*Jurnal Sains Kesihatan Malaysia* **12** (2) 2014: 45-51

**Kertas Asli/*Original Articles***

# Factors Affecting Alcohol Consumption: The Case of Penang, Malaysia

(Faktor-Faktor Yang Mempengaruhi Penggunaan Arak: Kes Pulau Pinang, Malaysia)

YONG KANG CHEAH

ABSTRACT

*In light of the increases in alcohol-induced diseases and social problems, the present study sets out to examine the factors affecting alcohol consumption among adults in Penang (Malaysia) using a cross-sectional survey sample consisting of 398 respondents. The results of the logistic regression analysis show that age, gender, ethnicity, marital status and smoking are significantly associated with alcohol consumption. In particular, males (OR: 3.720; 95% CI: 1.939, 7.136), Chinese (OR: 3.628; 95% CI: 1.808, 7.279) and smokers (OR: 5.083; 95% CI: 1.876, 13.774) are more likely to consume alcohol than others, whereas, old individuals (OR: 0.971; 95% CI: 0.941, 1.002), Malays (OR: 0.059; 95% CI: 0.021, 0.165) and married individuals (OR: 0.419; 95% CI: 0.211, 0.833) are less likely to consume alcohol than others. Based on the findings of the present study, several intervention strategies toward reducing alcohol consumption are proposed. Specifically, these strategies should be targeted at young individuals, males, Chinese, unmarried individuals and smokers.*

*Keywords: Alcohol; demography; drinking; health; lifestyle*

ABSTRAK

*Berasaskan bukti peningkatan penyakit-penyakit dan masalah sosial yang disebabkan oleh pengunaan arak, kajian ini bermatlamat meninjau faktor-faktor yang mempengaruhi penggunaan arak di Pulau Pinang (Malaysia). Data survei yang mengandungi 398 responden telah digunakan untuk memenuhi matlamat ini. Keputusan model regresi logistic memperlihatkan umur, jantina, suku kaum, taraf perkahwinan dan merokok berkorelasi dengan penggunaan arak. Lelaki (OR: 3.720; 95% CI: 1.939, 7.136), kaum Cina (OR: 3.628; 95% CI: 1.808, 7.279) and perokok (OR: 5.083; 95% CI: 1.876, 13.774) menunjukkan kemungkinan yang lebih untuk menggunakan arak berbanding dengan yang lain, manakala, individu tua (OR: 0.971; 95% CI: 0.941, 1.002), kaum Melayu (OR: 0.059; 95% CI: 0.021, 0.165) dan individu yang telah berkahwin (OR: 0.419; 95% CI: 0.211, 0.833) menunjukkan kemungkinan yang kurang untuk menggunakan arak berbanding dengan yang lain. Berpandukan penemuan kajian ini, pelbagai tindakan telah dicadangkan untuk mengurangkan penggunaan arak. Tindakan ini hendak memberi tumpuan kepada individu muda, lelaki, kaum China, individu yang tidak berkahwin dan perokok.*

*Kata kunci: Alkohol; demografi; minum; kesihatan; gaya hidup*

## INTRODUCTION

Alcohol is the most dangerous substance in today's society. A study published in Lancet has found that alcohol is far more risky than the well-known illegal drugs, such as, heroin, crack cocaine and metamphetamine (Nutt et al. 2010). Using a multicriteria decision analysis (MCDA) to measure the harmfulness and destructiveness of drugs to users and society as a whole in terms of mental and physical health, family issue and economic cost, Nutt et al. (2010) found that alcohol scored 72 points, whereas heroin, crack cocaine and metamphetamine scored only 55, 54 and 33 points, respectively, (score of 100 points are assigned to the most harmful drugs) thus implying that alcohol caused more serious negative impacts on both the users and people around the users compared to other banned substances.

