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Changing Patterns of Alcohol Use and Poverty

Ruwan Jayathilaka*

Abstract

Concerns surrounding alcohol consumption and poverty have a long history, with both recognised to be important phenomena in current socio-economic policy analysis. In order to examine the impact of household level alcohol consumption on poverty, data from four micro-level surveys conducted by the Department of Census and Statistics (DCS) was used. The main aim of this study is to measure the effects of alcohol consumption on the level of poverty in a systematic way. Using Sri Lanka as a case study, this paper demonstrates that consumption of alcoholic beverages has a significant positive impact on the incidence of poverty, particularly the illegal beverages. Although national poverty decreased to 8.9 per cent in 2009/10, if households consumed illegal alcoholic beverages, the probability of poverty increasing at the national level rose by 1 to 2 percentage points. This suggests the illegal alcohol consumption was also found to be highly sensitive to the changes in the incidence of poverty at the national level.

Keywords: Alcohol consumption, Ordered probit model, Poverty, Household characteristics.

JEL Classification: C21, I32.

1. Introduction

Drawing on the long history of alcohol consumption and poverty, it is not surprising to see that both are very important phenomena at present. Researchers in a number of disciplines including health, sociology and economics are currently paying a great deal of attention to these topics because of the importance of their ill effects on society. As a result of this attention, two distinct bodies of literature on the topics have emerged; the first dealing with alcohol consumption, and the second with poverty. Despite the abundance of literature on both alcohol consumption and poverty separately, little attention has been paid to the link between alcohol consumption and poverty.

Poverty may be primarily determined by labour market outcomes, but it is also affected by family composition. Family composition affects poverty by altering family size, and sources and quantity of non-earned income. Labour market outcomes are determined by a person's human capital, which in this case is summarised by a person's level of education and other human capital investments (such as training and health). Thus, Consumption of alcohol may affect the determinants of poverty through limiting access to education, good health, human capital and other various socio-economic and demographic characteristics.

The main purpose of this study is to examine the relationship between alcohol consumption on poverty in a comprehensive manner. Using Sri Lanka as a case study, this research will be undertaken with the use of country-wide household consumption and expenditure survey data sets with separate unit record data for poor and non-poor households and a number of other characteristics, including alcohol consuming status.

The rest of the paper is structured as follows: Section 2 presents a brief literature review in relation to alcohol consumption and poverty and section 3 describes the methodology and data used in the study. Section 4 presents the levels of poverty and the characteristics

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of the variables used in the econometric models during surveys period. Section 5 then discusses the estimation results. Finally, Section 6 gives the summary and conclusion of this part.

2. Literature Review

The economic theory of consumer behavior implies that like other consumer goods, demand for alcoholic beverages decreases when prices increase. A number of research studies have shown that this "law of demand" holds for alcoholic beverages as well (Andrikopoulos & Loizides, 2000; Clements & Johnson, 1983; Crawford, Smith, & Tanner, 1999; Crawford & Tanner, 1995; Gallet, 2007; Salisu & Balasubramanyam, 1997; Selvanathan, 1988; Simon, 1966; Trolldal & Ponicki, 2005). In addition, economic research emphasizes the social costs of excessive drinking and related government policies. A number of studies have developed econometric models to identify the factors that influence alcohol consumption and how alcohol related problems are linked to consumption levels. Such models have two main elements: modeling of alcohol consumption and linking alcohol consumption with socio-demographic variables.

There is a large body of empirical literature on the demand for alcoholic beverages. Most of the studies have used time series data to estimate a demand system with the aim of calculating income and price elasticities (Andrikopoulos, Brox, & Carvalho, 1997; Gallet, 1999; Selvanathan, 1988; Theil, 1980; Trolldal, 2005). In addition, some studies have focused on advertising as a most common exogenous variable (Duffy, 1987, 1995; Larivière, Larue, & Chalfant, 2000; Lee & Tremblay, 1992; Selvanathan, 1989), and other studies have estimated demand systems including some socio-demographic variables (Blake & Nied, 1997; Blay, Fillenbaum, Andreoli, & Gastal, 2009; Breen, Roxburgh, & Degenhardt, 2005). Furthermore, some studies have investigated the effects of taxation on alcohol consumption (Adrian & Ferguson, 1987; Clements & Selvanathan, 1991; Crawford et al., 1999; Holm & Suoniemi, 1992; Smith, 1976), and income inequality on alcohol consumption (Adams & Page, 2003; Elgar, Roberts, Parry-Langdon, & Boyce, 2005).

In order to link alcohol consumption with socio-demographic variables, most of the studies have described in detail how sociological and demographic variables affect consumption. The selection of such variables is based on subjective criteria of plausibility. Some studies have examined the demographic determinants of use of alcohol (Abdel-Ghany & Silver, 1998; Bluthenthal et al., 2008; Heien & Pompelli, 1989; Moore et al., 2009; Nelson, 1997; Selvanathan & Selvanathan, 2004; Wang, Gao, Wailes, & Cramer, 1996) and some investigate the alcohol crisis on employment and unemployment (Khan, Murray, & Barnes, 2002; Mossakowski, 2008; Mullahy & Sindelar, 1996). However, cross-sectional studies dealing with economic theory of the consumer behavior are limited. Also, past studies tend to exclude the illegal alcohol market (Angulo, Gil, & Gracia, 2001). The illegal alcohol market is a significant sector of the alcohol market in many developing countries such as Sri Lanka.

Studies directly dealing with poverty and alcohol consumption are very limited in the literature. Very few studies have discussed the possible effects of alcohol consumption on poverty (Jayathilaka, 2007; Khan et al., 2002; Neufeld, Peters, Rani, Bonu, & Brooner, 2005). Some other studies' findings are that households with increased alcohol consumption and other drug use and related problems have low education and lower

income than the households with no problem drinkers (Delva & Kameoka, 1999; Droomers, Schrijvers, Stronks, van de Mheen, & Mackenbach, 1999). Further, higher alcohol consumption was found among households with poor, black men (Jones-Webb, Snowden, Herd, Short, & Hannan, 1997) and unemployed individuals (Singer, Valentin, Baer, & Jia, 1992). Acute and chronic alcohol-related mortality were also found more among low socioeconomic status groups (Pia, 1999). Almost all the literature reviewed above has focused on different aspects of alcohol consumption and there has not been much analysis done on the relationship between alcohol consumption and the level of poverty in the context of a less developed country.

