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SOCIOECONOMIC DETERMINANTS OF ALCOHOL CONSUMPTION AMONG NON-MALAYS IN MALAYSIA*

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Abstract

In light of the increases in prevalence of alcohol consumption, the objective of the present study is to examine the socioeconomic determinants of alcohol consumption in Malaysia. The Third National Health and Morbidity Survey (NHMS III) consisting of 13477 non-Malay respondents is used. The present study applies two logit models to analyse the factors affecting the likelihood of heavy and light alcohol drinking. The results show that the likelihood of heavy alcohol drinking is positively associated with younger individuals, lower income earners, males, the less-educated, non-singles, rural dwellers and the employed, whereas, the likelihood of light alcohol drinking is positively associated with higher income earners, the well-educated, urban dwellers and the unemployed. Based on these findings, several policy implications are discussed.

Keywords: alcohol, health; income, likelihood, odds; socioeconomic
JEL classification Codes: I10, I18

I. *Introduction*

In today's rapidly urbanising society, alcohol consumption has become a serious public health issue worldwide (Mohapatra et al., 2010). In 2004, about 2 billion people consumed alcohol, and around 76.3 million people were diagnosed with alcohol use disorder (Institute for Public Health, 2008). Each year, approximately 2.5 million mortalities are associated with harmful use of alcohol, and at least 0.3 million people aged between 15 and 29 die from consuming alcohol, which accounts for around 10% of all types of death in that age groups (World Health Organization, 2011). Institute for Public Health (2008) reported that at least 20% of cardiovascular diseases (CVDs) and cancer-related deaths are caused by harmful use of alcohol every year. Among the other common consequences of excessive use of alcohol include

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neuropsychiatric disorder, stroke, hepatitis, cirrhosis of liver, road traffic accidents, violence, child abuse, suicides, poor work performance and high-risk sexual behaviours (Institute for Public Health, 2008; Baliunas et al., 2010; Parry et al., 2011; World Health Organization, 2011).

Similar trend was noted in Malaysia (Institute for Public Health, 2008). World Health Organization (2004) reported that almost half of the alcohol drinkers in Malaysia were young adults in 2004. Sales of alcohol in Malaysia increased from United States dollar (USD) 176 million in 2000 to USD 500 million in 2011 (Tan et al., 2009). In addition, alcohol is regarded as one of the leading causes of poverty in Malaysia. There was evidence suggesting that a rural worker spent as much as all of his or her monthly individual income (approximately USD 80) just on alcohol, which amounted to about USD 960 in a year (World Health Organization, 2004). Worse still, the Road Safety Council of Malaysia reported that at least three out of every ten road accidents throughout the nation were attributable to alcohol drinking in 2004 (World Health Organization, 2004; Tan et al., 2009).

In view of the profound impact of alcohol on morbidity and mortality worldwide, there is a growing literature that examines the factors affecting alcohol consumption in developed countries (Yen, 1994; Abdel-Ghany and Silver, 1998; Manrique and Jensen, 2004; Yen, 2005; Saffer and Dave, 2006; Gallet, 2007; Yuan and Yen, 2012). Astonishingly, however, the attention devoted to examining this topic in Malaysia is still lacking, where alcohol consumption is prevalent. Hence, the present study attempts to narrow this research gap by answering a research question – how do socioeconomic factors affect alcohol consumption in Malaysia?

In brief, the present study provides four substantial contributions to the existing literature and society. First, the present study provides the first in-depth analysis of the socioeconomic determinants of alcohol consumption in Malaysia. Second, the focus of the present study is on a rapidly developing country, Malaysia, where alcohol consumption is widespread. Third, the present study exploits a nationally representative health survey data consisting of a large sample size and detailed information on individual's demographic, lifestyle and health profiles for a robust analysis, and thus, seeks to generate important findings. Fourth, the findings of the present study can provide public health administrators with the baseline information on formulating a better nationwide health policy.

II. *Theoretical Bases*

1. Health Capital Model

From the economics perspective, Grossman (1972, 2000) claimed that health was a capital that was used to produce output of 'healthy time'. According to Grossman (1972, 2000), health could determine the amount of time that individuals could spend on both market and non-market activities. In fact, the level of health capital varied across individuals as it was mainly determined by genetic, lifestyle and environmental factors (Grossman, 1972, 2000). Similar to other types of capital, health could depreciate over time, which meant individuals would become weaker as they aged, and such depreciation would ultimately lead to death when the health capital fell below the minimum level (Grossman, 1972, 2000), at which, the amount of

time that individuals could spend in producing market and non-market goods was equal to zero.

In line with Becker (1965), to reduce the depreciation of health capital, it was necessary to increase the input of resources, such as, time, medical care, shelter, sport equipment and food into health, meaning that individuals needed to participate in a healthy lifestyle and use medical care in order to stay healthy. Grossman (1972) defined this as 'health investment', and concluded that individuals had the capability to determine their length of life.