Alcohol consumption has become a serious public health and social issue in Malaysia (Institute for Public Health 2008). Malaysia is ranked as one of the highest alcohol consumption country in the world, with an estimated USD500 million are spent by its populations on alcohol annually (Tan 2011). This is equivalent to seven litres of per capita alcohol consumption. Worse still, the average age of alcohol drinkers in Malaysia is only 22 years old and almost half (45%) of youths under age of 18 are alcohol drinkers (Assunta 2001; World Health Organization 2004). In terms of economic burden, alcohol is one of the main causes of poverty in Malaysia, as the rural dwellers can spend up to USD5.5 million yearly just on alcohol products (World Health Organization 2004). Furthermore, a large proportion of road accidents and family problems in Malaysia are associated with alcohol consumption (World Health Organization 2004).

In view of the alarming evidence on the dangers of alcohol, the objective of the present study is to investigate the factors affecting individuals' decision to consume

alcohol. This is to provide government with the useful information on policy development. Although there are studies examining alcohol consumption in Malaysia (Hejar et al. 2004; Nor Afiah et al. 2006), the studies lack contributions to the literature and policy development. This is because focuses of the studies are limited to only the prevalence rate of alcohol consumption among students in selected schools in Malaysia, while the likelihood of consuming alcohol among adults has not been examined in detail.

The present study attempts to fill this research gap in several ways. First, the present study uses a cross-sectional survey data consisting of various age groups, income and education levels of respondents for a robust analysis. Second, the present study applies a rigorous statistical model to examine the factors that affect individuals' likelihood of consuming alcohol. Third, in addition to socio-demographic variables, the present study includes several important health (history of serious family illnesses) and lifestyle (smoking, physical activity) variables.

## METHODS

### DATA

Given the budget and resource constraints, data from the present study was collected using convenience sampling. Various locations in Penang where consisted of various age groups, races, income and education levels of individuals (e.g. shopping malls, offices, cafeterias and residential areas) were chosen to conduct the survey. Penang was chosen because it had a relatively high prevalence rate of alcohol consumption (15.90%) compared to other states in Malaysia (Institute for Public Health 2011). The survey period was from August 2010 to October 2010. The inclusion criteria of the survey were: (1) adults aged 21 years and above; (2) both genders and (3) all ethnic groups.

During the survey, piloted bilingual (*Bahasa Malaysia* and English) questionnaires were distributed for self-administration by the respondents. Nevertheless, a brief explanation was provided upon giving out the questionnaires. The respondents were asked to self-report whether they had consumed alcohol in the past 30 days prior to the survey, and those who answered "yes" were categorised as alcohol drinkers, otherwise they were categorised as non-alcohol drinkers (Institute for Public Health 2008). Meanwhile, the respondents' were also asked to report their socio-demographic, lifestyle and health profiles. A total of 415 respondents had completed the questionnaires. However, owing to inappropriate information reported by some, only 398 (95.90%) respondents were used for analysis. Despite the sample size, it was still able to represent the population of Penang (Given the 1,609,900 population, a minimum sample size of 384 respondents was estimated based on 95% confidence level and the assumption of 50% populations were alcohol drinkers) (SERI 2010).

### VARIABLES

The explanatory variables of this study were selected based on the previous studies that investigated the factors affecting alcohol consumption in other countries (Nayga & Capps 1994; Yen 1994; Parker et al. 1995; Nayga 1996; Yen & Jensen 1996; Abdel-Ghany & Silver 1998; Jonas 2000; Sharpe et al. 2001; Zhao & Harris 2004; Manrique & Jensen 2004; Marques-Vidal & Dias 2005; Neufeld et al. 2005; Le et al. 2009). The variables were grouped into three categories: (1) socio-demographic (age, gender, marital status, employment status, house locality, income, education); (2) health (history of serious family illnesses) and (3) lifestyle (smoking, physical activity) (Table 1).

The respondents' ethnics were categorised into three groups: Malay, Chinese and Indian/others. Marital status was divided into two categories: married and unmarried (i.e. single, divorcé and widow/widower). House locality was grouped into two categories: rural (i.e. Balik Pulau, Batu Kawan and Bertam) and urban. Employment status was categorised into two categories: employed and unemployed (included student, housewife, retiree, non-paid work and unable to work). Based on Cheah (2012), monthly individual income was divided into four groups: low (RM0 – 999), lower-middle (RM1000 – 2999), upper-middle (RM3000 – 5999) and high (≥ RM6000). Education was grouped into three categories: primary (≤ 6 schooling years), secondary (7-11 schooling years) and tertiary (≥ 12 schooling years).

