundation Division, Centre for Addiction and Mental Health.
- Klausner SZ & Foulks EF. (1982) *Eskimo Capitalists: Oil, Politics and Alcohol*. Totowa, New Jersey: Allenheld, Osmun.
- Marshall M, ed. (1979) *Beliefs, Behaviors, and Alcoholic Beverages: A Cross-Cultural Survey*. Ann Arbor: University of Michigan Press.
- Marshall M & Marshall L. (1990) *Silent Voices Speak: Women and Prohibition in Truk*. Belmont, CA: Wadsworth Publishing.
- Medina Mora ME & Borges G. (forthcoming) The measurement of alcohol consumption and harm in Mexico, *Journal of Substance Abuse*.
- Miguez HA. (1983) Alcohol consumption levels in Costa Rica. *Bulletin of the Pan American Health Association*, 17: 396-404.
- O'Malley PM & Wagenaar AC. (1991) Effects of minimum drinking age laws on alcohol use, related behaviors and traffic crash involvement among American youth: 1976-1987. *Journal of Studies on Alcohol*, 52: 478-491.
- Österberg E. (2000) Unrecorded alcohol consumption in Finland in the 1990s. *Contemporary Drug Problems*, 27: 271-299.
- Rehm J. (1998) Measuring quantity, frequency, and volume of drinking. *Alcoholism: Clinical and Experimental Research*, 22(2 Supplement): 4-14.
- Riley L & Marshall M. (1999) *Alcohol and Public Health in 8 Developing Countries*. Geneva: World Health Organization, Document WHO/HSC/SAB/99.9.
- Room R. (forthcoming-a) Concepts and items in measuring social harm from drinking, *Journal of Substance Abuse*.
- Room R. (forthcoming-b) Measuring drinking patterns: the experience of the last half century, *Journal of Substance Abuse*.
- Room R et al. (forthcoming) *Alcohol in A Changing World: Drinking Patterns and Problems in Developing Societies*. Cambridge: Cambridge University Press.
- Singh G. (1989) Epidemiology of alcohol abuse in India, pp. 3-11 in R. Ray and R.W. Pickens, eds., *Proceedings of the Indo-US Symposium on Alcohol and Drug Abuse*. Bangalore: NIMHANS, Publication No. 20.
- United Nations Development Program. (1998) *Human Development Report 1998*. New York: UNDP.
- Website: <http://www.undp.org/hdro/98hdi1.htm> (and hdi2 & hdi3).
- World Health Organization. (1999) *Global Status Report on Alcohol*. Geneva: World Health Organization, document WHO/HSC/SAB/99.11

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He is a sociologist with a PhD from the University of California, Berkeley. He was director of the Alcohol Research Group in Berkeley, California from 1977 to 1991, and then Vice-President for Research and Development and Chief Scientist at the Addiction Research Foundation in Toronto from 1991 to 1998. Since 1999 he has been a professor and the Director of the Center for Social Research on Alcohol and Drugs at Stockholm University, Stockholm (Sweden). Among other research, he has worked on the social and cultural epidemiology of alcohol and other drugs, and on the social construction of addiction concepts. Professor Room is a member of the World Health Organization's Expert Advisory Panel on Drug and Alcohol Dependence and a recipient of the Jellinek Memorial Award for Alcohol Studies.

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