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Factors Affecting Use of Preventive Medical Care: An Exploratory Case Study Using Penang Data

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Abstract: *The objective of this study is to examine socio-demographic, lifestyle and health determinants of use of preventive medical care in Malaysia. Based on a cross-sectional survey conducted in Penang (Malaysia), logit models were used to analyse the likelihood of using preventive medical care. Findings indicate age, ethnicity, marital status, history of serious family illnesses, education, income and self-rated health can affect the likelihood of using preventive medical care. In particular, young individuals, ethnic Malays, the unmarried, individuals without history of serious family illnesses, the less-educated, low income earners and individuals with self-rated fair/excellent health are unlikely to use preventive medical care. Based on these findings, several population-based health policies targeted at increasing the use of preventive medical care are proposed.*

Keywords: Demography, Health, Lifestyle, Medical Care, Preventive Medicine
JEL Classification: I10, I11

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1. Introduction

Health capital plays an important role in determining economic growth (Bloom et al., 2004). Governments allocate a sizeable portion of their budget to healthcare aimed at improving health capital, but the adverse impacts of excessive healthcare expenditure on economic development are often overlooked (Barraclough, 1999; Roemer, 1991). In fact, this article believes a reduction in medical expenditure as a percentage of national income is vital for economic growth. Non-communicable diseases (NCDs) account for more than 65% of disease burdens in Malaysia (World Health Organization, 2012; Yasin et al., 2012). A total of 26,876 of those admitted to government hospitals in 1990 had hypertension (Ministry of Health Malaysia, 2006) and the figure increased to 37,580 in 2005 accounting for RM325.90 million in medical expenditure (Institute for Public Health, 2008; Sameerah & Sarojini,

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2007). Malaysia has the fourth highest prevalence of diabetes in Asia. Official records indicate Malaysia has 800,000 patients with diabetes (Lee & Loh, 2010). This figure is expected to reach one million in the immediate future. In terms of economic costs, Chan (2013) reported that a significant percentage (16%) of the national healthcare budget in 2010 was allocated for diabetes-related treatments, placing Malaysia at the top 10 countries in Asia for the highest expenditure for healthcare.

Since prevention is always better than cure, an effective way to ease the burden of healthcare expenditure as well as to reduce the prevalence of NCDs is to promote use of preventive medical care. Studies have suggested preventive medical care can improve health and overall well-being of an individual because diseases could be detected early (Burton et al., 1995; Sinderlar, 1982; Tian et al., 2010). Newhouse and Friedlander (1980) and Kenkel (1994) point out the risks of developing NCDs, most notably cancers, can be lowered if appropriate preventive measures are adopted which would also reduce the demand for heavily subsidised curative medical care.

In light of the importance of preventive medical care, governments should have a better understanding of what influences an individual's decision to use preventive medical care. While there is a growing study examining the determinants of use of preventive medical care in developed countries (Abraido-Lanza et al., 2004; Belkar et al., 2006; Haliday et al., 2007; Hsieh & Lin, 1997; Kenkel, 1994; Lin, 2008; Zhang et al., 2000; Tian et al., 2010), only a handful of studies were conducted in Malaysia (Dunn et al., 2010; Dunn & Tan, 2010, 2011). However, the scope of these studies was confined to Pap test and Mammogram for women. Blood sugar and blood cholesterol tests across gender were not factored in. Considering this research gap, the objective of the present study is to examine the determinants of use of preventive medical care in Malaysia with a focus on a wider range of services and populations. This can provide baseline information for policymakers.

The contributions of the present study are three folds. First, in addition to socio-demographic variables, several important lifestyle and health variables such as smoking, physical activity and self-rated health are examined. Earlier studies found physical activity, smoking and self-rated health were significantly associated with use of preventive medical care (Deb, 2001; Lin, 2008; Tian et al., 2010). Hence, a robust statistical model should not exclude these variables. Second, unlike most other studies, the present study includes a hereditary variable, that is, the presence of history of serious family illnesses, as it can affect an individual's health awareness and propensity to take preventive measures against diseases. Third, the focus of the present study is on a developing country, Malaysia, where NCDs are prevalent and only few studies exist on this. The findings can, thus, facilitate a comparison of preventive medical care usage behaviour between a developing country and that of a developed country.