History of serious family illnesses referred to the respondents who reported to have parents suffering from non-communicable diseases (NCDs). Smoker refers to the respondents who smoked in the past 30 days preceding the survey or reported to be smoking at the time of the survey, otherwise the respondents were categorised as non-smoker (Cheah and Naidu 2012). In terms of physical activity, the respondents who spent at least 15 minutes three times per week in leisure-time physical activity were considered as physically active, otherwise they were considered as physically inactive (Cheah 2011).

### STATISTICAL ANALYSIS

A logistic regression model was used to examine the factors affecting the odds of consuming alcohol among the respondents. Likelihood ratio (LR) and Hosmer-Lemeshow (HL) tests were conducted to test the goodness-of-fit of the current regression model. In addition, correlation coefficients between income and education variables were calculated in order to diagnose the potential multicollinearity problem. The significant level of all the tests was based on p-value of less than 10% (two-sided). The statistical analysis was performed using Stata statistical software (StataCorp 2005).

TABLE 1. Descriptive analysis of variables in the statistical model

| Variables | Definition | Mean/%* |
|---|---|---|
| Age | Age (in years) | 36.56 |
| Gender | | |
| Male | Respondent is male | 44.22 |
| Female | Respondent is female | 55.78 |
| Ethnicity | | |
| Malay | Respondent is Malay | 37.94 |
| Chinese | Respondent is Chinese | 40.95 |
| Indian/others | Respondent is Indian/others | 21.11 |
| Marital status | | |
| Married | Respondent is married | 49.75 |
| Unmarried | Respondent is unmarried | 50.25 |
| House locality | | |
| Rural | Rural areas | 21.11 |
| Urban | Urban areas | 78.89 |
| Employment status | | |
| Employed | Respondent is employed | 77.64 |
| Unemployed | Respondent is unemployed | 22.36 |
| Income | | |
| Low | Monthly individual income is RM 0 – 999 | 32.16 |
| Lower-middle | Monthly individual income is RM 1000 – 2999 | 44.97 |
| Upper-middle | Monthly individual income is RM 3000 – 5999 | 18.59 |
| High | Monthly individual income is ≥ RM 6000 | 4.28 |
| Education | | |
| Primary | Highest level of education is primary | 4.78 |
| Secondary | Highest level of education is secondary | 30.40 |
| Tertiary | Highest level of education is tertiary | 64.82 |
| Family illness | | |
| Yes | Having history of serious family illness | 50.50 |
| No | Not having history of serious family illness | 49.50 |
| Smoker | | |
| Yes | Respondent is a smoker | 14.57 |
| No | Respondent is a non-smoker | 85.43 |
| Physically active | | |
| Yes | Respondent is physically active | 21.11 |
| No | Respondent is physically inactive | 78.89 |

*Note*: *For age variable (continuous), the value refers to mean, whereas for the other variables (categorical), the value refers to percentage.

## RESULTS

### CHARACTERISTICS OF THE SURVEY RESPONDENTS

The average age of the respondents is 37 years. The majority of the sample are females (55.78%). The ethnic comprises 37.94% Malay, 40.95% Chinese, and 21.11% Indian/others. These ethnic and gender structures closely mirror the composition of Penang population (41.60% Malays, 40.90% Chinese, 17.50% Indians/others, 50.70% females) (SERI 2010). Half of the respondents are married (49.75%). Approximately 21.11% of the respondents reside in rural areas. A large proportion of the respondents are employed (77.64%). In terms of income, 32.16%, 44.97%, 18.59% and 4.28% of the respondents are in the low, lower-middle, upper-middle and high income groups, respectively. The majority of the respondents have tertiary education (64.82%), followed by those with secondary (30.40%) and primary (4.78%) education. Of the total sample, 50.50% have history of serious family illnesses, 14.57% are smokers and 21.11% are physically active adults (Table 1).

