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An empirical analysis of the determinants of expenditure on alcohol by alcohol dependent individuals in Mauritius

Sanjeev Sobhee, Harshana Kasseeah, Verena Tandrayen-Ragoobur and Asrani Gopaul

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Abstract

Purpose – *Without an understanding of the factors that influence the expenditure of alcohol-dependent individuals on alcohol, it is unclear whether policies to control excessive consumption of alcohol can be effective. The purpose of this paper is to empirically investigate the factors that affect the expenditure of alcohol-dependent individuals on alcohol.*

Design/methodology/approach – *The main contribution of this paper is that it relies on a survey consisting exclusively of 300 alcohol-dependent individuals to capture the variables influencing their expenditure on alcohol. The survey was carried out by fieldworkers in the year 2012. The respondents come from varied socio-economic backgrounds and consist of both male and female alcohol-dependent individuals living in various geographical parts of the island of Mauritius.*

Findings – *The results obtained indicate that expenditure on alcohol by alcohol-dependent individuals increases as income increases. Given that the coefficient on the income variable is positive but less than one, this indicates that alcohol is viewed as a necessity. Apart from income, the age when the person first started drinking and the family size are important variables influencing the expenditure of alcohol-dependent individuals on alcohol.*

Research limitations/implications – *The findings indicate that alcohol-dependent individuals should be sensitized so that they are not tempted to increase expenditure on alcohol as their income increases. Sensitization should be aimed at making them understand that the increase in income allocated toward alcohol expenditure could be better spent. Awareness programs could also help to address the issue of over-consumption of alcohol among the youth.*

Originality/value – *As far as the authors know, there has not been any empirical studies conducted in Mauritius on the expenditure on alcohol by alcohol-dependent individuals.*

Keywords *Socio-economic, Survey, Determinants, Income, Expenditure, Alcohol dependent*

Paper type *Research paper*

1. Introduction

According to the International Centre for Alcohol Policies (ICAP), alcohol beverages are an integral part of the fabric of adult society in most countries. Alcohol consumption behavior is motivated by several factors including enjoyment, lifestyle, rites of passage, parental influence and the cultural acceptability of drinking. Although alcohol consumption is considered to be part of normal and balanced life in most societies, drinking patterns are largely culturally determined. In many countries, consumption of alcohol is considered normative behavior. The World Health Organisation (WHO) defines "alcoholism" as "a term that refers to chronic continual drinking or periodic consumption of alcohol which is characterized by impaired control over drinking, frequent episodes of intoxication and preoccupation with alcohol and the use of alcohol despite

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adverse consequences." In this paper, we define an alcohol-dependent individual as someone who may be drinking every day; someone who may be drinking in the morning; who may be drinking at the place of work; who may be drinking to get drunk and a person who may be having health problems linked to the overconsumption of alcohol.

Overconsumption of alcohol leads to harmful consequences. Alcohol-related burden comprising diseases and death remains significant among those who over-consume alcohol irrespective of the level of development of economies. According to Anderson and Baumberg (2006) over-consumption of alcohol can lead to social, health and economic burden. According to Maurer (2012), the harmful use of alcohol is a worldwide problem resulting in millions of deaths. It is not only a causal factor in many diseases but also a precursor to injury and violence. Furthermore, the negative impacts of alcohol can spread through a community or a country and beyond, by influencing levels and patterns of alcohol consumption across borders. According to the WHO, alcohol consumption is the world's third largest risk factor for disease and disability, and especially a risk in middle-income countries.

Harmful use of alcohol is an important public health problem and is costly to both communities and societies (WHO, 2014). Many countries have recognized the serious public health problems caused by the harmful use of alcohol and have taken steps to adopt preventive policies and programs, particularly to reduce drink-driving. However, it is important that an investigation of the factors that influence expenditure on alcohol is undertaken so that the measures taken have a better impact on over-consumption of alcohol, a task that this paper attempts to undertake.

The empirical literature on the determinants of alcohol expenditure is quite broad. Expenditure on alcohol is of policy interest for two major reasons. First, taxes on beer, wines and spirits provide a major source of government revenue. Second, there is also concern on social and health grounds with the level of consumption of alcohol and its distribution. Recent studies on alcohol consumption and the factors that affect expenditure on alcohol increasingly rely on the use of survey data, which help to capture a wide range of socio-economic determinants. Although there have been a number of studies which have empirically investigated the factors that impact on the expenditure on alcohol, the main novelty of this paper is that it relies on an exclusive survey of 300 alcohol-dependent individuals.

The main objective of this paper is to empirically investigate the factors that determine the expenditure of alcohol-dependent individuals on alcohol. Therefore the main purpose of this research is to use the Republic of Mauritius as a case study, if not a laboratory in itself, to analyze the determinants of expenditure on alcohol by alcohol-dependent individuals. This is important given that alcohol consumption and problems related to alcohol vary widely around the world. This case provides several country-specific economic and social insights which contribute to additional empirical evidence as well as break through avenues that have not been well documented. Such a study draws several policy recommendations for the Government of the Republic, private sector, civil society and the international community.