2. An Economic Analysis of Health

From the perspective of economists, health is a type of capital which produces services. These services are consumed throughout an individual's lifetime (Grossman, 1972). Each individual has a given stock of health, but it depreciates overtime. Worse still, death can happen when the stock falls below the minimum level. As such, health needs to be improved by consumption of medical care. The stock of health and its depreciation rate vary across individuals and are determined by both uncontrollable and controllable factors. Age and genetic makeup, for instance, are the uncontrollable factors, while lifestyle, environment and consumption of medical care are the controllable factors.

Health is used for two purposes: consumption and investment (Grossman, 1972). According to the consumption purpose, individuals want to stay healthy to avoid diseases that can yield disutility. The investment purpose is about the relationship between health and time. When individuals are healthy, they can spend more time in the future on market and non-market activities with the aim of earning more income and receiving more pleasures. Individuals' lifestyles can be explained using the investment purpose. Individuals who are future oriented are more likely to adopt a healthy lifestyle, such as participation in physical activity and healthy dieting to increase healthy days in the future, whereas individuals who are present-oriented may tend to engage in unhealthy behaviours, such as smoking and alcohol drinking.

Since the stock of health capital depreciates over time, maintenance of health via a production process is necessary (Santerre and Neun, 2010). Similar to a situation where firms use capital and labour to produce goods and services, individuals use medical care and other non-medical inputs such as environment and lifestyle to produce health. A production function of health shows the amount of health individuals can produce by using various inputs. In general, the production function of health can be expressed as follows:

$$\mathrm{H} = f(m, t, p, l, e, d, v) \tag{1}$$

where, H refers to the level of health capital; m is the quantity of medical care consumed including curative and preventive medical care; t reflects the medical technology; p indicates the individuals' mental and physical profile; l is the lifestyle factors; e denotes economic factors such as income and price; d refers to demographic factors such as age, education and gender; and v refers to environmental factors, such as air and water.

3. Literature Findings

The relationship between age and use of preventive medical care is mixed. Hsieh and Lin (1997) and Tian et al. (2010), using a nationwide data of

Taiwan, find that older people are more likely to use preventive medical care than younger people. Similar findings are evidenced by Dardanoni and Wagstaff (1990). This is simply because older individuals are more susceptible to diseases and consequently are more devoted to use preventive medical care. However, Kenkel (1994) and Lairson et al. (2005) have different views. They suggest that older individuals are less likely to use cancer screening than younger individuals. Owing to the fact that preventive medical care only generates benefits in the future when diseases are successfully prevented, older individuals tend to find preventive medical care less attractive compared with younger individuals (Cropper, 1977).

There is evidence suggesting that gender is significantly associated with use of preventive medical care. Lairson and Swint (1978) and Hsieh and Lin (1997) find that women are more likely to use preventive medical care than men. The reason is that men tend to face a greater opportunity cost of non-working time as the average wage paid to men is often higher (Sindelar, 1982). As a result, men tend to place more value on the time spent on working than on using preventive medical care. Another contributing factor is that women have a stronger family caretaker characteristic than men and thus, are more concerned about health (Cheah & Naidu, 2012).

Lin (2008) and Tian et al. (2010) find that marital status is significantly associated with use of preventive medical care. Married individuals are more likely to use preventive medical care than unmarried individuals. Similar findings are shared by Yi (1994) who studied cervical cancer screening among Vietnamese women. The positive externalities of using medical care reaped by married individuals in terms of improving household members' well-being can explain these findings (Sindelar, 1982).

Studies have suggested that medical insurance plays a role in influencing an individual's decision to use preventive medical care (Deb, 2001; Hsieh & Lin, 1997; Kenkel, 1994; Zhang et al., 2000). Individuals who have medical insurance are more likely to use preventive medical care than their peers who do not. This could be due to the fact that an early detection of illnesses is precious if it can be followed by cost reduced medical treatments (Kenkel, 1994). In other words, individuals who have medical insurance may find preventive medical care more attractive than individuals who need to bear all the medical costs.