Grossman (1972, 2000) emphasised that people consumed health for two main reasons. First, people had better well-being when they were healthier, thus better health yielded greater utility. Second, health increased the amount of time that people could spend on their future market and non-market activities, such as, working, home production and leisure. The first reason was known as 'consumption benefits of health', while the second reason was known as 'investment benefits of health'.

Cropper (1977) advanced an alternative health capital model, which mainly focused on how health investments, such as, use of medical care, diet and exercise varied in a life-cycle. According to Cropper (1977), the main purpose of health investment was not to gain more healthy time in the future for money earning activities but to avoid diseases, which were able to yield disutility. The utility that individuals received when they were sick was equal to the utility gained from consuming nothing. Therefore, illness was considered as one of the main factors causing serious negative impacts on individuals' quality of life and well-being.

Cawley and Ruhm (2012) applied both Grossman (1972) and Cropper (1977) health models to study unhealthy behaviours. The study classified unhealthy behaviours, such as, smoking and alcohol drinking as 'negative health investment' or 'health disinvestment', meaning that participation in unhealthy behaviours could depreciate health capital. In addition, Cawley and Ruhm (2012) claimed that individuals' decisions to participate in unhealthy behaviours were determined by the marginal costs (MCs) and marginal benefits (MBs) of participation. Based on the cost-benefit marginal analysis, rational individuals preferred to participate in unhealthy behaviours only when the MB of participation was greater than the MC, and individuals would optimise the net benefit of participation by equalising the MB and the MC (i.e. MB＝MC) (Cawley and Ruhm, 2012).

2. Rational Addiction Model

Theory of rational addiction was first developed by Becker and Murphy (1988). It was a theory used to explain how addictive behaviours or use of addictive goods affected individuals' utility. According to Becker and Murphy (1988), 'rational' referred to a situation where individuals' utility was maximised throughout their lifetime, while, 'addictive good' was defined as the good which its present consumption was affected by its stock of past consumption. The main concern of this theory was that when the level of addictiveness of a particular good was high, the steady-state of demand for that good was unstable.

Becker and Murphy (1988) claimed that the current utility that individuals reaped from consuming addictive goods was not only influenced by their present consumption of addictive goods, but also the stock of their past consumption of addictive goods (i.e. the frequency of participation in addictive behaviours), as well as their current consumption of non-addictive goods. It was argued that rational individuals took account of the costs of addictive goods, including both monetary price and costs of future addiction, and consumed only when the

benefits received exceeded the costs. As such, individuals who discounted their future heavily were likely to have a high tendency to become addicted.

Becker and Murphy (1988) divided addictive behaviours into two categories, i.e. detrimental and advantageous. Detrimental addictive behaviours referred to the behaviours that had harmful effects on individuals. Alcohol drinking, smoking and gambling, for example, are the common detrimental addictive behaviours. Advantageous addictive behaviours, on the other hand, referred to the behaviours which possessed beneficial effects on individuals, such as, participation in physical activity and use of food label.

Several arguments were made by Becker and Murphy (1988). First, since stock of past consumption was associated with current consumption, current consumption of addictive goods was affected by their past prices. Second, because future and current consumptions were complements, changes of expected future prices of addictive goods could influence current consumption of addictive goods. Third, the effects of changes of permanent prices on current consumption were larger than the effects of temporary price changes. Fourth, the short run demand for addictive goods was less elastic than the long run demand. Fifth, the price elasticity of demand for addictive good was positively associated with its level of addictiveness.

3. Bounded Rational Addiction Model

Although there was a growing literature that used Becker and Murphy's (1988) theory of rational addiction to model demand for various addictive goods such as cigarettes, alcohol, drugs and gambling, it had a major drawback. Gruber and Koszegi (2001) developed an alternative addiction model, in light of this issue. The study argued that the assumption of Becker and Murphy (1988) concerning individuals were time-consistent was somewhat unrealistic. In reality, individuals were unable to accurately predict their future behaviours based on their current preferences and tastes, meaning that there was time-inconsistency in decision-making.

Gruber and Koszegi (2001) studied individuals' addictive behaviours by adding time-inconsistency in its addiction model. The study pointed out that there were two methods that could help individuals stop consuming addictive goods, i.e. 'quitting aids' and 'self-control devices'. The difference between these two methods was that quitting aids were able to lower the disutility received from not participating in addictive behaviours, whereas, self-control devices could reduce the utility gained from participating in addictive behaviours. Different methods suited different time-consistency of individuals. As emphasised by Gruber and Koszegi (2001), when individuals were time-consistent, individuals used quitting aids, as it was irrational for individuals to choose to reduce the utility of their undesirable alternative, whereas, when individuals were time-inconsistent, self-control devices appeared to be a better choice because it could overcome individuals' own time-inconsistent tendency.

Furthermore, Gruber and Koszegi (2001) argued that when individuals were time-consistent, they were able to accurately predict their future consumption of addictive goods, but when individuals were time-inconsistent, they did not have the capability to foresee their future consumption. Individuals with time-inconsistency were more likely to underestimate the likelihood of future consumption of addictive goods than individuals with time-consistency. As such, there would be difficulties for individuals to stop consuming addictive goods in the future.