2. Background

Mauritius, is a small island economy located off the eastern coast of Madagascar. This research focusses on the Republic of Mauritius, itself intensively involved in the production of beer and rum made out of sugar. There is an established drinking culture in Mauritius, which is prevalent in a number of ethnic groups especially among Christians and Hindus (National Agency for the Treatment and Rehabilitation of Substance Abusers, NATReSA)[1]. Alcohol is present in many occasions such as parties and other events but is also part of the folklore of the Mauritian lifestyle. This drinking is also influenced to a certain extent by the island culture and the island lifestyle. For instance, it is current practice for friends and relatives to consume alcohol during get-togethers and on the beach. Table I shows a comparison of alcohol consumption in Mauritius compared to other WHO members for different types of alcoholic beverages.

According to the World Health Organisation (2004), the recorded per capita (yearly) alcohol consumption in Mauritius is about 3.0 litres of pure alcohol among adults. Although alcohol

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Table I Comparative analysis of alcohol consumption across countries

WHO members	*Recorded consumption*	*Unrecorded consumption*	*Total consumption*	*Beer*	*Wine*	*Spirits*	*Others*	*Total male drinkers*	*Total female drinkers*
Litres of consumption per person per year									
Low-income countries									
Ethiopia	0.52	3.5	4.02	0.19	0.01	0.13	0.25	21.7	7.2
Ghana	1.47	1.5	2.97	0.4	0.07	0.03	0.97	12.5	6.9
Lower middle income countries									
Angola	3.8	1.6	5.4	1.81	1.37	1.12	0.41	–	–
Tunisia	1.09	0.2	1.29	0.67	0.34	0.04	0	20.8	17.2
Higher middle income countries									
Mauritius	2.72	1	3.72	1.92	0.32	0.39	0	10.5	4.3
Malaysia	0.5	0.32	0.82	0.38	0.02	0.08	0	32.2	19.6
South Africa	6.69	2.5	9.46	3.93	1.17	1.17	0.75	39.6	23.8
High-income countries									
UK	11.67	1.7	13.37	4.93	3.53	2.41	0.67	21.6	9.5
Canada	7.77	2	9.77	4.1	1.5	2.1	0	18.2	7

Source: World Health Organisation (2011)

consumption is not in any way higher compared to other countries, excessive alcohol consumption in Mauritius has led to several economic and social problems. Dealing with these problems is not costly to the individual herself in terms of health deterioration, loss of output and productivity and cohesion within the family but also increases the burden of the government who needs to spend more on specialised health services and other related transfer payments.

Consumption expenditure on alcohol has increased from 8.9 percent in 1996/1997 to 10 percent in 2011, while at the same time the production of wine (rum) has risen from 41,200 to 48,900 H/L over the decade 2000-2010 as reported by Statistics Mauritius (2010). Mauritius is both an importer and exporter of alcoholic products. Imports and exports of alcoholic drinks are subject to regulations by the Mauritius Revenue Authority (MRA). In 2011, Mauritius exported 4,906,000 litres of alcoholic beverages while it imported 3,241,000 litres of alcoholic beverages (Statistics Mauritius, Digest of External Trade). Mauritians purchased not less than 53.5 million bottles of alcoholic beverages in 2012, spending 2 billion rupees (USD 67 million), which include "4 million bottles of wine, 12.6 million bottles of whisky and rum and 36 million cans of beer."

Data from the MRA indicate that the number of litres of imported or locally produced alcohol products has decreased from 56.0 million litres in 2011 to 52.4 million litres in 2013. During the same period, the estimated yearly per capita litres of alcohol intake followed a decreasing trend from 44.7 to 41.6 litres. Although absolute consumption is down, expenditure on alcohol is on an upward trend as shown in Table II.

The estimated private household consumption on three main items, namely; rum and cane spirits, beer and stout and wine is shown in Table II. The following figures are extracted from the Household Budget Survey (HBS) 2001/2002 and 2006/2007 conducted by Statistics Mauritius.

It can be seen that in both household budget surveys carried out for 2001/2002 and 2006/2007, the most preferred alcoholic beverages of Mauritians is "Beer and Stout," followed by "Rum and Cane Spirits." According to World Health Organisation (2011), the preferred alcoholic drink of the average Mauritian aged 15 and above remains beer. This could be because beer is cheaper than other types of alcohol and also the fact that some brands of beer are locally produced.

The 2009 National Non-Communicable Diseases (NCD), conducted by the Ministry of Health and Quality of Life (MOHQL), indicates that 49 percent of adults above the age of 20 years were consuming any type of alcohol. Among those 49 percent, male represented 66 percent while female represented 34 percent. Over the years, male drinkers have been the ones to abuse more of alcohol consumption. Indeed, it can be seen that over the years, the percentage of women abusing alcohol is very much lower than that of men. However, recent trend shows that this situation is in decline.

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Table II Estimated private household consumption based on household budget survey

Items	*Estimated private household consumption per annum based on the 2001/2002 HBS (million USD)*	*Estimated private household consumption per annum based on the 2006/2007 HBS (million USD)*	*Estimated private household consumption per annum based on the 2012 HBS (million USD)*
Rum and cane spirits	7.43	13.00	18.33
Beer and stout	8.63	14.73	17.67
Wine	4.13	5.00	6.67

Sources: Statistics Mauritius and Household Budget Surveys

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As indicated by Table III, in terms of age group, men were found throughout to be consuming larger amounts of alcohol when compared to women. Between the age-group of 40-49 years, the percentage of abusive consumption was higher. Alcohol seems to be a prevalent problem among fishermen and sugar planting community (NATReSA, 2010).