In examining the differences in health care utilisation across house locality, Zhang et al. (2000) found that rural dwellers are less likely to use preventive medical care than the urbanites. Similarly, Coughlin and Thompson (2004) find that individuals who reside in rural areas are less likely to use cancer screenings than individuals who reside in urban areas. This may be because of urban-rural differences in the supply of medical care. Health related goods and services are more concentrated in urban areas which mean rural dwellers face more constraints in using medical care (Hicks, 1990).

There is a positive relationship between education and use of preventive medical care (Abraido-Lanza et al., 2004; Belkar et al., 2006; Kenkel, 1994; Lairson et al., 2005; Tian et al., 2010). Earlier studies are in agreement that higher educated women are more likely to use Pap test and Mammogram than their lower educated counterparts. As pointed out by Grossman (1972), well-educated individuals are more efficient at producing good health than less-educated ones. Since preventive medical care can improve health, individuals with better educational standards access it far more than those who are lower educated. Also, higher educated individuals have a better interpreting skill and health knowledge and thus, are more aware of the benefits of preventive medical care (Kenkel, 1994).

The effect of income on use of preventive medical care is noteworthy. In investigating health screenings and vaccinations among adults, Lairson and Swint (1978) found that high-income individuals have a higher likelihood of using preventive medical care than the lower income individuals. These findings are consistent with Halliday et al. (2007) who use a Hawaiian sample. A likely explanation is that higher income individuals reap a higher return from health investment than lower income individuals as they can earn a higher salary in the future if they are healthy (Grossman, 1972). Since preventive medical care is a health investment, high income individuals have a higher incentive to use it than low-income individuals.

Looking at lifestyle factors, Lin (2008) and Tian et al. (2010) found that participation in physical activity is significantly associated with use of preventive medical care as physically inactive individuals have a lower likelihood of using preventive medical care compared with physically active ones. The authors also report that smokers are less likely to use preventive medical care than non-smokers. Taken together, it can be concluded that physically inactive individuals and smokers are less risk-averse, thus, they are less concerned about their own health.

The effects of self-rated health on use of preventive medical care appear to be inconclusive. Deb (2001) and Tian et al. (2010) found that individuals who self-rate their own health as poor are more likely to use preventive medical care than their counterparts with self-rated excellent health. However, Lairson et al. (2005) found that individuals who self-rate their health as poor tend to use more curative medical care than preventive one. Owing to the fact that preventive medical care only generates health benefits in the future when diseases are successfully prevented, individuals with poor health condition may find it unattractive.

4. Methods

4.1 Data

Given the time, budget and resource constraints, the cross-sectional survey data used in the present study was collected based on a non-probabilistic convenient sampling. Nonetheless, an effort was made to stratify the sample based on the ethnic and gender structures of the population of Penang. The survey was conducted at various locations (such as shopping malls, offices, cafeterias and residential areas) in Penang and respondents came from various age groups, races, income and education levels. The survey period was from August 2010 to October 2010. During the survey, piloted questionnaires in *Bahasa Malaysia* and English were distributed to be self-administered by respondents. Nevertheless, brief explanations were provided by interviewers to the respondents. The inclusion criteria of the survey were: (1) adults aged 21 years and above; (2) all genders; (3) all ethnic groups; and (4) residents in Penang[1].

In the survey, the respondents were asked to indicate whether they had used any preventive medical care (blood pressure test, blood sugar test and cholesterol test) in the past 12 months. They were also requested to provide their socio-demographic, lifestyle and health profiles. A total of 415 respondents were selected, but only 398 had completed the questionnaire. The response rate was 95.90%. In spite of the small sample size, it was still representative of the population of Penang[1]. Data was analysed using Stata statistical software (StataCorp, 2005).

4.2 Variables

Based on previous empirical research findings (Abraido-Lanza et al., 2004; Belkar et al., 2006; Haliday et al., 2007; Hsieh & Lin, 1997; Kenkel, 1994; Lin, 2008; Tian et al., 2010; Zhang et al., 2000), the following socio-demographic, lifestyle and health variables are hypothesised that affect the use of preventive medical care: (1) age; (2) ethnicity; (3) gender; (4) marital status; (5) medical insurance; (6) house locality; (7) history of family illness; (8) education; (9) income; (10) smoking; (11) drinking; (12) physical activity; and (13) self-rated health.