Based on the Gruber and Koszegi's (2001) addictive behaviour model, two conclusions

were made. First, individuals should use self-control devices rather than quitting aids to help them stop consuming addictive goods in the future. Second, individuals often did not realise the real difficulty in quitting addictive behaviours.

III. *Methods*

1. Data

The present study used data from the Third National Health and Morbidity Survey (NHMS III), which was a nationally representative cross-sectional population-based survey conducted by the Ministry of Health Malaysia over the period April 2006 to January 2007. The survey covered all the urban and rural areas in the 13 states of Malaysia, as well as, the federal territory of Kuala Lumpur. Following the sampling frame designed by the Department of Statistics Malaysia, a two stage stratified sampling approach proportionate to the size of population in Malaysia was used to collect the data. The first stage sampling unit was based on geographically contiguous areas of the country [Enumeration Blocks (EBs)]. The second stage sampling unit was based on the Living Quarters (LQs) in each EB, and all the households and individuals that resided in the selected LQs participated. In particular, each EB consisted of 80-120 LQs with a population of about 600. The EBs were based on the population of gazetted and built-up areas [i.e. urban ($\geq$10000 populations) and rural ($<$10000 populations)].

The inclusion criteria of the survey were: 1) all adults aged 18 years old and above; 2) all gender; 3) all ethnic groups; and 4) Malaysian citizens. The sample size was calculated based on three criteria: 1) the 10% prevalence rate of the health problems (e.g. hypertension, diabetes, smoking, overweight, hiperlipidemia and obesity) in Malaysia obtained from the Second National Health and Morbidity Survey (NHMS II); 2) the overall response rate of NHMS II (i.e. 97%); and 3) margin of error of 1.2 and design effect of 2, which were used at the initial stage of the calculation of the sample size of each state. More detailed information about the calculation was published elsewhere (Institute for Public Health, 2008). The calculated target sample size was 34539 respondents, which represented 12923504 Malaysian adults. The targeted household member was classified as 'no response' after three consecutive unsuccessful visits. The overall response rate was about 99.30% (34305 respondents). The piloted bi-lingual (*Bahasa Malaysia* and English) questionnaires were used by the health professionals to interview the respondents face-to-face. During the interview, the respondents were asked to self-report their socio-demographic, lifestyle and health profiles. Meanwhile, the respondents' blood pressure, blood cholesterol and blood glucose were also examined by the health professionals.

2. Dependent Variables

Alcohol consumption used in the present study was divided into 'heavy alcohol drinking' and 'light alcohol drinking'. According to Ministry of Health Malaysia, consumptions of 15 units or more of alcohol per week were considered as moderate to heavy alcohol drinking, whereas consumptions of less than 15 units of alcohol per week were denoted as light alcohol drinking. To allow for a better comparison, moderate and heavy alcohol drinking were

combined to form 'heavy alcohol drinking'. More detailed information on alcohol drinking behaviours was published elsewhere (Institute for Public Health, 2008).

Since heavy alcohol drinking could lead to serious health and social problems, it was categorised as a negative health investment or heath disinvestment. Light alcohol drinking, on the other hand, could reduce the risks of coronary heart disease (CHD) and ischaemic stroke (Agarwal, 2002), as well as the rate of time preference and risk-seeking behaviours (Ida and Goto, 2009). Besides, light alcohol drinking could also promote better self-control abilities (Ainslie, 2001). Light alcohol drinking was, therefore, classified as a health investment.

3. Model Development

Based on the economic theory and previous economics studies on addictive behaviours, the following socioeconomic variables were selected, and were hypothesised to have significant impacts on alcohol consumption: 1) age; 2) income; 3) gender; 4) education; 5) marital status; 6) house locality; and 7) employment status.

According to Grossman (1972), older individuals tended to invest in their health more greatly than younger individuals because their health was likely to depreciate faster. This indicated that age was positively associated with health investment. However, Cropper (1977) and Kenkel (2000) studied the role of age in health and claimed that health investment decreased with increasing age. The reason was that while older individuals faced a higher risk of acquiring diseases compared to younger individuals, their pay-off period of health investment was shorter. It was because health investment only yielded benefits in the future when diseases were successfully prevented. Hence, to capture the causal relationship between age and alcohol consumption, the respondents' age (in years) was included for analysis.