The Government of Mauritius has taken several measures to reduce over-consumption of alcohol including increase in excise and taxes and ban on advertisements. The Public Health Act prohibits advertisements of alcoholic drinks and any sponsorship related to an alcoholic drink or brand name or brand associated with an alcoholic drink. The sale of alcohol is regulated by the authorities whereby the law does not allow for the sale of alcoholic beverages to anyone below the age of 18. WHO has highlighted the different flaws in the laws regarding alcohol sale and consumption. In particular, it reports that there are no binding restrictions with respect to advertisements pertaining to alcohol and sale of alcoholic drinks to an already drunk individual. In spite of different laws, alcohol-related social and health problems, accidents, deaths and crimes in Mauritius are on the rise.

As early as 2002, the WHO has pinpointed the increasing number of alcohol-dependent patients admitted in public hospitals and the number of drunk-drivers caught by the police in Mauritius. The increasing number of road accidents and major causes of deaths on the road could be largely attributed to substance abuse (WHO, 2002). For instance, out of 1,680 breathanalyzer tests conducted by Mauritian traffic police during January to June 2003, 59 percent were positive for alcohol (WHO, 2003). Many drunk drivers do not abide by the law and take risks to drive back home or to drop their friends after having partied together. Large alcohol intake reduces the vision and provokes very bad accidents in major cities of the world. Again in the context of Mauritius, road accidents have increased from 18,278 in the year 2000 to 21,258 in 2010 with fatalities amounting 163 in 2000 and 158 in 2010.

Heavy alcohol consumption leads to several consequences in terms of health, social and economic impact. In terms of health impacts, heavy alcohol intake leads to health problems in terms of electrolyte depletion, vitamin deficiencies in micronutrients and several complications such as liver damage and a number of psychiatric disorders. These will indirectly have an impact on the economy in terms of low productivity and high absenteeism at work. In 2012, 42.5 percent of people admitted in Brown Séquard Psychiatric Hospital in Mauritius, were alcohol dependent.

Table III Excessive alcohol consumption by age group

Age group (years)	*Male (%)*	*Female (%)*
20-29	12	1
30-39	16	0.90
40-49	19	0.40
50-59	16	0.40
60-69	13	0.60
70-79	9	0.60

Source: NATReSA (2010)

In Mauritius, according to the Ministry of Health and Quality of Life's Health Plan 2015 (Ministry of Health and Quality of Life's Health Plan, 2015), there are around 16 percent of adults in Mauritius who are heavy drinkers, and this proportion is on rise. According to NATReSA, Mauritians consumed some 3.6 million litres of alcohol over the period of a year in 2008 and alcohol consumers are now starting at a very young age in their early teens.

The other main concern about alcohol abuse is the increasing number of deaths caused by NCD. It has been proven medically that alcohol, as well as smoking, does exacerbate the problem of high blood pressure. Addiction indeed results in large numbers of people dying out because of substance abuse despite the fact that they have been on medication and were suffering from NCD. Mauritius is currently one of the countries experiencing the highest rate of diabetes in the world. In the year 2000, among the causes of deaths, 15 percent people died due to diabetes and this figure has increased to 24 percent in 2010 while for that year 32 percent died because of circulatory problems. At the same time, treating alcoholic patients, many of whom end up in asylums and mental hospitals, involves very high opportunity cost in terms of tax payers' money that could have been used for other more productive public spending projects.

3. Brief empirical review

This brief empirical review provides an overview of the factors that have been identified in the literature as influencing expenditure on alcohol. The review also looks at factors identified in more recent studies based on low- and middle-income countries.

Studies on the determinants of alcohol consumption and/or expenditure on alcohol have spanned several countries including both high-income and low- and middle-income countries. Most empirical studies of the effect of economic conditions on alcohol consumption have covered countries such as Finland, France, the USA and Canada where high-quality and reliable data are available. Yen and Jensen (1996) find that there have been numerous studies on the demand for alcoholic beverages. Ornstein (1980) and Ornstein and Levy (1983) provide surveys of earlier studies. Leung and Phelps (1993) performed a literature review of 15 studies that analyzed either statewide or nationwide data on alcohol consumption. In the UK for instance studies have found that that household expenditure on alcoholic drink is substantial and constitute around 7.5 percent of total household spending and find evidence that price has a negative impact on alcohol consumption in the UK and that among all the categories of alcoholic products, beer is the most inelastic (Atkinson *et al.*, 1990; Collis *et al.*, 2010).

Apart from price and income, various studies have found that other characteristics also influence consumption and expenditure on alcohol. In the case of Canada, for example, Adrian and Ferguson (1987), while examining the long-run income elasticity of the demand for alcohol find that household characteristics play an important role in explaining expenditures on alcohol. The same is found by Yen and Jensen (1996), that income, religion and household composition, education, home ownership, gender and age of the household head and race are among the significant determinants of household alcohol expenditures. Some studies have also found that earlier the age at which young people take their first drink of alcohol, the greater the risk of abusive consumption and the development of serious problems including alcohol disorders (Dewit *et al.*, 2000).

Previous studies on the economic determinants of alcohol consumption have used time series data or pooled time series data and cross-section data. According to Adrian and Ferguson (1987), it has been found that economic studies using cross section data give different results from those based on time series data. The results of cross-section studies are often taken to reflect long-term effects while time series data pick up short-term effects. Hence, in some cases we find that survey data is more useful when studying alcohol-related issues. The use of micro-data allows the examination of the effects of detailed household characteristics and provides the degrees of freedom to estimate a large number of parameters (Adrian and Ferguson, 1987). However, Midanik (1982) points out that survey data might only be capturing around half of the actual consumption level. Other than under-reporting, household-based surveys may also have a somewhat biased sample.