Age is measured as a continuous variable. Respondents come from three major ethnic groups in Malaysia: Malays, Chinese and Indian/others. Marital status is categorised as married and unmarried (single, divorcé and widow/widower). The insurance variable refers to the respondents whose medical expenditures are partially or fully paid by medical insurance. House locality is divided into two groups: rural (*Balik Pulau*, *Bertam* and *Kepala Batas*) and urban. History of serious family illnesses refers to the respondents whose immediate families have been diagnosed with NCDs such as diabetes, heart diseases and kidney diseases. Education is grouped into three categories:

primary (≤ 6 schooling years), secondary (7-11 schooling years) and tertiary (≥ 12 schooling years). Based on Cheah's (2011) study, monthly individual income is divided into four groups: low (RM 0 – 999), lower-middle (RM 1000 – 2999), upper-middle (RM 3000 – 5999) and high (≥ RM 6000).

Smoker refers to those who smoked in the past 30 days preceding the survey or reported to be smoking at the time of the survey (Cheah & Naidu, 2012). An alcohol drinker refers to the respondents who consumed alcohol in the past 30 days preceding the survey or reported to be drinking at the time of the survey. In terms of physical activity, respondents who spend at least 15 minutes three times per week in leisure-time physical activity are considered as physically active (Cheah, 2011). To facilitate a better comparison, self-rated health is categorised into two categories: poor and fair/excellent. Details about self-rated health have been described by Cheah (2012).

4.3 Econometric Specification

The present study uses three dependent variables: (1) blood pressure test; (2) blood sugar test; and (3) blood cholesterol test. These dependent variables indicate whether or not the respondents used preventive medical care (blood pressure test, blood sugar test, cholesterol test) in the past 12 months prior to the survey. Logit model is used to examine the factors affecting the likelihood of using preventive medical care as it can predict the probability that lies in the unit interval (Greene, 2007). In general, the logit model is formulated as follows:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_1 X_{1i} + \cdots + \beta_k X_{ki} + \varepsilon_i \qquad (2)$$

where L_i = the log of the odds ratio; P_i = probability that a respondent uses preventive medical care; $1 - P_i$ = probability that a respondent does not use preventive medical care; $P_i/(1 - P_i)$ = the ratio of the probability that a respondent uses preventive medical care; α = constant term; X_i = independent variables; β = coefficients of the independent variables; and ε_i = stochastic error term.

For estimation purpose, the logit model for each dependent variable can be written as follows:

$$L_{ri} = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \beta_{17} X_{17i} + \varepsilon_i \qquad (3)$$

$$L_{si} = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \beta_{17} X_{17i} + \varepsilon_i \qquad (4)$$

$$L_{ci} = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \beta_{17} X_{17i} + \varepsilon_i \qquad (5)$$

where L_{ri} = log of the odds ratio of the probability that a respondent uses blood pressure test; L_{si} = log of the odds ratio of the probability that a respondent uses blood sugar test; L_{ci} = log of the odds ratio of the probability that a respondent uses blood cholesterol test; X_{1i} = age in years; X_{2i} = Malay; X_{3i} = Chinese; X_{4i} = male; X_{5i} = married; X_{6i} = having medical insurance; X_{7i} = rural dwellers; X_{8i} = presence of serious family illnesses; X_{9i} = secondary-educated; X_{10i} = tertiary-educated; X_{11i} = lower-middle income; X_{12i} = upper-middle income; X_{13i} = high income; X_{14i} = smoker; X_{15i} = alcohol drinker; X_{16i} = physically active; and X_{17i} = self-rated poor health.

5. Results

5.1 Characteristics of The Survey Respondents

The average age of respondents is 37 years. Overall, the sample consists of 37.94% Malays, 40.95% Chinese and 21.11% Indians and others. The males make up 44.22% of the sample. This sample distribution of the respondents by ethnicity and gender corresponds closely to the ethnic demographics of Penang 41.60% Malays, 40.90% Chinese, 17.50% Indians and others; the men make up 49.30% of the population (SERI, 2010) (see Table 1).

