

Determinants of the Demand for Using Preventive Medical Care Among Adults in Penang, Malaysia

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Abstract

Background: In light of the fact that chronic diseases were becoming more prevalent recently, the primary objective of the study was to examine the socio-demographic, health, and lifestyle determinants of the use of preventive medical care in Penang, Malaysia.

Methods: The study used the primary survey data in Penang which had a total of 398 respondents. Respondents were chosen based on convenient sampling, and the survey was carried out in various locations in Penang. During the survey, the designed questionnaires were distributed for self-administration by the respondents between August and October, 2010. The binary logistic regression model was employed for statistical analysis.

Results: Socio-demographic and health factors like income, marital status, education, history of serious family illnesses and self-perceived health status were statistically significant in affecting the likelihood of using preventive medical care. Specifically, being married (OR: 1.94; 95% CI: 1.13, 3.32), the presence of a history of serious family illnesses (OR: 2.14; 95% CI: 1.37, 3.36), having high income (OR: 8.71; 95% CI: 1.03, 73.59) and self-perceived poor health status (OR: 4.78; 95% CI: 1.09, 21.00) were positively related with using preventive medical care. However, having low educational background (OR: 0.23; 95% CI: 0.06, 0.95) were inversely related to the probability of using such medical care.

Conclusion: In view of the findings, the individuals' socio-demographic and health profiles were suggested to be given attention by the public health authorities if the goals of increasing the use of preventive medical care in the community were to be achieved.

Keywords: demography, health promotion, medical, preventive medicine

Introduction

One of the important goals of the public healthcare sector in Malaysia is to improve the health of its human capital as better health of the population can, in turn, lead to a better development in the country (1–3). To date, the Malaysian government has been spending a lot of money on medical care and healthcare (4). As pointed out in the report of the Institute for Public Health (5), the per capita health expenditure in Malaysia had increased tremendously from RM 379 in 1997 to RM 555 in 2002, and such a burden of rising medical care costs has become a serious issue for the country (6).

It is worthwhile to note that chronic diseases are becoming more prevalent in Malaysia as more and more people are suffering from heart diseases, hypertension, kidney disease, macro vascular disease, cerebrovascular disease and diabetes in this age of industrialisation and urbanisation (7–9). Statistics show that the prevalence of hypertension in Malaysia had

increased from 14.4% in 1986 to 32.2% in 2006, while the prevalence of diabetes had increased from 6.3% in 1986 to 11.5% in 2006 (8–9). On top of that, nearly 71% of mortalities in Malaysia in 2002 were caused by chronic diseases (10).

Following the notion that prevention is always better than cure, an effective way to ease the burden of healthcare expenditure as well as to reduce the prevalence of chronic diseases is to promote the use of preventive medical care. Previous studies by Sindelar (11), Burton et al. (12) and Tian et al. (13) claimed that by using preventive medical care, individuals' health will improve through the early detection of diseases, and thus reducing the demand for in-patient services. Likewise, Kenkel (14) emphasised that the likelihood of suffering from chronic diseases can be minimized through the use of preventive medical care.

In view of the importance of preventive medical care, it is essential to have a better understanding on the determinants of the use of preventive medical care. Reviewing past

literatures, most of the studies were conducted in well-developed western countries (13–19). On the other hand, little attention was paid to countries that are developing, particularly in the Southeast Asian region such as Malaysia, for which only two studies had been conducted thus far, namely Tan (20) and Dunn and Tan (21). However, findings of these studies were claimed to be very limited because their focus were only on certain types of preventive medical care (i.e. blood sugar test, Pap Smear test) that were used by certain groups of individuals (i.e. diabetes patients, female population). As such, to contribute to the existing literatures on the use of preventive medical care, a more in-depth study needs to be carried out.

Furthermore, even though the influences of socio-demographics, health, and lifestyle factors on the use of preventive medical care were commonly given consideration in the past studies, none had actually investigated the impact of hereditary factors such as the history of serious family illnesses. The fact is that individuals who have a history of serious family illnesses are likely to be more aware of their own health, and consequently would be more inclined to live a healthy lifestyle and use preventive medical care. In order to address this gap, hereditary factor is taken into account in the present study, with an attempt to examine its effect on the use of preventive medical care.

In summary, the study was undertaken to fill the gap in the in-depth study of the use of preventive medical care in Malaysia and the purpose was to provide a better understanding for public health administrators, and thus to have the creation of better healthcare policies. The primary objective of the study was to empirically examine the socio-demographics, health and lifestyle determinants of the use of preventive medical care in Penang, as one of the fourteen states in Malaysia.

Theoretical framework

In general, health is defined as “a state of complete physical, mental and social well-being along with the absence of diseases or other abnormal conditions” (22). Whereas, from the economic point of view, health is a capital stock that produces healthy time as the output, and it is consumed permanently throughout the lifetime (23). However, it is claimed that health capital can depreciate over time due to diseases and aging. For these reasons, medical care plays an important role in minimizing such an undesirable depreciation.