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With the background of alcohol use and alcohol-related problems on the rise in low- and middle-income countries, expenditure on alcohol is an important problem for families and communities and needs to be assessed. Consequently, a number of studies have also been carried out in low- and middle-income countries. For instance, Ackah and Aryeetey (2012) find that for Ghana having a woman as a head of the household significantly reduces the budget shares to alcohol and tobacco and clothing. Cheah (2014) investigates factors associated with alcohol consumption among adults in Penang, Malaysia. The study relies on a cross-sectional primary survey data with a total of 398 respondents. This study finds that age, gender, ethnicity, marital status, smoking status and participation in physical activity could significantly affect individuals' decision to consume alcohol. In particular, individuals who are older, Malays, married and physically inactive have lower propensity to consume alcohol. House locality, employment status, income and education do not possess any significant impacts on the likelihood of alcohol consumption.

Giang (2013) examines the level of alcohol consumption and expenditure on alcohol in a district in Vietnam. The cross-sectional survey was conducted in a rural district in Northern Vietnam among 765 males and 799 females aged between 18 and 60 years. The prevalence of alcohol use was 35 percent, higher among men. The same percentage prevailed for those indulging in excessive drinking. It was also found that median expenditure for alcohol consumption during one month by those who consumed alcohol was USD3.5 accounting for 4.6 percent of household food expenditure and 2.7 percent of total household expenditure and 1.8 percent of total household income.

Ground and Koch (2008) use data from the 2000 Income and Expenditure Survey of South Africa to examine both tobacco and alcohol expenditure. Their results indicate that household composition is strongly related to the probability of purchasing either tobacco or alcoholic beverages. Furthermore, Ground and Koch (2008) find that Asian households in South Africa were less likely to purchase alcohol than any other racially composed household.

Asia and other developing countries have seen a huge increase in people with money to spend on alcohol and increasingly on more expensive alcohol. For instance, in India itself there are an estimated 300 million young, upwardly mobile consumers. These young adults and the emerging middle-class are increasingly taking over the patterns of consumption from Europe. Tumwesigye *et al.* (2013) find that in Uganda, cluster or village-level variation in regard to frequent and heavy drinking is quite significant. The influence remains strong even after controlling for sex, age and the number of children. Measures taken to reduce the frequency and amount of alcohol that people consume should take into account village-level influences. In South Africa, the rapid social and economic changes stemming from urbanization account for new patterns of drinking in most African settings (Setlalentoa *et al.*, 2010). These are influenced by factors such as easy access to alcohol, advertising and disregard to constraints on when alcohol can be consumed.

4. Hypothesis development

There are various determinants of drinking behavior, which fall into four groups. These groups include the genetic predisposition of the individuals who consume alcohol, their individual characteristics and their social and economic factors and environmental determinants (ICAP, 2009). The individual characteristics include factors such as their current age, the age at which the alcohol dependent individual started drinking, personality traits and physical and mental health status all affect the development of drinking patterns. The relationship between drinking and the resulting problems are also affected by socio-economic status. For some alcohol-dependent individuals, drinking behaviors are influenced by not only by their family members and their family environment but also by their peers. Peer interaction influences indeed play an important role in social networks.

Hypotheses

H1. As income increases, expenditure on alcohol increases.

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A low-income elasticity means that the demand for the good does not respond strongly to income and is usually taken to indicate that the good is a necessity. A high-income elasticity is a sign that the good is a luxury good. Goods with income elasticities less than 1 indicate that the proportion of the consumer's budget increases, expenditure on that particular good increases too but by less than the increase in income:

H2. Age of the drinker negatively influences alcohol expenditure.

Younger people are more likely to drink heavily than other groups than other age groups. Eigenbrodt *et al.* (2001) using cross-section and longitudinal data study the impact of age on alcohol consumption. The study finds that the amount of alcohol consumed was inversely associated with age. Ageing and factors related to ageing is associated with a decrease in drinking. Similarly, the age the drinker first started drinking is also important. Dewit *et al.* (2000) study alcohol-related harm among those who have their first drink at ages 11-14. This heightens the risk of progression to the development of alcohol-related disorders and therefore is a reasonable target for policy-related intervention. These can include strategies to delay its first use as a means of averting problems later in life:

H3. The bigger the family, lesser the expenditure on alcohol.

The household size is likely to have an impact on the expenditure and income of the household as well as the purchasing power of the household. Another variable to capture the same effect could be controlling for the number of children. Higher number of children is likely to reduce household expenditure on alcohol. Our third hypothesis tests this particular relationship between household size and expenditure on alcohol:

H4. Men are likely to spend more on alcohol than women.

Drinking is a gender issue everywhere in that men do more of the drinking but women disproportionately suffer the consequences (WHO, 2002). In the study of Dias *et al.* (2011) participants were randomly selected within non-institutional adult population in Portugal consisting both of men and women and findings indicate that current and high-intake drinkers were more frequently men. Similarly, Wilsnack *et al.* (2009) find that men exceed women in drinking and higher volume drinking. Compared with women throughout the world, men are more likely to drink and consume more alcohol. Wilsnack *et al.* (2009) find that this gender gap is one of the few universal gender differences in social behavior. Hence our fourth hypothesis tests if gender has a significant impact on monthly expenditure on alcohol:

H5. Positive influence of drinkers in a household on individual alcohol consumption.