### LOGISTIC REGRESSION ANALYSIS OF CONSUMING ALCOHOL

The value of LR $\chi^2$ with 15 degrees of freedom is 180.480 and has a p-value of less than 10%, while the value of HL $\chi^2$ with 8 degrees of freedom is 5.650 and has a p-value of more than 10%, thus, implying that the current regression model is very good fit (Table 2). Besides, the result of the collinearity test indicates that there is no serious multicollinearity problem in the current regression model (Table 3).

The results of the logistic regression show that an additional year of age reduces individuals' odds of consuming alcohol (OR: 0.971; 95% CI: 0.941, 1.002).

TABLE 2. Results of logistic regression analysis of alcohol consumption

| Variables | Coefficient error | Standard ratio | Odds | 95% CI | P-value |
|---|---|---|---|---|---|
| Age | -0.029 | 0.016 | 0.971 | 0.941, 1.002 | 0.071 |
| Gender | | | | | |
| Male | 1.314 | 0.332 | 3.720 | 1.939, 7.136 | < 0.001 |
| Female* | – | – | 1.000 | – | – |
| Ethnicity | | | | | |
| Malay | -2.825 | 0.521 | 0.059 | 0.021, 0.165 | < 0.001 |
| Chinese | 1.289 | 0.355 | 3.628 | 1.808, 7.279 | < 0.001 |
| Indian/others* | – | – | 1.000 | – | – |
| Marital status | | | | | |
| Married | -0.870 | 0.350 | 0.419 | 0.211, 0.833 | 0.013 |
| Unmarried* | – | – | 1.000 | – | – |
| House locality | | | | | |
| Rural | -0.130 | 0.384 | 0.878 | 0.413, 1.865 | 0.735 |
| Urban* | – | – | 1.000 | – | – |
| Employment status | | | | | |
| Employed | -0.369 | 0.674 | 0.692 | 0.185, 2.591 | 0.584 |
| Unemployed* | – | – | 1.000 | – | – |
| Income | | | | | |
| Low* | – | – | 1.000 | – | – |
| Lower-middle | 0.002 | 0.609 | 1.002 | 0.304, 3.306 | 0.997 |
| Upper-middle | 0.673 | 0.692 | 1.959 | 0.505, 7.600 | 0.331 |
| High | 0.679 | 0.923 | 1.971 | 0.323, 12.030 | 0.462 |
| Education | | | | | |
| Primary* | – | – | 1.000 | – | – |
| Secondary | 0.835 | 0.814 | 2.305 | 0.467, 11.367 | 0.305 |
| Tertiary | 1.110 | 0.862 | 3.033 | 0.560, 16.437 | 0.198 |
| Family illness | | | | | |
| Yes | 0.332 | 0.295 | 1.393 | 0.781, 2.484 | 0.261 |
| No* | – | – | 1.000 | – | – |
| Smoker | | | | | |
| Yes | 1.626 | 0.509 | 5.083 | 1.876, 13.774 | 0.001 |
| No* | – | – | 1.000 | – | – |
| Physically active | | | | | |
| Yes | 0.115 | 0.349 | 1.122 | 0.566, 2.223 | 0.742 |
| No* | – | – | 1.000 | – | – |
| Constant | -1.193 | 1.262 | – | – | 0.344 |
| LR $\chi^2$ (15) | 180.480 | | | | |
| P > $\chi^2$ | < 0.001 | | | | |
| HL $\chi^2$ (8) | 5.650 | | | | |
| P > $\chi^2$ | 0.686 | | | | |
| R-squared | 0.817 | | | | |
| Observations | 398 | | | | |

*Note*: *refer to reference/base group. LR refers to likelihood ratio. HL refers to Hosmer-Lemeshow.

Males have higher odds of consuming alcohol than females (OR: 3.720; 95% CI: 1.939, 7.136). Comparing among the ethnic groups, Malays have lower odds of consuming alcohol than Indians and others (OR: 0.059; 95% CI: 0.021, 0.165), whereas Chinese have higher odds of consuming alcohol than Indians and others (OR: 3.628; 95% CI: 1.808, 7.279). Married individuals are found to have lower odds of consuming alcohol than unmarried individuals (OR: 0.419; 95% CI: 0.211, 0.833), while smokers have higher odds of consuming alcohol than non-smokers (OR: 5.083; 95% CI: 1.876, 13.774).