On one hand, Grossman (1972) concluded that income was positively correlated with health investment, meaning that higher income individuals invested in health more greatly than lower income individuals. This was because the value of individuals' healthy time increased in tandem with their income (Grossman, 1972). In other words, the time that higher income earners spent on money-earning activities was more valuable compared to the time spent by lower income earners, as income differential was the difference in the benefits that individuals could reap when healthy time was allocated for money-earning activities. On the other hand, Cawley and Ruhm (2012) claimed that income was negatively associated with health investment, if tobacco and alcohol were characterised as normal goods, that was, consumptions of tobacco and alcohol increased with income. In an attempt to examine the role of income in alcohol consumption, the present study divided the respondents' monthly individual income into four categories: Malaysian Ringgit (RM) 0-999, RM 1000-2999, RM 3000-5999 and $\geq$ RM 6000.[1]

Gender appeared to have an effect on health investment. According to the economic perspective, women were generally more risk averse than men (Croson and Gneezy, 2009). Hence, individuals who were risk-aversion oriented (i.e. women) tended to avoid risky and irrational behaviours, which included smoking and alcohol drinking. Nevertheless, women were also more sensitive to social cues, i.e. the verbal and non-verbal communications which affected individual's social interaction (Croson and Gneezy, 2009). Since unhealthy behaviours by

[1] Monthly individual income was segmented based on Cheah and Tang (2013).

women was less socially accepted than by men, women were less devoted to adopt unhealthy behaviours. Based on these rationales, the respondents' gender was included and was anticipated to possess an effect on alcohol consumption.

Education played an important role in explaining health investment since it could improve allocative efficiency (i.e. to engage in healthy behaviour) and productive efficiency (i.e. in using health inputs) in producing health (Grossman, 1972; Kenkel, 1991). Grossman (1972) emphasised that there was a positive relationship between education levels and health investment. Higher educated individuals had a higher marginal product of direct inputs to health than lower educated individuals given that they had better understanding skills and health knowledge. Hence, higher educated individuals were more efficient at using medical care and other effective methods to improve their health, for example, avoidance of smoking and alcohol drinking (Grossman, 1972; Kenkel, 1991; Grossman, 2000). Nevertheless, education could also affect time preference, as higher educated had a lower rate of time preference (i.e. more future oriented) than lower educated individuals (van der Pol, 2011). Individuals with a higher rate of time preference were more likely to engage in unhealthy behaviours than individuals with a lower rate of time preference (Fuchs, 1982; van der Pol, 2011). This was because unhealthy behaviours, such as, smoking and alcohol drinking could bring instantaneous pleasure, thus raising individuals' current utility, whereas healthy behaviours only generated utility in the future when diseases were successfully prevented. As such, the respondents' education levels were used in the present study, and were divided into three categories, i.e. primary, secondary and tertiary.

Previous studies found that household commitments played an important role in explaining health (Downward and Rasciute, 2010; Eberth and Smith, 2010). Individuals who carried family responsibilities may have less time on hand for health-related leisure activities, such as, exercise, smoking and alcohol drinking. For instance, Ruseski et al. (2011), a study on participation in physical activity, found that an additional hour spent on family could decrease the likelihood of participating in physical activity, meaning that family responsibility reduced the propensity to be physically active. Since alcohol drinking was considered as a health-related leisure activity, household commitments may possess effects on it. In an effort to investigate the influence of household commitments on alcohol consumption, marital status of the respondents was incorporated into the current model by three categories, i.e., single, married and widowed or divorced.

Information was an important determinant of health behaviours (Kenkel, 1991; Cawley and Ruhm, 2012). From the economic perspective, rational individuals would weigh the costs and benefits of certain health behaviour, and decided to participate only when the benefits exceeded the costs. However, individuals were unable to accurately estimate these costs and benefits without sufficient information (Cawley and Ruhm, 2012). A lack of information would result in the risks of unhealthy behaviours to be underestimated, thus, leading to frequent participation. Therefore, it could be concluded that a paucity of information on the consequences of unhealthy behaviours may indirectly increase individuals' propensities to live an unhealthy lifestyle. In order to capture the effect of information on alcohol consumption, the respondents' house locality was used as the proxy given that the availability of health-related information, including anti-alcohol media may vary across degree of urbanisation. The present study divided the respondents' house locality into two categories, i.e. urban (gazetted areas $\geq$ 10000 populations) and rural (gazetted areas $<$ 10000 populations).

Employment could explain alcohol consumption in two different ways. First, according to the SLOTH model developed by Cawley (2004), the greater the amount of time that an individual spent on working activity, the less likely that individual was to engage in leisure activity.[2] This meant that work commitment could reduce the likelihood of consuming alcohol, as alcohol drinking was a leisure activity. Second, based on the cost-benefit analysis, individuals who were employed tended to face a lower cost of consuming alcohol than individuals who were unemployed because they were more financially independent. Hence, employed individuals may have a higher tendency to consume alcohol than unemployed individuals. To access the causal relationship between employment and alcohol consumption, the respondents' employment status was used, and was grouped into two categories, i.e. employed and unemployed (including student, housewife and retiree).

4. Econometric Specification

The present study first used a logit model to analyse the factors affecting the likelihood of heavy alcohol drinking. Then, another logit model was applied to estimate the likelihood of light alcohol drinking. Since these two dependent variables possessed binary outcomes, use of logit model was appropriate as it could predict the probability that lied between the unit intervals (Greene, 2007). Nevertheless, it was also found that the p-values of Jarque-Bera statistic for these two regression models were less than 0.05. Hence, the null hypothesis that the residuals were normally distributed could be rejected, and this concluded that the logit models were suitable for the analysis. In general, the logit model can be written as follows:

$$\log\frac{P}{1-P}=\alpha+\beta_i X_i+\varepsilon \tag{1}$$

where, P is the probability that a respondent drinks heavily/lightly; 1 – P is the probability that a respondent does not drink heavily/lightly; P/(1 – P) is the odds that a respondent drinks heavily/lightly; X are the independent variables which are hypothesised to affect the probability of heavy/light alcohol drinking; β are coefficients of the independent variables; and ε is the error term.