Liotta (1985) finds that there is a substantial body of work indicating behavioral, emotional and psychological issues adult children of alcohol-dependent individuals experience including lower self-esteem, higher rates of anxiety and depression and difficulty developing and sustaining both peer and intimate relationships among the various other problems they face:

H6. Smoking contributes positively to expenditure on alcohol.

Fry and Pashardes (1986) point out that the importance of distinguishing between "smokers" and "non-smokers" and "drinkers" and "non-drinkers." Blaylock and Blisard (1993) use a double hurdle approach to study the socio-economic factors affecting the participation and decisions on alcohol and tobacco independently. Moore (1996) presents evidence on the complementarities between alcohol and tobacco consumption. Our final hypothesis tests the relationship between smoking and expenditure on alcohol.

5. Data and methodology

The survey involved the use of a tailor-made questionnaire with a pre-formulated set of questions. The survey instrument covers 60 questions, which incorporate different but inter-related information. The first part of the survey questionnaire gathers information on the profile of the respondent/drinker and assesses demographic characteristics such as sex, age, ethnic group, religious belief, occupation, marital status, family size, education and location among others. The second part of the questionnaire covers alcohol consumption and expenditure of the consumer.

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This section includes questions on household income and expenditure, the respondent's alcohol consumption history, reasons for alcohol consumption, weekly and monthly expenditure on alcohol and weekly expenditure on different types of alcohol and expenditure on drinking in the previous week among others.

The questionnaire was translated in "creole"[2] to facilitate communication with the respondents. It was pre-tested initially with few alcohol-dependent individuals in various urban and rural regions of the island to ensure reliability and relevance to the Mauritian situation. Minor changes were made before undertaking the final survey. The questionnaires were then administered to alcohol-dependent individuals in different age brackets, diverse regions of the island and of different educational background. Field workers went in different parts on the island, including both rural and urban regions. All questionnaires were completed through face-to-face interviews administered by a pool of experienced field workers. The confidentiality of all respondents is strictly maintained. The data gathered were used strictly for academic purposes.

Our analysis is hence based on the responses of 300 individuals consuming excessive quantities of alcoholic beverages in different regions across the island. The survey was carried out between June and September 2012. The sampling unit was the household. Alcohol-dependent individuals were selected based on demographic characteristics namely age, sex, education, location and employment status among others. Information on alcohol consumption is derived from data obtained on the volume of alcohol and the different types of alcoholic drinks consumed. In recent years, new types of alcoholic drinks have been introduced on the local market where the alcohol content of some drinks has increased. A modified tri-level method was used to produce data on quantity and frequency of consumption (Assanangkornchai *et al.*, 2000; Saunders and Aasland, 1987). Softwares used for the data analysis included SPSS and STATA12.

Table IV provides an overview of both dependent and independent variables that have been used in prior studies, which allow us to formulate our reduced-form regression specification.

Table IV Variables capturing expenditure and determinants of expenditure on alcohol

	Country	*Dependent variable*	*Independent variables*
Andrienko and Nemtsov (2006)	Russia	Daily average consumption	Real income per head in a household, average prices for different types of alcoholic drinks, sugar and tobacco, age, gender, place of living (rural village, urban and regional capital)
Angulo *et al.* (2000)	Spain	Log of total beverage expenditure	Log of wine, beer, spirits, cava and other alcoholic and non-alcoholic beverage prices. Percentage of male members in the household, percentage of income earners in the household, family size, percentage of household members aged 1-15, 16-29, 30-59, 60 and above, size of town, education of household head, dummy for December
Petrie *et al.* (2008)	Australia	Demand for intensity, frequency of alcohol consumption	Age, marital status, education, dummy for employment status (student, work, casual or part-time, retired, home duties, unemployed) with the base case being those working full-time. Also control for smoking status and private health insurance
Collis *et al.* (2010)	UK	Income and expenditure variables comprising: gross normal wage of main earner, gross normal household income, gross current household income, normal disposable household income, total household non-alcohol expenditure	Household size, socio-economic group, region, survey month, quarter, year, drink prevalence
Yen and Jensen (1996)	USA	Household expenditure on alcohol	Household age composition, income, age of household head, dummy variables indicating regions of residence, education, marital status, gender, race of household head, home ownership and seasonality

Source: Various, compiled by authors

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To evaluate the determinants of alcohol expenditures, the regression is specified as follows:

Expenditure on Alcohol: f (Income, Age, Family Size, Gender, Initial age, Others, House Owner, Marital Status, Ethnic Group, Education Level)

where *Expenditure on Alcohol* is total expenditure on alcohol calculated as the log of total expenditure; *Income* is the log of total income of the household; *Age* captures for the effect of age; *FamilySize* controls for the size of the family. *Gender* captures the impact of gender on expenditure on alcohol. *Initial Age* captures for the impact of the age that the person first started drinking. *Others* controls for whether other members of the family living under the same roof as the drinker also drink. The variable *House Owner* captures for whether the drinker is the owner of the house he/she lives in. Marital status captures for whether the person is married or not. *Ethnic Group* is a dummy variable capturing for the influence of ethnicity in influencing expenditure on alcohol. The variable *Education level* controls for the level of education of the drinker and its influence on expenditure on alcohol.

Dummy variables are used to capture for the variation across households. In particular, the dummy variables are used to capture for marital status, ethnicity, education level, smoking status and the day the alcohol dependent individual consumes more alcohol.