This paper presents a systematic analysis of the effects of alcohol consumption on poverty and measures the impact of alcohol consumption on poverty quantitatively. The contribution of this paper differs from previous studies in a number of ways. This is the first study to quantitatively measure the impact of alcohol consumption on the incidence of poverty at various poverty levels during 1995/96 to 2009/10 period. In addition, this study extends the probit analysis of poverty to include the various illegal alcoholic beverages available in Sri Lanka. Furthermore, the marginal effects of the various household characteristics and, consumption of legal and illegal alcoholic beverages on poverty obtained in this study would be valuable inputs for policy analysis, especially on policy issues associated with the illegal sector alcohol production and consumption.

3. Methodology and Data

As this study proposes to analyse the effects of alcohol consumption and other socio economic factors as being poor or non-poor, the appropriate model to consider, in the first instance, would be the probit model with the dummy dependent variable taking the value 1 if the household is non-poor and 0 otherwise. The probit model is a linear probability model which is non-linear and has parameters reflecting the changes in the likelihood of being a non-poor household to the changes in explanatory variables. The model takes the form (Studenmund, 2006)

$$y_i^* = x_i' \beta + \varepsilon_i \quad (1)$$

where y_i^* is the binary dependent variable; x_i is a vector of explanatory variables, β is a vector of the unknown parameters; and ε_i is a random-error term assumed to be normally distributed with zero mean. We estimate β such that:

$$\begin{aligned} \Pr[y_i = 1 | x_i] &= \Pr[y_i^* > 0] = \Pr[x_i' \beta + \varepsilon_i > 0] \\ &= \Pr[\varepsilon_i < x_i' \beta] = \Pr[\varepsilon_i < x_i' \beta] \\ &= \Phi[x_i' \beta] \end{aligned}$$

where Φ is cumulative distribution function typically estimated by applying maximum likelihood technique. However, using binary variables to represent poor (or non-poor) does not measure the depth of poor (or non-poor). In order to overcome this limitation, this study disaggregates the poverty level from two levels, poor and non-poor, to four levels, defined as extremely poor, poor, vulnerable non-poor and non-poor and extends the analysis to an ordered probit model.

In our empirical specification, the decision on which variables to include is ultimately based on exploratory analysis. Based on past studies, possible explanatory variables which are expected to have an effect on household poverty in the context of Sri Lanka are shown in Table 1, which includes socio demographic, socioeconomic, location and alcohol consumption status variables.

Table 1: Definition of variables

Variables	Label
Socio demographic variables	
Children	Proportion of children (0-14 years) in the household
Male_HH	1 if household dominant by males and 0 otherwise (+15 years)
Married_HH	1 if household head married and 0 otherwise
Male_HH	1 if male headed household and 0 otherwise.
Education_HH	Household head's education level (years)
Average age	Average age of the household members (years)
H_Size	Household size
Unemployment	Unemployment rate of the household ¹
Geographical location variable	
Urban	1 if urban sector and 0 otherwise
Rural	1 if rural sector and 0 otherwise
Estate	Base location
Type of alcoholic beverage	
Kasippu*	1 if household member(s) consumed kasippu; 0 otherwise
Toddy	1 if household member(s) consumed toddy; 0 otherwise
Arrack	1 if household member(s) consumed arrack; 0 otherwise
Beer	1 if household member(s) consumed beer and/or stout; 0 otherwise
Other liquor	Base alcoholic beverage type

Note: *This is the most common and accepted name of illicit brewing in Sri Lanka.

To further analyse whether differences exist in the effects of the explanatory variables on the depth of poverty, we will also use the ordered probit model. Ordered probit model is a generalization of the standard probit model to the case of more than two outcomes of an ordinal dependent variable (Aitchison & Silvey, 1957). Here, the dependent variable, is now a discrete variable taking the values $\{1, 2, \dots, J\}$. Let P be the official poverty line in rupees and M be the per capita monthly household income represented by the per capita total consumption expenditure (in rupees). This study uses the official poverty line to categorize the respondent households into the following four ($J=4$) groups based on their income level:

Group 1 ($y=1$): Extreme poor = Households with income, $M \leq 0.5P$.

Group 2 ($y=2$): Poor households = Households with income, $0.5P \leq M \leq P$.

Group 3 ($y=3$): Vulnerable non-poor households = Households with income, $P \leq M \leq 1.5P$.

Group 4 ($y=4$): non-poor households = Households with income, $M \geq 1.5P$.

1. Unemployment rate of the household is calculated as the number of unemployed persons (15-64 years) expressed as a percentage of the total number of persons (15-64 years) in the household.

The general specification of the ordered probit can be written as,

$$y_i = x_i' \beta + \varepsilon_i \quad (2)$$

where y_i is a latent variable measuring the severity of i^{th} household poverty; x_i is a $(k \times 1)$ vector of observed explanatory variables; β is a $(k \times 1)$ vector of unknown parameters; ε_i is a random-error term assumed to be normally distributed with zero mean. The marginal effects of the variables obtained from the estimates of the ordered probit model measure the impact on the likelihood of being in a poverty level as a result of changes in the various explanatory variables.

In line with mainstream literature, this study considers that the ordered variable is linked to an underlying latent variable which is divided into 4 intervals. Forward step-wise regression technique was then carried out to select the significant variables. The goodness of fit of the models is evaluated with an overall goodness of fit statistics and is computed as follows (Ben-Akiva & Lerman, 1985):

$$\rho^2 = [1 - L(\beta)/L(c)] \quad (3)$$

where $L(\beta)$ is the maximum log-likelihood value and $L(c)$ is the value of likelihood when it includes only constants. Based on this, the model with the highest goodness of fitness value will be selected for our analysis.

The Data

The main source of data for Sri Lanka used in this study is the micro level national household survey, HIES, conducted by the Department of Census and Statistics (DCS). HIES is normally conducted every 5 years. This study uses the 1995/96, 2001/02, 2006/07 and 2009/10 survey data to analyse the relationship between alcohol consumption and poverty and to capture the change in household behaviour and level of poverty over the 15 year period. Table 2 gives the information on the number of households selected for the above four surveys.