Both Likelihood Ratio (LR) and Hosmer-Lemeshow (HL) tests were conducted to assess the goodness-of-fit of the current logit models. All the independent variables were tested for multicollinearity problems using the Variance Inflation Factor (VIF) test (see Appendix 1). The level of significance of all the tests was based on p-value of less than 5% (two-sided). Since Malays (Muslims) in Malaysia were strictly prohibited from consuming alcohol because of their Islamic religious background, the respondents who were from Malay ethnic group were removed from the sample.[3] Hence, only a total of 13477 respondents were used for analysis. The statistical analysis was performed using Stata statistical software (StataCorp, 2005).

[2] SLOTH is an economic framework that describes how individuals allocate their time for their daily activities in order to maximise the utility received.

[3] No Malay was likely to confess to consuming alcohol to the interviewers.

IV. *Results*

1. Characteristics of the Survey Respondents

The average age of the total respondents was about 42 years old. The majority (40.18%) of the respondents were in the RM1000-2999 income group, followed by those in the ≤RM999 (35.04%), RM3000-5999 (17.41%) and ≥RM6000 (7.37%) income groups. Approximately 44.30% of the respondents were males. A large proportion (46.48%) of the respondents had secondary education, followed by those with primary (43.57%) and tertiary education (9.95%). The total sample comprised 71.47%, 8.03% and 20.50% of the married, widowed/divorced and single respondents, respectively. About 69.01% of the total respondents resided in urban areas, while 30.99% resided in rural areas. Of the total sample, 56.97% were employed, while 43.03% were unemployed (see Table 1).

TABLE 1. DEFINITIONS AND SAMPLE MEANS OF VARIABLES

Variables	Definitions	% / Mean*
Age	Age in years	42.88
Income		
≤RM 999	Monthly individual income is ≤ RM 999	35.04
RM 1000-2999	Monthly individual income is RM 1000 – 2999	40.18
RM 3000-5999	Monthly individual income is RM 3000 – 5999	17.41
≥RM 6000	Monthly individual income is ≥ RM 6000	7.37
Gender		
Male	Gender is male	44.30
Female	Gender is female	55.70
Education		
Tertiary	Highest level of education is tertiary	9.95
Secondary	Highest level of education is secondary	46.48
Primary	Highest level of education is primary	43.57
Marital status		
Married	Marital status is married	71.47
Widowed/divorced	Marital status is widowed or divorced	8.03
Single	Marital status is single	20.50
House locality		
Urban	Urban dweller	69.01
Rural	Rural dweller	30.99
Employment status		
Employed	Being employed	56.97
Unemployed	Being unemployed	43.03

Note: *For age variable, the value refers to mean, whereas for the other variables, the value refers to percentage.
Source: Compiled from NHMS III.

2. Factors Affecting the Odds of Heavy Alcohol Drinking

The results of the logit analysis of heavy alcohol drinking are presented in Table 2. The value of LR χ^2 with 11 degrees of freedom was 3887.310, which had a p-value of less than

0.05. Thus, the null hypothesis could be rejected, indicating that the current logit model fitted the data well.Nonetheless, the value of HL χ^2 with 8 degrees of freedom was 13.750, which had a p-value of more than 0.05. Therefore, the null hypothesis could not be rejected, which further implied that the current logit model for heavy alcohol drinking was very good fit.

TABLE 2. RESULTS OF THE LOGIT ANALYSIS OF HEAVY ALCOHOL DRINKING

Variables	Estimated coefficient	Standard error	Odds ratio	95% CI	P-value
Age	−0.027	0.002	0.974	0.969, 0.978	＜0.001
Income					
≤RM 999	0.484	0.116	1.622	1.292, 2.038	＜0.001
RM 1000-2999	0.317	0.111	1.373	1.104, 1.708	0.004
RM 3000-5999	0.042	0.120	1.043	0.825, 1.320	0.725
≥RM 6000*	−	−	1.000	−	−
Gender					
Male	3.356	0.086	28.671	24.239, 33.913	＜0.001
Female*	−	−	1.000	−	−
Education					
Tertiary	−1.071	0.108	0.343	0.277, 0.424	＜0.001
Secondary	−0.387	0.061	0.679	0.602, 0.766	＜0.001
Primary*	−	−	1.000	−	−
Marital status					
Married	0.251	0.076	1.286	1.108, 1.492	0.001
Widowed/divorced	0.739	0.152	2.093	1.554, 2.819	＜0.001
Single*	−	−	1.000	−	−
House locality					
Urban	−0.283	0.057	0.754	0.674, 0.843	＜0.001
Rural*	−	−	1.000	−	−
Employment status					
Employed	0.408	0.067	1.504	1.320, 1.715	＜0.001
Unemployed*	−	−	1.000	−	−
Constant	−2.949	0.173	−	−	＜0.001
LR χ^2 (11)	3887.310				
p-value	＜0.001				
HL χ^2 (8)	13.750				
p-value	0.088				

Note: CI refers to confidence interval, LR refers to likelihood ratio and HL refers to Hosmer-Lemeshow. *refers to reference/base category (coded as 0).
Source: Compiled from NHMS III.