However, we cannot capture for taxes and price as this study uses survey data. Unlike previous studies, our study focusses on a sample of alcohol-dependent individuals defined as those people who drink everyday, drink in the morning before work and also drink during their work hours. Furthermore, these people drink to get drunk and may also be having health problems related to alcohol.

6. Summary statistics

The sample consists of 246 male and 54 female drinkers. Out of all the drinkers interviewed, 17 percent were divorced/ separated, 50 percent were married, 22 percent were single, 6 percent were widowed while 5 percent were living with a partner. Around 45 percent (136 out of 300) had been to a hospital due to health problems associated with alcohol consumption. Out of a total of 300 alcohol-dependent individuals interviewed, 154 (51 percent) claimed that they consumed alcohol on at least four days during the weekdays. The majority of alcohol-dependent individuals (84 out of 300) had a family consisting of four members. Regarding the number of children, the majority of alcohol-dependent individuals (34 percent) had two children.

Table V provides the summary statistics for the log of expenditure on alcohol and other variables across several groups of alcohol-dependent individuals.

Column (1) provides summary statistics across the full sample, Column (2) looks only at those residing in rural areas, Column (3) looks at smokers while Column (4) provides the summary statistics for alcohol-dependent individuals but who are non-smokers. Columns (5) and (6) bring in the gender dimension and distinguish between male and female alcohol-dependent individuals. There is not much variation across the expenditure on alcohol in the sample even when we distinguish across rural area, smokers and non-smokers. However, the summary

Table V Summary statistics

	(1) *Full sample*	*(2)* *Rural*	*(3)* *Smokers*	*(4)* *Non-smokers*	*(5)* *Male*	*(6)* *Female*
Log expenditure on alcohol	7.783 (0.545)	7.783 (0.545)	7.831 (0.549)	7.663 (0.518)	7.854 (0.536)	7.461 (0.468)
LnIncome	1.496 (0.445)	1.502 (0.435)	1.481 (0.415)	1.536 (0.516)	1.562 (0.412)	1.153 (0.459)
LnAge	3.708 (0.311)	3.696 (0.313)	3.669 (0.327)	3.804 (0.243)	3.699 (0.325)	3.750 (0.233)
LnFamilysize	1.341 (0.452)	1.374 (0.431)	1.302 (0.442)	1.434 (0.466)	1.341 (0.448)	1.342 (0.476)
LnAgestarteddrinking	2.873 (0.230)	2.863 (0.217)	2.835 (0.210)	2.967 (0.250)	2.844 (0.219)	3.005 (0.235)
Number of observations	300	278	213	87	246	54

Notes: Table V reports the summary statistics; the standard errors are reported in brackets

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statistics indicate that female alcohol-dependent individuals tend to spend less on alcohol compared to their male counterparts. Similarly, the female alcohol-dependent individuals tend to earn less. We also provide summary statistics across the age, family size and the age at which the individual first started drinking.

7. Results

Table VI presents the regression results. The dependent variable is the log of monthly expenditure on alcohol consumption. We regress the dependent variable on several independent variables captured by socio-economic variables. Column (1) shows the results of our baseline specification. In Column (2), instead of capturing for the whole family size, we control for the number of children the alcoholic has. In Column (3), we include the Houseowner variable to capture for whether the alcoholic owns her/his house as in Yen (1995). In Column (4) we control for both house ownership and if the alcoholic is also involved in other substance abuse as it has been found in the literature that alcohol-dependent individuals can also be involved in the use of stimulants and depressants (Marr, 1999). In Column (5) we control for smoking status as in Parker *et al.* (2013) who demonstrate that there is an association between drinking and smoking. Finally in Column (6) we also account for the alcohol-dependent individuals having a history of drinking problems in their family. Elliott *et al.* (2012) find that family history of alcohol use problems is a reliable determinant of alcohol use and problems. Similarly, Delaney *et al.* (2011) find evidence of strong associations between amounts of alcohol students consume and drinking of their fathers and siblings. Table VI also reports the number of observations and the adjusted R^2.

The results from our OLS regressions in Table VI indicate that income is a major determinant of expenditure on alcohol by alcohol-dependent individuals. In particular, income positively influences expenditure on alcohol. The coefficient indicates that if income goes up by one Mauritian Rupee, expenditure on alcohol will go up by between 30 and 40 cents. This gives support to *H1*, that is, expenditure on alcohol does go up as income increases. However, given

Table VI Controlling for individual-specific variation (marital status, ethnicity, education level, day on which more alcohol is consumed)