Table 1: Summary statistics of variables

Variables	Definitions	Mean/%*
Age	Age (in years)	36.56
Ethnicity		
Malay	Ethnicity is Malay	37.94
Chinese	Ethnicity is Chinese	40.95
Indian/others	Ethnicity is Indian/others	21.11
Gender		
Male	Gender is male	44.22
Female	Gender is female	55.78
Marital status		
Married	Marital status is married	49.75
Unmarried	Marital status is unmarried	50.25
Insurance		
Yes	Being covered by medical insurance	65.33
No	Not being covered by medical insurance	34.67

Table 1:(Continued)

House locality		
Rural	Rural dweller	21.11
Urban	Urban dweller	78.89
Family illness		
Yes	Having history of serious family illnesses	50.50
No	Not having history of serious family illnesses	49.50
Education		
Primary	Highest level of education is primary	4.78
Secondary	Highest level of education is secondary	30.40
Tertiary	Highest level of education tertiary	64.82
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
Smoker		
Yes	Being a smoker	14.57
No	Being a non-smoker	85.43
Drinker		
Yes	Being a alcohol drinker	31.91
No	Being a non-alcohol drinker	68.09
Physical activity		
Yes	Being physically active	21.11
No	Being physically inactive	78.89
Self-rated health		
Poor	Self-rated health is poor	5.03
Fair/excellent	Self-rated health is fair/excellent	94.97

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

Of the total respondents, about 49.75% are married, 21.11% are rural dwellers and 65.33% have medical insurance. 50.50% have a history of serious family illnesses. Approximately 64.82% of the respondents have tertiary education, followed by those with secondary (30.40%) and primary education (4.78%). In terms of income, 32.16% of the respondents are in the low income group, while 44.97% and 18.59% are in the lower-middle and upper-middle income groups respectively. However, only 4.28% are in the high income group. The sample comprises 14.57% smokers and 31.91% drinkers (i.e. consume alcohol). About 21.11% of the sample are physically active individuals. The sample shows only a small proportion of the respondents with self-rated poor health (5.03%).

5.2 Factors Affecting Use of Preventive Medical Care

To assess the goodness-of-fit of the logit models, Likelihood Ratio (LR) test is conducted. The *p*-values of LR χ^2 with 17 degrees of freedom of the three logit models are less than 0.01. Hence, the null hypothesis of each logit model that all the estimated coefficients are simultaneously equal to zero is rejected. It can be concluded that all the logit models fit the data very well (see Table 2). Furthermore, the calculated correlation coefficients between income and education variables are all less than 0.8, thus, implying that multicollinearity is not a serious issue (Studenmund, 2006).

Table 2: Results of the logit models

Variables	Blood pressure	Blood sugar	Blood cholesterol
Age	0.003 (0.003)	0.010 (0.004)***	0.012 (0.003)***
Ethnicity			
Malay	-0.096 (0.079)	-0.335 (0.087)***	-0.212 (0.085)**
Chinese	0.026 (0.080)	-0.005 (0.082)	0.008 (0.077)
Indian/others#	–	–	–
Gender			
Male	-0.058 (0.065)	-0.062 (0.076)	-0.081 (0.073)
Female#	–	–	–
Marital status			
Married	0.177 (0.067)***	0.149 (0.074)**	0.018 (0.070)
Unmarried#	–	–	–
Insurance			
Yes	-0.052 (0.067)	0.015 (0.078)	0.117 (0.074)
No#	–	–	–

Table 2: (Continued)