Table 2: Surveys period and coverage

Survey	Survey period	Number of		Average family size	Districts surveyed ^b
		Households ^a	Persons ^a		
(1)	(2)	(3)	(4)	(5)	(6)
HIES 1995/96	Nov 1995 - Oct 1996	19,753	89,734	4.54	17
HIES 2001/02	Jan 2002 - Dec 2002	16,924	71,290	4.21	17
HIES 2006/07	July 2006 - June 2007	18,542	76,744	4.14	19
HIES 2009/10	July 2009 - June 2010	19,958	80,872	4.05	22

Note: ^a Numbers exclude missing values and outliers; ^b There are 25 districts in Sri Lanka and districts affected by war in the North and East during the survey period were not included in the surveys.

As can be seen from columns three and four, a different number of households were surveyed at each time period (e.g. HIES 1995/96 covered 19,753 households and HIES 2001/02 covered 16,924 households). It is interesting to note from column five that average family size declined during the 15 year period. With regards to the HIES 1995/96 and 2001/02 surveys, they both covered 17 districts and excluded the Northern and

Eastern provinces. HIES 2006/07 covered 18,542 households and excluded the Northern Province and Trincomalee district in the Eastern Province. HIES 2009/10 covered 19,958 households in all the districts, except for Mannar, Kilinochchi and Mullaithivu districts in the Northern Province.

4. Levels of Poverty and Characteristics of the Sri Lankan Households

Table 3 shows the levels of poverty among Sri Lankan households across 1995/96 to 2009. As can be seen, in 2009/10 about 0.3 per cent of the households were extremely poor, 7.8 per cent were poor, and 92 per cent were non-poor. Even though 92 per cent of the households were non-poor about 21 per cent of the non-poor households were vulnerable non-poor. Analysis of the percentages of people belonging to extreme poor and poor groups shows a steady decline since 1995/96 with poverty decreasing between 2001/02 and 2009/10 by around one third. For example, table 3 shows that in 1995/96, approximately 2 per cent were extreme poor and 25 per cent were poor and by 2009/10, this had decreased to 0.3 per cent extreme poor and 8 per cent poor. During the same period however, the percentage of vulnerable non-poor decreased only from 29 per cent to 20 per cent. Furthermore, during the 2006/07 to 2009/10 period, the percentage of vulnerable non-poor decreased only marginally (down to 22 per cent). This indicates that poverty has significantly decreased in recent years, and that a large proportion of households just above the official poverty line are still at risk of slipping back into poverty.

Table 3: Levels of poverty among Sri Lankan households, 1995/96, 2001/02, 2006/07 and 2009/10

Level of poverty	1995/96		2001/02		2006/07		2009/10	
	Monthly expenditure	%	Monthly expenditure	%	Monthly expenditure	%	Monthly expenditure	%
Extreme poor	<SLRs416	1.98	<SLRs711	1.56	<SLRs 1116	0.40	<SLRs 1514	0.27
Poor	SLRs 417- SLRs 833*	25.23	SLRs 712- SLRs 1423*	22.47	SLRs 1117- SLRs 2233*	12.59	SLRs 1515- SLRs 3028*	7.80
Vulnerable non-poor	SLRs 834- SLRs 1250	29.41	SLRs 1424- SLRs 2135	24.90	SLRs 2234- SLRs 3350	21.74	SLRs 3029- SLRs 4542	20.61
Non-poor	>SLRs 1251	43.38	>SLRs 2136	51.07	>SLRs 3351	65.27	>SLRs 4543	71.31

Source: Based on the data from HIES 1995/96, 2001/02, 2006/07 and 2009/10.

Note: * Official poverty line

Table 4 reports the summary statistics for all independent variables which are expected to have some effect on the poverty status of a household across the survey years. Looking at the socio demographic characteristics of households in Sri Lanka, from 1995/96 to 2009/10, the percentage of the number of children in the household decreased from 26 per cent to 22 per cent. In 1995/96, 26 per cent of Sri Lankan households were male dominant while this decreased to 22 per cent by 2009/10, implying an increase in the proportion of female dominated households.

Table 4: Characteristics of Sri Lankan Households

Variables	1995/96		2001/02		2006/07		2009/10	
	(N=19,336)* % (Means if count)	Std. deviation	(N=16,521)* % (Means if count)	Std. deviation	(N=17,916)* % (Means if count)	Std. deviation	(N=19,197)* % (Means if count)	Std. deviation
Socio demographic variables								
<i>Children</i>	25.6%		23.16%		23.51%		21.89%	
<i>Male HH</i>	25.66%		24.53%		22.63%		21.89%	
<i>Married HH</i>	81.92%		82.20%		80.06%		79.71%	
<i>Male HH</i>	80.79%		79.83%		76.85%		76.63%	
<i>Education HH</i>	8.63	4.0615	9.46	3.9838	8.68	4.2228	8.75	4.0384
<i>Average age</i>	30.06	11.0590	31.68	11.4235	32.86	12.0545	33.83	12.3417
<i>H Size(mean)</i>	4.80	1.9247	4.42	1.7379	4.21	1.6735	4.14	1.6529
<i>Unemployment(overall)</i>	10.09%		12.46%		9.44%		10.68%	
• <i>Extreme poor</i>	15.20%		14.24%		14.79%		15.04%	
• <i>Poor</i>	11.01%		14.59%		11.15%		13.87%	
• <i>Vulnerable non-poor</i>	10.69%		13.25%		10.51%		12.66%	
• <i>Non-poor</i>	8.91%		11.08%		8.72%		9.75%	
Geographical location variables								
<i>Urban</i>	19.13%		19.33%		25.16%		26.51%	
<i>Rural</i>	71.89%		73.52%		65.59%		64.71%	
<i>Estate</i>	8.98%		7.15%		9.25%		8.78%	
Alcoholic beverages								
<i>Kavppu</i>	2.90%		4.79%		2.53%		2.05%	
<i>Toddy</i>	1.04%		1.66%		1.11%		0.95%	
<i>Arrack</i>	3.83%		5.94%		9.24%		8.92%	
<i>Beer</i>	0.28%		0.68%		0.76%		0.95%	
<i>Other liquor</i>	0.75%		0.38%		0.47%		0.34%	

Notes: a based on all households that reported every explanatory variable.

Source: Based on the data from HIES 1995/96, 2001/02, 2006/07 and 2009/10.

In general, the average age of the household member increased to 34 years from 30 years whilst the average family size decreased to 4.1 from 4.8. However, family size of the extreme poor household tended to be larger than the non-poor households (six versus three household members for extreme poor and non-poor households, respectively).

As can be seen from Table 4, almost 20 per cent of the household heads are still unmarried and more than 75 per cent of the households are male-headed. During the entire period, the average number of years of education of the household head was around nine years, which is less than high-school level.