Log expenditure on alcohol	*(1)*	*(2)*	*(3)*	*(4)*
LnIncome	0.395 (0.076)***	0.357 (0.082)***	0.376 (0.081)***	0.385 (0.083)***
LnAge	–0.078 (0.109)	0.120 (0.113)	0.019 (0.112)	–0.013 (0.114)
LnFamilysize	–0.234 (0.071)***	–0.261 (0.072)***	–0.264 (0.078)***	–0.237 (0.078)***
Male	0.274 (0.096)***	0.274 (0.096)***	0.258 (0.098)***	0.228 (0.098)***
LnAgestarteddrinking	–0.022 (0.008)***	–0.024 (0.008)***	–0.027 (0.008)***	–0.028 (0.008)***
Houseowner	0.055 (0.082)	0.059 (0.083)	0.058 (0.085)	0.049 (0.086)
Othersdrink	–0.015 (0.090)	–0.028 (0.091)	–0.003 (0.093)	0.010 (0.086)
Married	–0.074 (0.069)	–0.085 (0.070)	–0.053 (0.070)	–0.058 (0.070)
Hindu	–0.168 (0.161)	–	–0.173 (0.162)	–
Chinese	–0.091 (0.168)	–	–0.073 (0.170)	–
Creole	–0.166 (0.216)	–	–0.150 (0.216)	–
PrimaryEduc	–	–0.148 (0.162)	–	–
SecondaryEduc	–	–0.054 (0.169)	–	–
TertiaryEduc	–	–0.149 (0.217)	–	–
Friday	–	–	–	–0.191 (0.240)
Saturday	–	–	–	–0.159 (0.136)
Sunday	–	–	–	–0.089 (0.146)
Everyday	–	–	–	–0.087 (0.131)
Region Dummies	No	No	Yes	No
Constant	7.516 (0.473)***	7.423 (0.484)***	7.650 (0.489)***	7.730 (0.472)***
Adj R^2	0.21	0.208	0.279	0.279
Number of Observations	269	268	269	269

Notes: *,**,***Significance at 10, 5 and 1 percent levels, respectively
Source: Authors' computation

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that the coefficient is less than one, this supports the view that alcohol is regarded by the individuals in our sample, as a good which is a necessity.

The age of the drinker does not seem to have any significant explanatory power when considering its impact on monthly expenditure on alcohol. This does not support *H2*, given that the age of the drinker has no effect on alcohol expenditure. The three main variables affecting expenditure on alcohol include the size of the alcohol-dependent individuals' families (*LnFamilySize*), gender of the alcoholic (*Male*) and the age at which the alcoholic started drinking (*LnAgestarteddrinking*).

Family size negatively impacts on monthly expenditure on alcohol. This supports *H3* as the bigger the family, the lesser is expenditure on alcohol. Controlling for gender, we find that being a man has a positive impact on expenditure on alcohol. This result provides support to *H4*, that is, gender has important effects on expenditure on alcohol. The age at which the alcohol-dependent individuals started drinking has a positive impact on alcohol expenditure. This is similar to the study of Grant and Dawson (1997). Grant and Dawson (1997) use data from current and former drinkers to examine the relationship between age at first use of alcohol abuse and alcohol dependence among US adults (above 18) and also within sub-groups defined by age and sex. They find that those who started drinking at a younger age (14 or younger) abused alcohol more than those that started drinking at an older age (20 or older).

The results also indicate that the presence of other people who drink and who live under the same roof as the alcoholic has no impact on expenditure on alcohol by the latter. This does not provide support for *H5*. Similarly, our results also point out that smoking status has an insignificant impact on alcohol expenditure, which rejects *H6*.

To test for the robustness of our results in Table VII we also control for other factors such as marital status, ethnicity, education level and the day on which the alcoholic drinks more. In Column (1) of Table VII, we include dummy variables to capture for marital status (*Married*). One one hand it can be the case that being married acts as a disincentive for spending on alcoholic drinks as the person becomes more responsible and has a more important social role to play. On the other hand, people with marital issues and conflicts with the family either spouse or the children, are more likely to turn to drinking. In Column (2), we control for the level of education of the alcoholic. In particular, we capture for three broad groups, those having only primary education, those having up to secondary level education and those having tertiary education. In Column (3) we include region dummies to control for difference in the region where the alcohol-dependent individuals live. Finally, in Column (4) we include dummy variables to capture for the day on which the alcohol-dependent individuals drink more.

The results obtained are in line with the previous results, where we find that the main determinants affecting expenditure on alcohol remains income, family size, gender and the age at which the

Table VII Socio-economic determinants of alcohol consumption

Log expenditure on alcohol	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
LnIncome	0.361 (0.072)***	0.309 (0.078)***	0.360 (0.072)***	0.371 (0.073)***	0.373 (0.073)***	0.366 (0.074)***
LnAge	0.047 (0.105)	0.037 (0.120)	0.044 (0.105)	0.057 (0.106)	0.055 (0.106)	0.048 (0.105)
LnFamilysize	–0.234 (0.069)***	–0.105 (0.065)**	–0.234 (0.069)***	–0.206 (0.071)***	–0.218 (0.070)***	–0.237 (0.067)***
Male	0.254 (0.090)***	0.120 (0.094)***	0.247 (0.093)***	0.222 (0.096)***	0.221 (0.095)***	0.253 (0.091)***
LnAgestarteddrinking	–0.023 (0.008)***	–0.011 (0.008)***	–0.023 (0.008)***	–0.021 (0.008)***	–0.022 (0.008)***	–0.022 (0.008)***
Othersdrink	–0.015 (0.086)	–0.030 (0.090)	–0.016 (0.081)	–0.030 (0.087)	–0.026 (0.086)	–
Houseowner	–	–	0.028 (0.081)	0.033 (0.081)	0.028 (0.081)	–
Other substance abuse	–	–	–	0.064 (0.073)	–	–
Smoker	–	–	–	–	0.084 (0.073)	–
History	–	–	–	–	–	0.005 (0.097)
Constant	7.579 (0.402)***	7.269 (0.447)***	7.585 (0.403)***	7.433 (0.423)***	7.449 (0.420)***	7.555 (0.410)***
Adj R^2	0.21	0.142	0.207	266	269	268
Number of observations	269	213	269	0.197	0.231	0.209

Notes: *,**,***Significance at 10, 5 and 1 percent levels, respectively
Source: Authors' computation

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drinker first started drinking. The results are not affected even when we control for marital status, ethnicity, education levels and the day on which the alcoholic consumes more alcohol. The coefficients on the dummy variables capturing for the above conditions remain insignificant.