The results showed that an additional year of age reduced the odds of participating in heavy alcohol drinking by 0.026 times. In terms of income, individuals who were in the ≤RM999 and RM1000-2999 income groups had 1.622 and 1.373 times the odds, respectively, as individuals who were in the ≥RM6000 income group of participating in heavy alcohol drinking. Holding other factors constant, males had 28.671 times the odds as females of drinking heavily. Individuals with tertiary education had 0.343 times the odds as individuals with only primary education of participating in heavy alcohol drinking, while individuals with secondary education had 0.679 times the odds as individuals with only primary education of

participating in heavy alcohol drinking. Considering the effect of marital status, married and widowed/divorced individuals had 1.286 and 2.093 times the odds, respectively, as single individuals of drinking heavily. Urban dwellers had 0.754 times the odds as rural dwellers of participating in heavy alcohol drinking if other variables were held constant. With regard to employment status, employed individuals had 1.504 times the odds as unemployed individuals of drinking heavily.

3. Factors Affecting the Odds of Light Alcohol Drinking

The results of the logit analysis of light alcohol drinking are showed in Table 3. In terms of goodness-of-fit, the p-value of LR χ^2 of 639.240 was less than 0.05, thus, the null hypothesis that the regression model was not fit was rejected. Furthermore, the p-value of HL χ^2 of 7.910 was more than 0.05, hence, the null hypothesis that the regression model was fit could not be rejected. Taken together, the results of these two tests concluded that the current logit model for

TABLE 3. RESULTS OF THE LOGIT ANALYSIS OF LIGHT ALCOHOL DRINKING

Variables	Estimated coefficient	Standard error	Odds ratio	95% CI	P-value
Age	0.001	0.004	1.001	0.994, 1.008	0.754
Income					
≤RM 999	−1.080	0.138	0.340	0.259, 0.445	<0.001
RM 1000-2999	−0.925	0.116	0.397	0.316, 0.498	<0.001
RM 3000-5999	−0.470	0.116	0.625	0.498, 0.784	<0.001
≥RM 6000*	−	−	1.000	−	−
Gender					
Male	0.565	0.084	1.759	1.493, 2.072	<0.001
Female*	−	−	1.000	−	−
Education					
Tertiary	1.781	0.140	5.935	4.513, 7.804	<0.001
Secondary	1.023	0.120	2.781	2.198, 3.518	<0.001
Primary*	−	−	1.000	−	−
Marital status					
Married	−0.153	0.104	0.858	0.700, 1.053	0.142
Widowed/divorced	−0.673	0.281	0.510	0.294, 0.886	0.017
Single*	−	−	1.000	−	−
House locality					
Urban	0.489	0.109	1.631	1.316, 2.020	<0.001
Rural*	−	−	1.000	−	−
Employment status					
Employed	−0.015	0.092	0.985	0.823, 1.180	0.873
Unemployed*	−	−	1.000	−	−
Constant	−3.515	0.236	−	−	<0.001
LR χ^2 (11)	639.240				
p-value	<0.001				
HL χ^2 (8)	7.910				
p-value	0.442				

Note: CI refers to confidence interval, LR refers to likelihood ratio and HL refers to Hosmer-Lemeshow. *refers to reference/base category (coded as 0).
Source: Compiled from NHMS III.

light alcohol drinking was very good fit.

In terms of income, individuals who were in the ≤RM999, RM1000-2999 and RM3000-5999 income groups had 0.340, 0.397 and 0.625 times the odds, respectively, as individuals who were in the ≥RM6000 income group of participating in light alcohol drinking. Males had 1.759 times the odds as females of drinking lightly if other factors were held constant. Individuals with tertiary and secondary education had 5.935 and 2.781 times the odds, respectively, as individuals with only primary education of participating in light alcohol drinking. With regard to marital status, widowed/divorced individuals had 0.510 times the odds as single individuals of participating in light alcohol drinking. Holding other variables constant, urban dwellers had 1.631 times the odds as rural dwellers of drinking lightly.

V. *Discussion*

The present study found that age, income, gender, education, marital status, house locality and employment status were statistically significant in determining alcohol consumption. More specifically, younger individuals, lower income earners, males, the less-educated, being married/widowed/divorced, rural dwellers and the employed were associated with a higher likelihood of participating in heavy alcohol drinking. The likelihood of participating in light alcohol drinking, on the other hand, was positively correlated with higher income earners, the well-educated, being single and urban dwellers.