In recent years, the overall unemployment rate was about 10 per cent, and when disaggregated by level of poverty, unemployment rates were higher among the extreme poor, poor and vulnerable non-poor, than for the general population. In 2009/10, the unemployment rate was 15.0 per cent among the people in the extreme poor households compared with 13.9 per cent people in the poor households. Furthermore, 12.6 per cent people in the vulnerable non-poor households reported that they were unemployed. In addition, considering the geographical location of the households, it can be seen that nearly two-thirds lived in rural areas and a quarter were located in urban areas.

An analysis of household alcohol consumption shows that in 1995/96, only 9 per cent of the households consumed alcohol. However in 2009/10, alcohol consumed households increased to 13 per cent. As far as the type of alcohol beverages is concerned, arrack was popular at all times. In 1995/96, 4 per cent of the households consumed arrack and this increased to 9 per cent in 2009. In 1995/96, beer and stout consuming households were about 0.28 per cent and this increased to 0.95 per cent in 2009. However, for toddy, this slightly decreased from 1.04 per cent in 1996 to 0.95 per cent in 2009. Considering the consumption of gin, whisky, brandy and wine collectively, only 0.8 per cent of the households consumed these legal beverages in 1995/96 which slightly decreased to 0.3 per cent in 2009. In addition, the percentage of kasippu consuming households in 1995/96 was 2.9 per cent and this increased to 4.8 per cent in 2001. Further, in 2006/07, kasippu consuming households decreased to 2.5 per cent then decreased further to 2.1 per cent in 2009. Realistically however, the actual percentage would be higher than this as kasippu is an illegal alcohol product, and thus the survey respondents may not openly state that they consume this product. Hence, the survey results show that a considerable number of households consume illegal alcoholic beverages, as average expenditure on kasippu is second only to arrack consumption.

5. Estimation Results

The detailed estimation results using the probit models are presented in Table A1 to Table A4 of this paper and marginal values of each survey year are presented in Table 5. The data used for the estimations for 1995/96, 2002/03, 2006/07 and 2009/10 surveys included 5256, 3967, 2326 and 1549 numbers of poor households respectively. However, the probit models reproduced 62.9 per cent and 60.7 per cent of true cases for poor households in 1995/96 and 2001/02 surveys. For the 2006/07 and 2009/10 surveys this was 58.2 per cent and 43.8 per cent respectively. The number of the cases reproduced for non-poor households was more than 95 per cent for all four surveys. Overall, each probit model succeeded to produce more than 75 per cent of the true outcomes for 1995/96 and 2001/02 surveys. For the 2006/07 and 2009/10 surveys, the probit model produced more than 85 per cent and 90 per cent of the true outcomes respectively.

Socio demographic variables

As can be seen from the estimation results in Table 5, it is clear that the number of children, family size, unemployment rate and male domination have a negative significant effect on poverty. Although, in 1995/96 and 2001/02 average age had a positive effect on poverty, in 2006/07 it had a negative effect. The marginal effects highlighted that, in 1995/96, each unit increase in the ratio of the number of younger children in the household increased the probability of being in poverty by 3.5 percentage points, and in 2009/10 this reduced to 0.1 percentage points. The estimated coefficients of the average age of the household head and the family size of the household in 2006/07 revealed that a one year increase in the age of the household head will decrease the probability of being poor by 0.14 per cent and an additional family member will increase the probability of being poor by 3 per cent. These results are consistent with the findings of the previous studies (see e.g., (Aiyedogbon & Ohwofasa, 2012; Dawit, Woldeamlak, Gete, Yemisrach, & Peter, 2011; Rahman, 2013)).

By looking at the household head's education, it is important to note that, after 2001/02, the household head's education was an important factor in reducing the incidence of poverty. Estimated results showed that for every additional year (or grade) of household head's education, the probability of being in poverty decreased by 3.1 per cent in 2001/02 and after, increased to 3.6 in 2009/10. As far as the gender of the head is concerned, it was not an important factor affecting poverty. However, marital status of the household head was an important factor contributing towards reducing poverty after 2006/07. For example, if the household head was married, then there was a 3 per cent and 2 per cent improved chance to get out of poverty in 2006/07 and 2009/10 respectively. These are in line with the conclusion in the previous studies (see e.g., (Choi & Marks, 2011; de Silva, 2008; Jayathilaka, 2009))

Geographical location

The marginal effect of the geographical location of the household in 1995/96 shows poverty will decrease by 10 percentage points if the household is located in the urban sector. However, in 2001/02 this percentage increased to 16 percentage points and decreased to 6 percentage points by 2009/10. On the other hand, marginal effects for 1995/96 shows poverty would increase by 7 percentage points if the household was located in the rural sector, and for 2006/07 it shows poverty would decrease by 9 and 3 percentage points if the household was located in rural areas. As far as both sectors were concerned however, if the household was located in the urban sector, then there was a higher chance of it being recorded as non-poor.

Table 5: Marginal effects of the probit models

Variable	1995/96	2001/02	2006/07	2009/10
<i>younger_t</i>	-0.3449***	-0.2662***	-0.1995***	-0.0908***
<i>m_t</i>		-0.0196**	-0.0132**	-0.0104**
<i>married_t</i>			0.0341***	0.0237***
<i>education_t</i>	0.0257***	0.0304***	0.0035***	0.0036***
<i>av_t</i>	0.0027***	0.0011**	-0.0014***	
<i>f_t</i>	-0.0425***	-0.0402***	-0.0302***	-0.0210***
<i>unemployment_t</i>	-0.0010***	-0.0009***	-0.0005***	-0.0003***
<i>urban_t</i>	0.1085***	0.1635***	0.1496***	0.0696***
<i>rural_t</i>	-0.0790***		0.0946***	0.0364***

<i>kassippu_i</i>	-0.1064***	-0.0394***		-0.0199*
<i>arrack_i</i>	0.1830***	0.1196***	0.0690***	0.0440***
<i>beer_i</i>	0.2072***	0.1684***	0.0878***	0.0521***
Pseudo R2	0.1643	0.1830	0.1214	0.1102
Log likelihood	-9,454.5	-7,440.4	-6,076.8	-4,790.7
Number of observations	19,336	16,521	17,916	19,197

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Source: Based on HIES DCS (1996), DCS (2002), DCS (2007) and DCS (2010) data sets.