## DISCUSSION

Drawing on a cross-sectional survey sample, the present study finds that age, gender, ethnicity, marital status and smoking are significantly associated with alcohol consumption. According to the logistic regression analysis, males, Chinese and smokers are more likely to consume alcohol than others, whereas, old individuals, Malays and married individuals are less likely to consume alcohol compared to others.

TABLE 3. Correlation coefficients between income and education variables

| Variables | Income | | | |
|---|---|---|---|---|
| | Low | Lower-middle | Upper-middle | High |
| Primary | 0.174 | -0.084 | -0.077 | -0.047 |
| | (0.001) | (0.094) | (0.127) | (0.347) |
| Secondary | 0.200 | -0.016 | -0.147 | -0.140 |
| | (0.001) | (0.757) | (0.003) | (0.005) |
| Tertiary | -0.270 | 0.053 | 0.176 | 0.156 |
| | (0.001) | (0.296) | (0.001) | (0.002) |

*Note*: P-value in parentheses.

Age was found by the previous studies to have a U-shape relationship with alcohol consumption in United States (US) (Nayga & Capps 1994; Nayga 1996). The studies pointed out that individuals' likelihood of consuming alcohol decreased initially with age, but increased steadily after a certain age. Surprisingly, however, this evidence was not strongly supported by the studies on Australia, China, Korea and Thailand, which found age to be negatively associated with individuals' likelihood of consuming alcohol (Sharpe et al. 2001; Zhao & Harris 2004; Le et al. 2009). The finding of the present study is consistent with those of Sharpe et al. (2001), Zhao and Harris (2004) and Le et al. (2009), suggesting that older individuals are less likely to consume alcohol than younger individuals. A plausible explanation is that older individuals, especially those who face a serious deterioration in their health tend to be more aware of the harmful effects of alcohol on health and well-being, thus, they are less likely to indulge in alcohol drinking compared to their younger counterparts (Manrique and Jensen 2004). As such, an intervention strategy concentrating on discouraging young individuals from consuming alcohol may seem effective. Population-based health awareness programmes, for instance, should be urgently introduced by government to educate youngsters about the potential side effects of consuming alcohol.

The previous studies consistently found that males had a higher likelihood of consuming alcohol and also consumed more alcohol than females (Nayga and Capps 1994; Parker et al. 1995; Sharpe et al. 2001; Zhao & Harris 2004; Neufeld et al. 2005; Le et al. 2009). Similarly, the present study also finds males to be more likely to consume alcohol than females. As argued by Engs and Hanson (1990), cultural factor could be the reason for this outcome. The study claimed that women were generally less likely to be accepted by the society to adopt alcohol drinking habit compared to men. In fact, this is especially true in a developing country like Malaysia, where possesses a conservative culture. Nevertheless, women also have a strong natural family caretaker characteristic (Cheah 2011), and thus, are more concerned about the risks of consuming alcohol than men. The implication of this finding is that government should focus more on reducing alcohol consumption among males than females. It is worthwhile for government to use nationwide anti-alcohol campaigns to advertise the fact that alcohol can cause adverse effects on men's health, such as, erectile dysfunction and low sperm count (Lee et al. 2010; Joo et al. 2012).

Somewhat interestingly, the present study finds that ethnicity is significantly associated with alcohol consumption, as Malays are less likely to consume alcohol compared to Indians and others. This is simply due to the fact that Malays are prohibited from consuming alcohol given their religions. Chinese, on the other hand, are found to have a higher likelihood of consuming alcohol than Indians and others. Perhaps, this is because of the common presence of alcohol in Chinese traditional festivals, such as, New Year celebration and wedding ceremony. Government is, therefore, suggested to pay special attention to Chinese when formulating policy. In an effort to reduce alcohol consumption among Chinese, government should advocate using health professionals, such as, doctors, nurses and public health specialists from Chinese ethnic background, as well as Chinese language-based mass media, such as, newspapers, radio channels and television programmes to highlight the disadvantages of consuming alcohol.