House locality			
Rural	0.009 (0.071)	0.034 (0.083)	0.071 (0.068)
Urban#	–	–	–
Family illness			
Yes	0.171 (0.055)***	0.219 (0.064)***	0.240 (0.061)***
No#	–	–	–
Education			
Primary#	–	–	–
Secondary	0.250 (0.134)*	-0.030 (0.166)	0.121 (0.124)
Tertiary	0.245 (0.133)*	0.152 (0.168)	0.257 (0.172)
Income			
Low#	–	–	–
Lower-middle	0.018 (0.070)	-0.017 (0.081)	-0.072 (0.073)
Upper-middle	-0.070 (0.091)	0.007 (0.104)	-0.084 (0.098)
High	0.372 (0.128)***	0.249 (0.133)*	0.224 (0.104)**
Smoker			
Yes	-0.122 (0.084)	0.027 (0.106)	-0.047 (0.103)
No#	–	–	–
Drinker			
Yes	0.101 (0.074)	-0.063 (0.081)	-0.071 (0.079)
No#	–	–	–
Physical activity			
Yes	0.054 (0.074)	-0.068 (0.085)	-0.052 (0.078)
No#	–	–	–
Self-rated health			
Poor	0.379 (0.113)	0.197 (0.130)	0.269 (0.095)***
Fair/excellent#	–		–
Likelihood ratio $\chi 2$ (17)	72.470***	107.180***	103.570***
R-squared	0.671	0.736	0.749
Observations	398	398	398

Note: Asymptotic standard errors in parentheses. *** indicate significance at the 1% level, ** at the 5% level, and * at the 10% level. # refers to base/reference group.

In addition to the regressions' estimates, the marginal effects of the independent variables are estimated. The results show an additional year of age increases 1.00% and 1.20% probability of using blood sugar and blood cholesterol tests respectively. In terms of ethnicity, Malays have a 33.50% and 21.20% lower probability of using blood sugar and blood cholesterol tests respectively, compared with Indians and others. Holding other variables constant, married individuals are 17.70% and 14.90% more likely to use blood pressure and blood sugar tests respectively, compared with their unmarried counterparts.

Individuals with a history of serious family illnesses are 17.10%, 21.90% and 24.00% more likely to use blood pressure, blood sugar and blood cholesterol tests respectively compared with individuals who do not have such a medical history. Individuals who have secondary education have a 25.00% higher probability of using blood pressure test than their counterparts who have only primary education. Respondents with tertiary-level education have a 24.50% higher probability of using blood pressure test than those with primary-level education. In terms of income, high income individuals are 37.20%, 24.90% and 22.40% more likely to use blood pressure, blood sugar and blood cholesterol tests respectively than low income individuals. Individuals who self-rate their health as poor are 26.90% more likely to use blood cholesterol test than individuals who self-rate their health as fair or excellent if other variables are held constant.

6. Discussion

Using a cross-sectional primary survey data, the present study finds that age, ethnicity, marital status, history of serious family illnesses, education, income and self-rated health are significantly associated with use of preventive medical care. In particular, young individuals, Malays, unmarried individuals, individuals who do not have a history of serious family illnesses, the less-educated, low income earners and individuals with self-rated fair or excellent health tend to have a low likelihood of using preventive medical care.

The finding on age suggests that older individuals are more likely to use preventive medical care than younger individuals; this is consistent with the findings of Hsieh and Lin (1997) and Tian et al. (2010). Because older individuals face a higher risk of developing diseases than younger individuals, they invest more in health (Grossman, 1972). Older people are thus, more aware of the importance of preventive medical care. Among the ethnic groups, Malays have a lower likelihood of using preventive medical care than Indians and others. One possible explanation is the cultural differences across ethnic groups. As pointed out by Dunn and Tan (2010), Malays tend to be more reluctant to undergo medical check-up on religious grounds (i.e. Muslim). However, because cultural variable is not included in the models, one cannot

deduce this based solely on cultural factor. An in-depth qualitative study is therefore, needed for supplementing a better understanding of how ethnicity affects use of preventive medical care.

Married individuals have a higher likelihood of using preventive medical care than unmarried ones. Similar findings are evidenced by Lin (2008) and Tian et al. (2010). Because the well-being of an individual can be directly affected if his/her spouse suffers from diseases, married individuals may put more efforts into disease prevention than the unmarried (Sindelar, 1982). Additionally, married individuals assume greater responsibility in taking care of their family members compared with singles. It appears, therefore, that married individuals have greater awareness of health issues. As expected, the present study finds that individuals who have a history of serious family illnesses are more likely to use preventive medical care than their counterparts who do not have such medical history. The explanation is simple. Since individuals who have history of serious family illnesses face a higher risk of developing certain diseases, they tend to put more efforts into disease prevention.