Alcoholic beverages

Estimated results of the various types of alcoholic beverages revealed that drinking kasippu and toddy was associated with poor households, but the drinking of arrack, beer and stout beverages was associated with non-poor households. For example, in 1995/96, being a kasippu consuming household increased the probability of being poor by 10 per cent. In 2001/02 it decreased to 4 per cent, and it further decreased to 2 per cent in 2009/10. In addition, toddy consumption was not a significant factor affecting poverty in Sri Lanka. The probit model assumes all poor households are in the same situation and does not take into account the intensity of poverty. Thus, the ordered probit model was used to capture the intensity of poverty. Tables 6 to 9 present the estimation results of the final ordered probit models.

Table 6: Ordered probit regression result - 1995/96

Variable	Estimate	Robust SE	Marginal effects			
			Extreme poor Pr(y = 1)	Poor Pr(y = 2)	Vulnerable non- poor Pr(y = 3)	Non-poor Pr(y = 4)
<i>younger_i</i>	-1.0462***	0.0599	0.0196***	0.2933***	0.0969***	-0.4098***
<i>m_domi_i</i>	-0.0397**	0.0203	0.0008*	0.0112*	0.0036**	-0.0155**
<i>married_i</i>	-0.0878***	0.0306	0.0015***	0.0242***	0.0089***	-0.0346***
<i>headship_i</i>	0.0641**	0.0297	-0.0012**	-0.0180**	-0.0059**	0.0251**
<i>education_i</i>	0.0991***	0.0023	-0.0019***	-0.0278***	-0.0092***	0.0388***
<i>av_age_i</i>	0.0105***	0.0013	-0.0002***	-0.0030***	-0.0010***	0.0041***
<i>f_size_i</i>	-0.1348***	0.0050	0.0025***	0.0378***	0.0125***	-0.0528***
<i>unemployment_i</i>	-0.0038***	0.0004	0.0001***	0.0011***	0.0004***	-0.0015***
<i>urban_i</i>	0.5455***	0.0345	-0.0071***	-0.1341***	-0.0736***	0.2149***
<i>rural_i</i>	-0.1284***	0.0266	0.0023***	0.0353***	0.0130***	-0.0505***
<i>kasippu_i</i>	-0.3097***	0.0464	0.0041***	0.0779***	0.0410***	-0.1229***
<i>toddy_i</i>	-0.1476*	0.0766	0.0023**	0.0393**	0.0168*	-0.0584*
<i>arrack_i</i>	0.7291***	0.0455	-0.0065***	-0.1537***	-0.1215***	0.2817***
<i>beer_i</i>	1.6905***	0.3763	-0.0068***	-0.2113***	-0.2920***	0.5101***
Marginal effects after ordered probit						
Ancillary parameters			0.0067	0.2172	0.3518	0.4243
$\hat{\gamma}_1$	-2.2282	0.0701				
$\hat{\gamma}_2$	-0.5145	0.0665				
$\hat{\gamma}_3$	0.4355	0.0665				
Pseudo R ²	0.1368					
Log likelihood	-19,150.4					
Number of observations	19,336					

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Table 7: Ordered probit regression results - 2001/02

Variable	Estimate	Robust SE	Marginal effects			
			Extreme poor Pr(y = 1)	Poor Pr(y = 2)	Vulnerable non- poor Pr(y = 3)	Non-poor Pr(y = 4)
<i>younger</i>	-0.8262***	0.0669	0.0096***	0.2084***	0.1111***	-0.3292***
<i>m_dum</i>	-0.0576**	0.0227	0.0007**	0.0147*	0.0076***	-0.0229**
<i>education</i>	0.1258***	0.0026	-0.0015***	-0.0317***	-0.0169***	0.0501***
<i>av_d2c</i>	0.0075***	0.0013	-0.0001***	-0.0019***	-0.0010***	0.0030***
<i>f_size</i>	-0.1499***	0.0061	0.0017***	0.0378***	0.0202***	-0.0597***
<i>unemployed</i>	-0.0033***	0.0004	0.0000***	0.0008***	0.0004***	-0.0013***
<i>urban_i</i>	0.8203***	0.0403	-0.0058***	-0.1626***	-0.1365***	0.3048***
<i>rural</i>	0.0738**	0.0320	-0.0009**	-0.0189**	-0.0096**	0.0294**
<i>ksppu_i</i>	-0.1267***	0.0414	0.0013***	0.0304***	0.0185***	-0.0502***
<i>arrack</i>	0.5642***	0.0434	-0.0036***	-0.1120***	-0.0970***	0.2126***
<i>beer</i>	0.9954***	0.1440	-0.0039***	-0.1507***	-0.1785***	0.3331***
Ancillary parameters				Marginal effects after ordered probit		
$\hat{\gamma}_1$	-1.8788	0.0754	0.0039	0.1777	0.2980	0.5204
$\hat{\gamma}_2$	-0.1302	0.0717				
$\hat{\gamma}_3$	0.7278	0.0722				
Pseudo R ²	0.1559					
Log likelihood	-15,194.4					
Number of observations	16,521					

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Table 8: Ordered probit regression results - 2006/07

Variable	Estimate	Robust SE	Marginal effects			
			Extreme poor Pr(y = 1)	Poor Pr(y = 2)	Vulnerable non- poor Pr(y = 3)	Non-poor Pr(y = 4)
<i>younger_i</i>	-0.8453***	0.0687	0.0034***	0.1429***	0.1585***	-0.3047***
<i>m_domi_i</i>	-0.0485**	0.0235	0.0002*	0.0083**	0.0091**	-0.0176**
<i>married_i</i>	0.1929***	0.0247	-0.0009***	-0.0350***	-0.0352***	0.0712***
<i>education_i</i>	0.0357***	0.0026	-0.0001***	-0.0060***	-0.0067***	0.0129***
<i>av_age_i</i>	-0.0023*	0.0013	0.0001*	0.0004*	0.0004*	-0.0008*
<i>f_size_i</i>	-0.1816***	0.0062	0.0007***	0.0307***	0.0341***	-0.0655***
<i>unemployment_i</i>	-0.0026***	0.0004	0.0001***	0.0004***	0.0005***	-0.0009***
<i>urban_i</i>	1.2418***	0.0344	-0.0032***	-0.1471***	-0.2110***	0.3613***
<i>rural_i</i>	0.5929***	0.0287	-0.0035***	-0.1123***	-0.1033***	0.2190***
<i>kasippu_i</i>	-0.1136**	0.0541	0.0005*	0.0205**	0.0208**	-0.0419**
<i>toddy_i</i>	-0.1568**	0.0754	0.0008*	0.0291*	0.0284**	-0.0583**
<i>arrack_i</i>	0.4228***	0.0338	-0.0010***	-0.0571***	-0.0802***	0.1383***
<i>beer_i</i>	0.6540***	0.1190	-0.0011***	-0.0717***	-0.1194***	0.1922***
Marginal effects after ordered probit						
Ancillary parameters			0.0012	0.0968	0.2282	0.6738
$\hat{\gamma}_1$	-2.9054	0.0848				
$\hat{\gamma}_2$	-1.1616	0.0745				
$\hat{\gamma}_3$	-0.3191	0.0748				
Pseudo R ²	0.1005					
Log likelihood	-14,391.6					
Number of observations	17,916					