The findings of the present study showed that age was negatively associated with heavy alcohol drinking, which were consistent with those of Yen and Jensen (1996). The study applied a double-hurdle model to examine the factors affecting alcohol consumption among adults in United States (US) and found that older household heads were less likely to consume alcohol and also consumed less than younger household heads. Similar findings were evidenced by Cawley and Ruhm (2012), which suggested that age reduced the likelihood of heavy drinking. As explained by Grossman (1972), older individuals were more likely to encounter a higher rate of depreciation of health capital than younger individuals, and consequently were more devoted to invest in health by living a healthy lifestyle. Nevertheless, older individuals were also more aware of the risks of unhealthy behaviours compared to younger individuals, who tended to take health for granted. Chaloupka and Warner (2000) offered an additional reason that younger individuals were less future oriented than older individuals, thus, they were less concerned about their own health. Based on this outcome, it could be concluded that older individuals reported greater health investment than younger individuals despite the fact that age shortened the pay-off period of health investment (Cropper, 1977; Kenkel, 2000).

The present study found an interesting relationship between income and alcohol consumption. The likelihood of heavy drinking was greater among lower income individuals, whereas, the likelihood of light drinking was greater among higher income individuals. These outcomes were somewhat different from those of Yen (1994) using the Nationwide Food Consumption Survey sample, Parker et al. (1995) exploiting the National Household Survey on Drug Abuse data, as well as Yen and Jensen (1996) drawing from the Consumer Expenditure Diary Surveys. The studies had all found income to be positively associated with the frequency of alcohol consumption. This may be due to the fact that alcohol consumption was more common among individuals with higher socioeconomic status (SES) than individuals with lower

SES in western countries. Assuming that heavy alcohol drinking was a health disinvestment and light alcohol drinking was a health investment, the finding of the present study lent support to the arguments of Grossman (1972) that the incentive to invest in health increased with increasing income, whereas, the disincentive to invest in health increased with decreasing income. As pointed out by Grossman (1972), income was the return of health investment that individuals received when they allocated their healthy time for works. Hence, compared to lower income earners, higher income earners tended to find health investment more attractive.

There appeared to be significant gender differences in alcohol consumption as males were more likely to participate in heavy and light alcohol drinking than females. Using an endogenous switching regression model to investigate use of alcohol and tobacco in Spain and a sample selection model to examine the influence of socio-economic factors on alcohol consumption in US, Manrique and Jensen (2004) and Yuan and Yen (2012), respectively, found similar results on gender. Although it was fine to indulge in small amounts of alcohol drinking, there were chances for individuals to become addicted to alcohol once drinking began. Therefore, women, being risk aversion oriented, were likely to avoid alcohol at all cost (Croson and Gneezy, 2009). Another reason was that women were more sensitive to social cues than men (Croson and Gneezy, 2009). Owing to alcohol drinking by women was a less socially acceptable behaviour than by men, it was unlikely that women would have a tendency to drink. The findings of the present study led to the conclusion that there was a significant relationship between risk, social cues and gender.

In the present study, the likelihood of heavy alcohol drinking was found to decrease with levels of education, whereas, the likelihood of light alcohol drinking was found to increase with levels of education. These findings were similar to those of Cawley and Ruhm (2012) regarding the inverse relationship between heavy alcohol drinking and education. Similar outcomes were evidenced by Marques-Vidal and Dias (2005) which found small amounts of consumption of alcohol to be more prevalent among higher educated individuals than lower educated individuals in Portugal, as well as Jonas (2000) which suggested well-educated females to be more likely to drink lightly than less-educated females in Australia. According to Grossman (1972), Fuchs (1982), Kenkel (1991) and van der Pol (2011), education could improve health in two ways. First, education improved allocative and productive efficiencies in producing health, for example, well-educated individuals acquired a better knowledge of the pros and cons of heavy and light alcohol drinking than less-educated individuals. Second, education lowered the rate of time preference, thus making people less irrational and more future oriented. It could, therefore, be concluded that education could promote health investment and discourage health disinvestment.

Interestingly, marital status was found to be correlated with alcohol consumption. Compared to non-singles, singles were less likely to drink heavily and were more likely to drink lightly. These findings contradicted those of Zhao and Harris (2004), based on the Australian National Drug Strategy Household Survey, and Yuan and Yen (2012), based on the National Health and Nutrition Examination Survey. In the studies, Yuan and Yen (2012) identified that married individuals were about 8% less likely to consume alcohol than unmarried individuals, while, Zhao and Harris (2004) revealed that married individuals had about 1% lower likelihood of consuming alcohol than unmarried individuals. The prior assumption that alcohol drinking was subject to family commitments seemed to be not supported by the findings of the present study. Perhaps, it may be because alcohol was addictive and its

consumption was unlikely to be influenced by household activities.