Consistent with Yen and Jensen (1996) using a double-hurdle model and Jonas (2000) based on a Australian sample, married individuals are found to be less likely to consume alcohol than unmarried individuals. Since married individuals often need to spend their time at home with their family, where alcohol is usually prohibited, they are less devoted to adopt drinking habit compared to unmarried individuals (Nayga 1996). With regard to policy implications, two intervention strategies are proposed. First, government should provide several types of incentives to encourage marriage, for example merchandise discounts and income tax reduction offered only to married individuals. Second, in efforts to prevent divorce, government should set up professional bodies to provide individuals who face marital problems with counselling services and social supports.

The relationship between smoking and alcohol consumption was found to be significant by Abdel-Ghany and Silver (1998) and Jonas (2000). The studies claimed that alcohol and tobacco were consumed as complements, whereby, smokers had a higher likelihood of consuming alcohol than non-smokers. These findings are in line with that of the present study. The reason is that individuals who engage in smoking tend to be less concerned about their own health than those who avoid smoking, and consequently are more likely to indulge in alcohol drinking (Raptou et al. 2005). In view of the evidence that smoking can increase the likelihood of consuming alcohol, government should make a concerted effort to reduce smoking among adults if the goal of reducing alcohol consumption is to be achieved. Several tough intervention measures, such as, raising taxes on tobacco, increasing legal age to smoke and limiting sales license should be given consideration.

It is, however, that, given the small sample size and the limited availability of data, several socio-demographic variables, such as, income, education and employment status are found to be statistically insignificant in affecting alcohol consumption. Besides, these limitations also cause other important variables like household size and household income could not be included for analysis. It appears, therefore, that a qualitative study is needed for supplementing a better understanding of the factors affecting alcohol consumption among adults in Malaysia. Despite these inherent limitations, the present study is the first in-depth study that examines alcohol consumption in Penang. Moreover, dissimilar from most studies, the present study takes hereditary and lifestyle factor into account for analysis.

## REFERENCES


Abdel-Ghany, M. & Silver, J.L. 1998. Economic and demographic determinants of Canadian households' use of and spending on alcohol. *Family and Consumer Sciences Research Journal* 27(1): 62-90.

Assunta, M. 2001. *The Alcohol Problem in Malaysia*. The globe special issues 4. Global Alcohol Policy Alliance, 2001-2002.

Cheah, Y.K. 2011. Influence of socio-demographic factors on physical activity participation in a sample of adults in Penang, Malaysia. *Malaysian Journal of Nutrition* 17(3): 385-391.

Cheah, Y.K. 2012. An exploratory study on self-rated health status: The case of Penang, Malaysia. *Malaysian Journal of Economic Studies* 49(2): 141-155.

Cheah, Y.K. and Naidu, B.M. 2012. Exploring factors influencing smoking behaviour in Malaysia. *Asian Pacific Journal of Cancer Prevention* 13(4): 1125-1130.

Engs, R.C. & Hanson, D.J. 1990. Gender differences in drinking patterns and problems among college students: A review of the literature. *Journal of Alcohol and Drug Education* 35(2): 36-47.

Hejar, A.R., Nor Afiah, M.Z., Kulanthayan, K.C.M., Law, T. H. & Fadhilah, J. 2004. Health risk behaviours and alcohol drinking among twenty year students in Selangor, Malaysia. *International Medical Journal*. [Online] Available at: http://www.eimjm.com/Vol3-No1/Vol3-No1-B4.html [Accessed 1 May 2011].

Institute for Public Health. 2011. *National Health and Morbidity Survey 2011 (NHMS 2011)*. Ministry of Health, Malaysia.

Institute for Public Health. 2008. *Third National Health and Morbidity Survey (NHMS III) 2006: Alcohol*. Ministry of Health, Malaysia.

Jonas, H.A. 2000. Patterns of alcohol consumption in young Australian women: Socio-demographic factors, health-related behaviours and physical health. *Australian and New Zealand Journal of Public Health* 24(2): 185-191.