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Table 9: Ordered probit regression results - 2009/10

Variable	Estimate	Robust SE	Marginal effects			
			Extreme poor Pr(y = 1)	Poor Pr(y = 2)	Vulnerable non- poor Pr(y = 3)	Non-poor Pr(y = 4)
<i>younger_i</i>	-0.7550***	0.0482	0.0022***	0.0832***	0.1604***	-0.2458***
<i>m_domi_i</i>	-0.0685***	0.0236	0.0002**	0.0078***	0.0146***	-0.0226***
<i>married_i</i>	0.1806***	0.0249	-0.0006***	-0.0216***	-0.0384***	0.0607***
<i>education_i</i>	0.0439***	0.0028	-0.0001***	-0.0048***	-0.0093***	0.0143***
<i>f_size_i</i>	-0.1896***	0.0063	0.0006***	0.0209***	0.0403***	-0.0617***
<i>unemployment_i</i>	-0.0032***	0.0004	0.0001***	0.0004***	0.0007***	-0.0010***
<i>urban_i</i>	0.8694***	0.0359	-0.0017	-0.0727***	-0.1667***	0.2410***
<i>rural_i</i>	0.3948***	0.0308	-0.0014***	-0.0479***	-0.0833***	0.1326***
<i>kasippu_i</i>	-0.1063**	0.0620	0.0004**	0.0127**	0.0227**	-0.0357**
<i>arrack_i</i>	0.4779***	0.0365	-0.0008***	-0.0388***	-0.0946***	0.1343***
<i>beer_i</i>	0.9552***	0.1428	-0.0009***	-0.0507***	-0.1566***	0.2082***
Marginal effects after ordered probit						
Ancillary parameters			0.0009	0.0553	0.2056	0.7382
$\hat{\gamma}_1$	-3.0726	0.0679				
$\hat{\gamma}_2$	-1.5225	0.0465				
$\hat{\gamma}_3$	-0.5727	0.0457				
Pseudo R ²	0.0971					
Log likelihood	-13,549.2					
Number of observations	19,197					

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Socio demographic variables

The coefficients of the socio demographic variables in the 2009/10 survey revealed that a one per cent increase in the younger ratio of poor households and vulnerable households increases the probability of being in poverty by 0.08 and 0.16 percentage points. The 1995/96 and 2001/02 surveys however, showed that poor household increase in probability of being in poverty by 0.2-0.11 percentage points if the number of younger people ratio increased by one unit. Recent survey results show that a household head's education level is an important factor to determine poverty. For example, in 2006/07, it was estimated that one additional year of education for the household heads will decrease the probability of reporting a vulnerable non-poor and poor household by 7 percentage points. In 2009/10, it was estimated that if the household head had one additional year at the education, there would be a 5 percentage point decrease in the probability of reporting as a poor household. Furthermore, recent 2009/10 survey results report that the probability of reporting as a vulnerable non-poor household is 9 percentage points lower for an additional year of education. Therefore, the education level of the household head has been an important factor for reducing poverty in recent years.

Considering the marginal effect of the marital status of the household head for both the 2006/07 and 2009/10 surveys, it was revealed there was a 2-3 percentage point chance of being poor if the household head was unmarried. Furthermore, estimated result for 2009/10 survey showed that vulnerable non-poor households face a 4 percentage point higher chance of being poor if the household head was unmarried. As far as considering the family size of the household, in the 2006/07 and 2009/10 surveys it was disclosed that having one additional member in a poor household will increase the chances of being classed as poor by 2-3 percentage points. However, in the 2009/10 survey, it was found that having one additional member in a vulnerable non-poor household will increase the chances of reporting as vulnerable non-poor by 4 percentage points. Thus, marital status of the household head and family size are vital components in the determination of poverty in Sri Lanka in recent years. Although the effects of other characteristics of the household head are very small in magnitude, they are all highly significant.

Geographical location

The coefficients of the location factor in the 1995/96, 2001/02 and 2006/07 surveys implied that the poor were 13, 16 and 14 percentage points less likely to be from the urban sector. In addition, the 1995/96 survey showed that urban sector households are 7 percentage points less likely to report as being vulnerable non-poor. These numbers gradually increased to 17 percentage points in 2009/10 and this implies that poor and vulnerable non-poor households have a decreasing trend of reporting as poor and vulnerable non-poor households in urban sector. With reference to rural sector, poor are 2-4 percentage points less likely to report as poor and 8-11 percentage points less likely to report as vulnerable non-poor households. This indicates that in the urban sector, it is more important to report being less poor and less vulnerable than non-poor households in the rural sector.

The 1995/96 survey showed that urban sector households were 21 percentage points more likely to report as non-poor and rural sector households were 5 percentage points less likely to report as non-poor. However, in 2009/10, both sectors were more likely to report as non-poor. It showed that urban sector households were 24 percentage points, and rural sector households were 13 percentage point, more likely to report as non-poor.

This implies there is a higher chance of reporting non-poor household in the urban sector. Magnitude of the location factor of extreme poor was however marginal and stayed less than 0.01 per cent and overall, the household being located in the urban sector is a vital factor in poverty especially among the poor and vulnerable non-poor groups.