In Table VIII, our dependent variable is the share of expenditure on alcohol calculated as monthly expenditure on alcohol as a ratio of total household monthly expenditure. As expected, the level of income has a negative impact on expenditure share. Households with higher incomes have a reduced expenditure share on alcohol. This implies that as income of the alcoholic goes up, his spending on alcohol as a proportion of total spending will fall. *FamilySize* also has a negative impact on expenditure share. The age the alcoholic started drinking remains negative. However, it should be noted that the gender variable that was positive and significant in all cases in Tables VI and VII, is now insignificant.

8. Conclusion

Alcohol consumption and problems related to alcohol vary widely around the world and policy makers worldwide have come up with a number of policies to try to curb excessive alcohol consumption. Without an understanding of the factors that influence the expenditure of alcohol-dependent individuals on alcohol, it is unclear whether policies to control excessive consumption of alcohol can be effective. Hence, the focus of this paper is to examine the variables that determine the expenditure of excessive consumers of alcohol.

This study uses a survey of 300 individuals who are considered as "alcohol-dependent individuals" and tries to empirically examine the determinants of their expenditure on alcohol. Our results indicate that expenditure on alcohol by alcohol-dependent individuals increases as income increases. Our results indicate that the coefficient on our income variable is positive but less than one, indicating that alcohol is viewed as a necessity. This suggests that increasing taxes with the view of decreasing alcohol consumption is unlikely to have the desired impact. Hence, this has important policy implications from both an economic and a social perspective. We also find that age does not affect expenditure on alcohol while family size affects expenditure on alcohol negatively. This implies that the bigger the family, the lesser is expenditure on alcohol. The family plays an important role in restraining the amount spent on alcohol.

Table VIII Expenditure share as the dependent variable and controlling for socio-economic characteristics of addicts

Expenditure Share	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
LnIncome	–0.160 (0.069)***	–0.161 (0.072)***	–0.163 (0.069)***	–0.199 (0.076)***	–0.122 (0.077)*
LnAge	0.153 (0.098)	0.162 (0.099)**	0.148 (0.100)	0.234 (0.103)	0.108 (0.107)
LnFamilysize	–0.253 (0.066)***	–0.279 (0.064)***	–0.254 (0.066)***	–0.267 (0.068)***	–0.247 (0.076)***
Male	0.023 (0.084)	0.030 (0.085)	0.013 (0.087)	0.054 (0.088)	0.007 (0.094)
LnAgestarteddrinking	–0.024 (0.007)***	–0.023 (0.007)***	–0.024 (0.007)	–0.025 (0.007)***	–0.027 (0.007)***
Othersdrink	–0.114 (0.080)	–	–0.116 (0.080)	–0.163 (0.082)**	–0.104 (0.086)
History	–	0.053 (0.091)	–	–	–
HouseOwner	–	–	0.042 (0.076)	0.082 (0.075)	0.078 (0.080)
Married	–	–	–	–0.094 (0.063)	–0.095 (0.066)
Hindu	–	–	–	–0.010 (0.150)	–0.066 (0.157)
Chinese	–	–	–	0.031 (0.158)	–0.018 (0.165)
Creole	–	–	–	–0.122 (0.200)	–0.162 (0.207)
PrimaryEduc	–	–	–	–0.140 (0.103)	–
SecondaryEduc	–	–	–	–0.055 (0.109)	–
TertiaryEduc	–	–	–	0.379 (0.165)	–
Constant	0.849 (0.373)	0.690 (0.382)	0.857 (0.374)	0.719 (0.441)	0.916 (0.463)
Adj R^2	0.103	0.100	0.101	0.152	0.113
Number of observations	254	253	254	253	254

Notes: *,**,***Significance at 10, 5 and 1 percent levels, respectively
Source: Authors' computation

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Public health policy-makers in low- and middle-income countries are increasingly challenged to formulate effective strategies to address the public health problems caused by the harmful use of alcohol. There are a number of policies and laws that regulate the sale and consumption of alcohol in Mauritius. Unfortunately, it seems that there is a lack of enforcement of these laws. Hence, better enforcement would also act as a guard against over-consumption of alcohol.

In terms of policy implications of our study, we find that alcohol-dependent individuals should be sensitized so that they are not tempted to increase expenditure on alcohol as their income increases. They have to be made to understand that the increase in income could be better spent for instance in the education of their children. Sensitization campaigns and awareness programmes could indeed also help to address the issue of over-consumption of alcohol. Our results also point out that the age at which the alcoholic first started drinking has an important effect on expenditure on alcohol. The younger the age at which the alcoholic started drinking, the more is the expenditure on alcohol. Hence, alcohol-dependent individuals who started drinking at a later age are likely to spend less on alcohol compared to their counterparts who started drinking at an early age. Policies targeting specifically the youth can be effective in discouraging alcohol over-consumption and preventing young drinkers in turning into alcohol-dependent individuals.

Notes

1. NATReSA is established as a parastatal body by the provisions of the NATReSA Act No. 25 of 1996. It operates under the aegis of the Ministry of Social Security, National Solidarity and Senior Citizens Welfare & Reform Institutions. NATReSA is the sole Government Institution responsible for the prevention, treatment and rehabilitation of substance abusers.
2. Creole is the mother tongue of the country.

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