Joo, K.J., Kwon, Y.W., Myung, S.C. & Kim, T.H. 2012. The effects of smoking and alcohol intake on sperm quality: Light and transmission electron microscopy findings. *Journal of International Medical Research* 40(6): 2327-2335.

Le, C., Chongsuvivatwong, V., Geater, A. & Apakupakul, N. 2009. Contextual and individual demographic determinants of alcohol consumption and smoking: A comparative study in Southwestern China and Southern Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health* 40(2): 370-379.

Lee, A.C.K., Ho, L.M., Yip, A.W.C., Fan, S. & Lam, T.H. 2010. The effect of alcohol drinking on erectile dysfunction in Chinese men. *International Journal of Impotence Research* 22(4): 272-278.

Manrique, J. & Jensen, H.H. 2004. Consumption of tobacco and alcoholic beverages among Spanish consumers. *Southwestern Economic Review* 31: 41-56.

Marques-Vidal, P. & Dias, C.M. 2005. Trends and determinants of alcohol consumption in Portugal: Results from the National Health Surveys 1995 to 1996 and 1998 to 1999. *Alcoholism: Clinical and Experimental Research* 29(1): 89-97.

Nayga, R.M. 1996. Sample selectivity models for away from home expenditures on wine and beer. *Applied Economics* 28(11): 1421-1425.

Nayga, R.M. & Capps, O. 1994. Analysis of alcohol consumption in the United States: Probability and level of intake. *Journal of Food Distribution Research* 25(2): 17-23.

Neufeld, K.J., Peters, D.H., Rani, M., Bonu, S. & Brooner, R. K. 2005. Regular use of alcohol and tobacco in India and its association with age, gender, and poverty. *Drug and Alcohol Dependence* 77(3): 283-291.

Nor Afiah, M.Z., Hejar, A.R., Kulanthayan, K.C.M., Fadhilah, J. & Law, T.H. 2006. Prevalence of smoking and drinking habits among form six students in Petaling district, Selangor. *Medical Journal of Malaysia* 61(1): 41-47.

Nutt, D.J., King, L.A. & Phillips, L.D. 2010. Drug harms in the UK: A multicriteria decision analysis. *Lancet* 376(9752): 1558-1565.

Parker, K.D., Weaver, G. & Calhoun, T. 1995. Predictors of alcohol and drug use: A multi-ethnic comparison. *Journal of Social Psychology* 135(5): 581-590.

Raptou, E., Mattas, K., Tsakiridou, E. & Katrakilidis, C. 2005. Factors affecting cigarette demand. *International Advances in Economic Research* 11(3): 275-290.

SERI (Socioeconomic & Environmental Research Institute). 2010. *Penang Statistic*. [Online] Available at: www.seri.com.my [Accessed 21 October 2010].

Sharpe, D.L., Abdel-Ghany, M. & Kim, H.Y. 2001. Alcohol consumption decision in Korea. *Journal of Family and Economic Issues* 22(1): 7-24.

StataCorp. 2005. *Stata Statistical Software: Release 9.2.* Texas: Stata Corporation.

Tan, C. 2011. Malaysia Ranked World's 10th Largest Consumer of Alcohol. The Star. [Online] Available at: http://thestar.com.my/news/story.asp?file=/2011/5/23/nation/8737875&sec=nation [Accessed 29 March 2012]

Yen, S.T. 1994. Cross-section estimation of US demand for alcoholic beverage. *Applied Economics* 26(4): 381-392.

Yen, S.T. & Jensen, H.H. 1996. Determinants of household expenditures on alcohol. *Journal of Consumer Affairs* 30(1): 48-67.

World Health Organization. 2004. *WHO Global Status Report on Alcohol 2004*. Geneva, Switzerland.

Zhao, X. & Harris, M.N. 2004. Demand for marijuana, alcohol and tobacco: Participation, level of consumption and cross-equation correlations. *Economic Record* 80(251): 394-410.

Yong Kang Cheah
School of Economics, Finance and Banking
College of Business
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Darul Aman, MALAYSIA

Correspondence author: Yong Kang Cheah
Email address: cheahykang@gmail.com / yong@uum.edu.my
Tel: +604 928 6927

Received: November 2013
Accepted for publication: June 2014