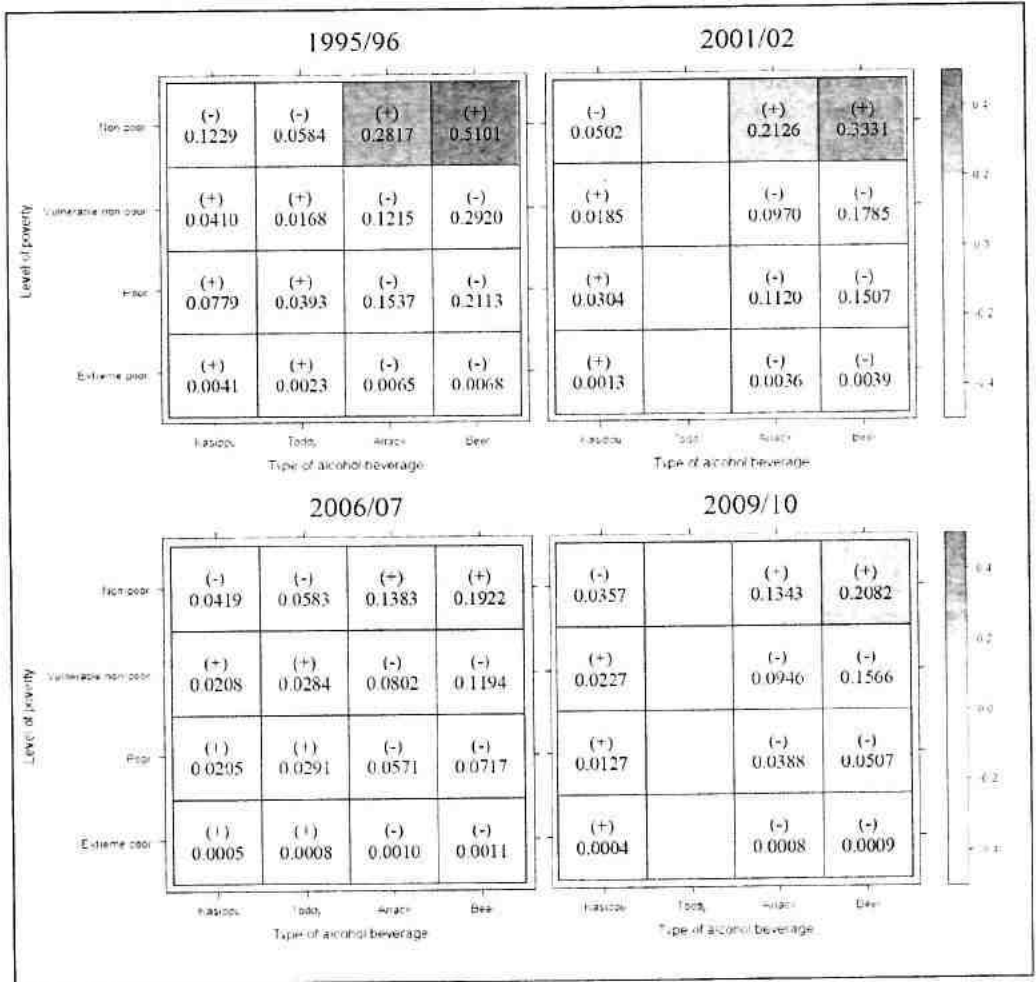
Alcoholic beverages

Figure 1 shows historical changes of different poverty groups according to the consumption of different alcoholic beverages. Considering the signs of the marginal effects, overall, we can see that non-poor households were negatively associated with the consumption of kasippu and toddy while the vulnerable non-poor, poor and extremely poor households were positively associated with the consumption of these beverages. In contrast, non-poor households were positively associated with arrack and beer consumption while other households were negatively associated with the consumption of these beverages. This is in line with the conclusion in the probit model.

In terms of the variables related to kasippu, toddy, arrack, beer and other legal beverages, all variables have significant effects except for toddy in 2001/02 and 2009/10. Thus, in regards to the any households group in 2001/02 and 2009/10, toddy consumption was not a significant factor to determine poverty status. A beer consuming household did show an increased probability of reporting non-poor group by 51 percentage points in 1995/96, but this steadily decreased to 21 percentage points in 2009/10.

In addition, looking at the arrack consuming households shows that arrack consumers were 28 percentage points more likely to report being non-poor in 1995/96. This reduced to 21 percentage points in 2001/02 and further again to 13-14 percentage points in 2006/07 and 2009/10. It seems that the probability of being non-poor among the arrack consumers was much higher between 1995/96 and 2001/02 period.

Figure 1: Heat maps for marginal effect changes



Although arrack, beer and other legal beverages are mainly consumed by the non-poor households, the consumption of kasippu increased the level of poverty. For example, amongst non-poor households consuming kasippu or toddy; there was a 12 percentage point in 1995/96 and this reduced to 3 percentage points in 2009/10. This implies that a non-poor person who consumed kasippu has a lesser chances of reporting as non-poor in a recent year.

With regard to kasippu and toddy beverages, these two beverages had positive effects on the vulnerable non-poor after 1995/96. For example, kasippu consuming households were 1 percentage point more likely to report as being vulnerable non-poor in 2001/02 and this increased to 2 percentage points in 2006/07 and 2009/10. With regard to toddy, this increased 2 percentage point in 1995/96 to 3 percentage points in 2006/07.

Kasippu consumption had a positive effect on poverty from 1995/96 to 2009/10 but this effect was less strong in recent years. For example, kasippu consumers were 8 percentage points more likely to report being poor in 1995/96. The chances of increasing poverty

level decreased to 3 percentage points in 2001/02 and 2 percentage points in 2006/07. This further decreased to 1 percentage point in 2009/10. There is therefore a very small chance of increasing poverty level in the extreme poor households by consuming kasippu or toddy.

Hence, marginal effects on the various types of alcoholic beverages reveal that drinking kasippu decreased the existing poverty among the poor and vulnerable non-poor groups. The incidence of poverty at the national level was recorded as 8.9 per cent in 2009/10. Using the same survey, results reveal there is a 1-2 per cent chance of increasing the national level poverty if households consumed illegal alcohol beverages. With regards to the non-poor group, consumption of arrack, beer and other legal beverages diminish the likelihood of being viewed as non-poor.

6. Conclusion

The main objective of this paper was to provide a more complete picture of the changing patterns of alcohol consumption and poverty. The probit model emphasised that kasippu consuming households increased the probability of poverty by 10 percentage points in 1995/96 and decreased this to 2 percentage points in 2009/10. Toddy was not an important factor to determine poverty. The study also demonstrated that poor households and vulnerable non-poor households spend a very high proportion of their income on alcohol and there is a strong relationship between poverty and expenditure of illegal alcoholic beverages. Without doubt, illegal alcohol consumption is especially prevalent in the poor and vulnerable non-poor households, particularly those from the rural and estate sector. Thus incidence of poverty at the national level in Sri Lanka is highly sensitive due to the illegal alcohol consumption.