Consistent with the findings of Kenkel (1994), Zhang et al. (2000), Abraido-Lanza et al. (2004), Lairson et al. (2005), Belkar et al. (2006) and Tian et al. (2010), well-educated individuals have a higher likelihood of using preventive medical care than less-educated individuals. Three reasons may explain this. First, well-educated individuals are more efficient at producing health than their less-educated counterparts (Grossman, 1972). Since preventive medical care can improve health, well-educated individuals are more inclined to use it. Second, well-educated individuals often have better interpreting skills and health knowledge and consequently, are more aware of the benefits of preventive medical care (Kenkel, 1994). Third, well-educated individuals are more future oriented, that is, they exhibit a lower rate of time preference compared with less-educated individuals (Van der Pol, 2011). Hence, they tend to place a higher value on preventive medical care.

Lairson and Swint (1978) concur with the finding on income influencing health awareness. Halliday et al. (2007) noted that higher income individuals are more likely to use preventive medical care than lower income individuals. This is simply because the benefits reaped by higher income individuals from using preventive medical care are higher than lower income individuals (Grossman, 1972). In other words, the rate of return on health capital investment is higher for higher income earners. This is due to the fact that higher income earners can earn higher income in the future if they allocate "healthy time" for work. In line with the findings of Deb (2001) and Tian et al. (2010), individuals with self-rated poor health have a higher likelihood of using preventive medical care compared with individuals who self-rate their health as excellent or fair. Perhaps this could be attributed to the fact that individuals with self-rated poor health are more concerned about their own

health than their counterparts with self-rated excellent or fair health.

Somewhat surprisingly, the finding on gender contradicts those of Lairson and Swint (1978) and Hsieh and Lin (1997). The argument of Kenkel (1990) that women have greater awareness of the benefits of medical care compared with men is, thus, not supported by the present study. It is also noteworthy that smoking, alcohol drinking and physical activity variables are not statistically significant in affecting individuals' decisions to use preventive medical care. The small sample size and the limited availability of data may be the reason for these outcomes.

7. Conclusion and Policy Implications

Based on the findings of the present study, several population-based intervention measures toward promoting use of preventive medical care among adults are proposed. First, the government should urgently introduce nationwide health promotion programmes to educate young adults about healthy behaviour as a preventive measure against diseases. In Malaysia, health education and physical education subjects are compulsory subjects in all primary and secondary schools, but they are often replaced by "more important" subjects, such as mathematics and science, especially when examinations are around the corner (Wee, 2013). Hence, the government should seriously consider introducing effective measures to increase knowledge on health and healthy behaviour both at the school and societal levels.

Second, more Malay language-based health awareness advertisements are needed to promote the importance of using preventive medical care. Although Malay language has often been used in health awareness campaigns, only a small proportion of people have benefited from the campaigns due to lack of participation (Hassali et al., 2012). Therefore, there has to be sustained efforts in promoting awareness via on-going health campaigns; this should not be neglected to achieve the goal of increasing the prevalence of use of preventive medical care.

Third, since budgetary constraint is a barrier to widespread use of preventive medical care, an effective policy should be one that encourages non-public hospitals to charge a nominal price for the poor to access preventive medical care. Alternatively, co-payments from the employers or medical insurances could be implemented to cover a certain amount of the costs of preventive medical care. Existing policies that provide low income women (those earning a monthly household income of less than RM5000) who face a high risk of developing breast cancer with a RM50 subsidy for every mammogram done in private hospitals can be extended to include other basic screening services, such as blood glucose and blood cholesterol tests (Dahlui et al., 2011).

Several limitations of the study are acknowledged. First, owing to time,

budget and geographical constraints, data is limited and based on a non-probability sampling. Hence, it could not represent the national population. Second, several important variables such as, household size and price of medical care, are not included in the models. Therefore, future studies should extend the scope by having data collected from various regions in Malaysia, as well as taking into account other variables.

Notes

1. Given the 1,609,900 population (SERI, 2010), a minimum sample size of 384 respondents was estimated based on 95% confidence level and the assumption of 50% populations were preventive medical care users.

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Appendices

Appendix 1: 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.