The present study found spatial differences in alcohol consumption as urban dwellers were less likely to participate in heavy alcohol drinking than rural dwellers. This was followed by a higher probability of urban dwellers to participate in light alcohol drinking compared to rural dwellers. The fact of the matter was that rural dwellers were likely to be unaware of the risks of heavy drinking and the benefits of light drinking because of the paucity of alcohol-related information in rural areas. These findings confirmed the prior hypothesis that there was a positive relationship between availability of health-related information and health investment, but were in contrast to those of previous empirical studies (Yen, 1994; Nayga and Capps, 1994). Yen (1994) exploited the Nationwide Food Consumption Survey data of US and found that rural households were less likely to consume alcohol and also consumed less than urban households, while, Nayga and Capps (1994) used the Heckman model and found that individuals who resided in non-metro areas in US had a lower likelihood of consuming alcohol than individuals resided in urban and suburban areas.

The results of the present study suggested that employed individuals were more likely to indulge in heavy alcohol drinking than unemployed individuals. Likewise, employed individuals were also less devoted to adopt light alcohol drinking habits compared to their unemployed peers. Similar outcomes were echoed by Parker et al. (1995) using the National Household Survey on Drug Abuse conducted in US. The study found that consumption of alcohol was more frequent among full-time employed workers than the unemployed. Two reasons may explain why employed individuals reported more alcohol use. First, employed individuals were more financially independent, and consequently encountered a lower cost of consuming alcohol than their unemployed counterparts. Second, since alcohol drinking was a common activity at social functions of the employees, employed individuals were more likely to have excessive indulgence in alcohol compared to the unemployed (Huerta and Borgonovi, 2010).

VI. *Policy Implications*

Based on the findings of the present study, several intervention measures toward reducing the prevalence of alcohol consumption in Malaysia are suggested. First, an effective public policy should include the need to launch awareness creation programmes directed at youngsters to help reduce alcohol consumption. Since the introduction of health and pictorial warning labels on tobacco products is effective in reducing smoking throughout the nation (Fathelrahman et al., 2010), public health authorities should consider applying the same strategy on alcohol products, especially beer, wine and liquor. In addition, efforts to utilise social media which have strong influences on youngsters, such as, Facebook, Twitter and Yahoo to advertise the facts about the harmful effects of alcohol drinking, as well as, to increase the minimum age to purchase and consume alcohol to at least 21 years of age are worthy of consideration.

Second, government should pay considerable attention to reducing alcohol consumption among males by introducing more nationwide anti-alcohol programmes. In particular, these programmes should include advertising the information about how alcohol drinking can impair men's health, such as, erectile dysfunction and low sperm count (Lee et al., 2010; Joo et al., 2012). Since information plays an important role in influencing individuals' health behaviour (Kenkel, 1991; Cawley and Ruhm, 2012), policies focusing on providing more alcohol related

information for the public can produce desirable outcomes.

Third, a strategy targeted at reducing the prevalence of alcohol consumption among rural dwellers may be worthwhile. Government should make a concerted effort to advertise the risks of alcohol consumption throughout the nation with a specific focus on rural areas. Television, newspaper, book and magazine, for instance, should include more anti-alcohol related advertisements. Last, intervention strategies directed primarily at employed individuals can be very effective. In particular, government should take more serious efforts to conduct workplace health promotion programmes to discourage alcohol consumption among employed individuals. These programmes should include using health professionals, such as, medical doctors, public health specialists and nurses to educate employees about the disadvantages of alcohol drinking.

VII. *Conclusion*

To effectively reduce the alcohol-induced health and social problems, especially in Malaysia where lacks studies on alcohol consumption, it is worthwhile to gain a good understanding of the factors that can affect the decisions of people to indulge in alcohol drinking, particularly heavy alcohol drinking. Drawing from a nationally representative sample and rigorous statistical models, the present study has reached the conclusion that younger individuals, lower income earners, males, the less-educated, non-singles, rural dwellers and the employed are associated with a higher likelihood of heavy drinking, whereas, higher income earners, the well-educated, urban dwellers and the unemployed are correlated with a higher likelihood of light drinking.

Although the present study has thrown new light on the influences of socioeconomic factors on alcohol consumption, the relationships between lifestyle and health factors and alcohol consumption are not examined in great detail. Hence, it is important for future studies to include variables other than socioeconomic factors for analysis. Besides, it is also worthwhile for future studies to use several years of data for a panel analysis, thus, the trend and pattern of alcohol drinking will be well-identified.

Appendix 1. VIF Test for All the Independent Variables

Variables	VIF	1/VIF
Age	1.85	0.541
Income		
≤RM 999	4.29	0.233
RM 1000-2999	4.13	0.242
RM 3000-5999	2.82	0.355
≥RM 6000*	–	–
Gender		
Male	1.24	0.809
Female*	–	–
Education		
Tertiary	1.46	0.684
Secondary	1.51	0.661
Primary*	–	–
Marital status		
Married	1.71	0.585
Widowed/divorced	1.87	0.536
Single*	–	–
House locality		
Urban	1.13	0.889
Rural*	–	–
Employment status		
Employed	1.29	0.773
Unemployed*	–	–

Note: *refers to reference/base category (coded as 0). VIF refers to variance inflation factor. A VIF value of more than five indicates a multicollinearity problem (Studenmund, 2006).
Source: Compiled from NHMS III.

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