In 1995/96, consumers of legal alcoholic beverage (i.e. arrack and beer) were 28 to 51 percentage points more likely to be non-poor. This decreased to 13 to 20 percentage points in 2009/10 which implies that these legal alcoholic beverage consumers have faced a reduced chance of being non-poor in recent years. Consumption of kasippu or toddy by the poor and vulnerable non-poor groups increased the probability of them reporting as poor. Kasippu consumers were 1 to 2 percentage points more likely to report as poor or being vulnerable non-poor in recent years. Furthermore, toddy consuming households were 3 percentage points more likely to report as being poor or vulnerable households. The incidence of poverty at the national level in Sri Lanka was recorded as 8.9 per cent and the incidence of poverty was seen to be highly sensitive to illegal alcohol consumption. The chances of experiencing an increasing in the poverty level by consuming kasippu or toddy amongst the extreme poor households were very small.

The empirical investigations of this study relating to Sri Lanka further found that poor household groups are more vulnerable to alcohol consumption. Undoubtedly, these findings are useful in the formulation of policies and the implementation of strategies to reduce poverty and alcohol consumption. The study revealed that taking account of regional variations in alcohol consumption is also important in policy making. For example, illegal alcohol consumption is mainly associated with households in poor districts and regions. It is therefore important to design policies aimed at improving living conditions and income levels of households in these districts and regions in order to reduce illegal alcohol consumption.

The study also found that households which are either led by males, or are close to the poverty line, are more vulnerable to alcohol consumption and tend to be poor. When designing strategies on poverty reduction through reducing alcohol consumption it is important to policy makers to focus more on male-headed households than female-headed households. Further, the results pointed out that estate sector is mostly affected by poverty and also highly exposed to the consumption of illegal alcohol beverages. In terms of geographical location, households in the estate sector were revealed to be more vulnerable to the consumption of toddy and kasippu beverages. Therefore, governments should develop poverty reduction programmes in areas where the number of poor households have increased over the last two decades. Particular attention should be given to households which are close to the poverty line.

Overall, this study suggests that designing and implementing policies towards reducing alcohol consumption, particularly illegal alcohol consumption, are necessary to reduce poverty in Sri Lanka. In order to implement such policy in the most effective way, it is necessary to strengthen institutions, improve law and order and minimise political interference.

Appendices

Table A1: Probit regression results -1995/96

Variable	Sri Lanka		
	Estimate	Robust SE	Marginal Effects
Constant	0.8075	0.0817	
<i>younger_i</i>	-1.1371	0.0741	-0.3449
<i>education_i</i>	0.0849	0.0027	0.0257
<i>av_age_i</i>	0.0090	0.0016	0.0027
<i>f_size</i>	-0.1402	0.0060	-0.0425
<i>unemployment_i</i>	-0.0033	0.0005	-0.0010
<i>urban_i</i>	0.3952	0.0476	0.1085
<i>rural_i</i>	-0.2731	0.0377	-0.0790
<i>kassippu_i</i>	-0.4134	0.0652	-0.1064
<i>arrack_i</i>	0.8755	0.0723	0.1830
<i>beer_i</i>	1.2508	0.4449	0.2072
Pseudo R2	0.1643		
Log likelihood	-9,454.5		
Number of observations	19,336		

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Table A2: Probit regression results - 2001/02

Variable	Sri Lanka		
	Estimate	Robust SE	Marginal Effects
Constant	0.4392	0.0853	
<i>younger_i</i>	-0.9857	0.0846	-0.2662
<i>m_domi_i</i>	-0.0714	0.0285	-0.0196
<i>education</i>	0.1126	0.0030	0.0304
<i>education_i</i>	0.0041	0.0017	0.0011

<i>av_age_i</i>	-0.1489	0.0075	-0.0402
<i>f_size_i</i>	-0.0034	0.0005	-0.0009
<i>unemployment_i</i>	0.7605	0.0394	0.1635
<i>kassippu_i</i>	-0.1555	0.0534	-0.0394
<i>arrack_i</i>	0.5678	0.0595	0.1196
<i>beer_i</i>	1.1344	0.2592	0.1684
Pseudo R2	0.1830		
Log likelihood	-7,440.4		
Number of observations	16,521		

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Table A3: Probit regression results -2006/07

Sri Lanka			
Variable	Estimate	Robust SE	Marginal Effects
Constant	1.5747	0.1012	
<i>younger_r_i</i>	-1.1369	0.0948	-0.1995
<i>m_domi_i</i>	-0.0736	0.0316	-0.0132
<i>married_i</i>	0.1814	0.0326	0.0341
<i>education_i</i>	0.0199	0.0034	0.0035
<i>av_age_i</i>	-0.0078	0.0018	-0.0014
<i>f_size_i</i>	-0.1719	0.0078	-0.0302
<i>unemploynet_i</i>	-0.0028	0.0006	-0.0005
<i>urban_i</i>	1.2067	0.0491	0.1496
<i>rural_i</i>	0.4885	0.0374	0.0946
<i>arrack_i</i>	0.5207	0.0523	0.0690
<i>beer_i</i>	0.9392	0.2686	0.0878
Pseudo R2	0.1214		
Log likelihood	-6,076.8		
Number of observations	17,916		

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

Table A4: Probit regression results -2009/10

Variable	Sri Lanka		
	Estimate	Robust SE	Marginal Effects
Constant	1.6619	0.0666	
<i>younger_i</i>	-0.7662	0.0703	-0.0908
<i>m_domi_i</i>	-0.0848	0.0347	-0.0104
<i>married_i</i>	0.1835	0.0359	0.0237
<i>education_i</i>	0.0299	0.0042	0.0036
<i>f_size_i</i>	-0.1767	0.0084	-0.0210
<i>unemployment_i</i>	-0.0029	0.0006	-0.0003
<i>urban_i</i>	0.7504	0.0539	0.0696
0.2863	0.0443	0.0364	
-0.1505	0.0833	-0.0199	
0.5160	0.0610	0.0440	
0.8376	0.2439	0.0521	
Pseudo R2	0.1102		
Log likelihood	-4,790.7		
Number of observations	19,197		

Notes: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

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