On one hand, as argued by Cropper (24), every human being has the uncertainty about their own health condition. Hence, an individual needs to use preventive medical care to identify his/her state of health before undergoing any medical treatment. This is somewhat different from Grossman’s (23) theory where every individual is certain about his/her health condition prior to the use of medical care. Cropper (24) categorises preventive medical care into primary and secondary prevention. Primary prevention are the medical services that could reduce the probability of illnesses (e.g. vaccination), whereas secondary prevention are the medical services used to detect diseases but without reducing the probability to occur (e.g. health screening) (25–26).

Health can generate two sources of utility, namely a direct source of utility, and an indirect source of utility (23). The former can be described as when an individual consumes health, he/she can actually avoid suffering from illnesses which have adverse impact on well-being. The latter can be defined as when an individual consumes health, he/she will be awarded more time available in the future for money and non-money earning activities. On the other hand, Phelps (27) takes into account both preventive and acute medical care into an individual’s utility function, and claims that the benefits of medical care are based on both the reduction of loss of work time and out-of-pocket medical expenditure. Further, Cropper (24) argues that, to lower the odds of suffering from illnesses, an individual needs to invest in his/her health capital, but there is no guarantee that the sickness will not be on the onset again. In other words, the uncertainty of returns does occur when an individual invests in health.

Materials and Method

Respondents

Various locations in Penang, such as shopping malls, offices, cafes and residential areas were selected to conduct the survey between August and October, 2010. The Penang data was used in the current study given that the people who reside in Penang were recorded as the population having a very high expenditure on medical care, and this implied that the people in Penang were prone to have weaker health conditions in comparison to the population in other states of Malaysia (5). A total of 415 respondents were surveyed. Given that Penang had a total of 1609 900 populations, a minimum sample size of 384 respondents was estimated based on 95% of confidence level

and the assumption of 50% of the population used preventive medical care. The sample size was calculated by using OpenEpi (<http://www.openepi.com/OE2.3/Menu/OpenEpiMenu.htm>). The design effect of one was chosen. The survey was carried out based on the convenient sampling method. Nonetheless, an effort was made to stratify the respondents in proportion to the ethnic and gender composition of the Penang population (41.6% Malays, 40.9% Chinese, 17.5% Indian/others, 49.3% males) (28).

In this survey, the respondents must be of at least 21 years old and above, and had been residing in Penang for 12 months. Owing to incomplete information as reported by some, information from only 398 respondents was retained for the final analysis. The total response rate was about 95.9%. In order to facilitate the interviews with different respondents from different ethnic groups, structured bi-lingual (Bahasa Malaysia and English) questionnaires were distributed for self-administration by the respondents. Nevertheless, some explanations were provided upon distribution of the questionnaires. In the survey, respondents were asked to indicate whether they had used any preventive medical care (i.e. health-screening) in the past 12 months. In addition, several potential determinants, particularly the details of the respondents' socio-demographics, health and lifestyle profiles were elicited. The questionnaires were designed closely based on the survey questionnaires used in the Malaysia Non-Communicable Disease Surveillance-1 (MyNCDS-1) (29).

Definition of variables

Based on an in-depth review of previous empirical studies (13, 14, 16-18, 30-34), the following socio-demographic, health and lifestyle variables are included in the current study for analysis: (i) age; (ii) ethnicity; (iii) gender; (iv) marital status; (v) medical insurance; (vi) house locality; (vii) history of serious family illnesses; (viii) educational background; (ix) individual income; (x) physical activity participation, and (xi) self-perceived health status

As argued by Tian et al. (13), Abraido-Lanza et al. (18) and Hsieh and Lin (33), older individuals are more susceptible to diseases and thus, are more inclined to use preventive medical care compared to the younger individuals. Thereby, an individual's age in continuous form is included in the current model for investigation. It is possible that cultural differences among the ethnicities could impact the use of preventive medical care. Hence, given the uniqueness of a multiethnic

composition in Malaysia, an individual's ethnic profile is taken into account in the three major groups: Malays, Chinese and Indians/others (base group).

As the literatures thus far have revealed, women are more likely to use preventive medical care than men (16,33). The reason arising is that the opportunity costs of time in using preventive medical care tend to be higher for men as compared to women who are often homemakers (35). Therefore, since the different gender of individuals may have different views on preventive medical care, gender variable is taken into account in the current model as 1 if individual is male and 0 if female. On one hand, it is well-documented that marital status can affect the preferences for preventive medical care (13,34). As such, a respondent's marital status is taken into account as 1 if married while 0 if unmarried [i.e. single, divorcé and widow(er)].

Pauly (36) argues that people with medical insurance are likely to be less cautious about the importance of preventive medical care because their medical fees are paid by the insurance company if anything happens to them. This is the so-called "moral hazard". On the opposite side, Kenkel (14), Zhang et al. (17), Hsieh and Lin (33) and Deb (34) claim that individuals who have medical insurance are more inclined to use preventive medical care since preventive medical care can lead to the early detection of diseases. Putting it differently, individuals having medical insurance are likely to have their health examined at an early stage while the payments are still covered by the medical insurance. Therefore, to capture the impact of insurance, a respondent who has medical insurance is included in the current model as 1, otherwise 0.

Apart from that, it is also desirable to pay attention to the impact of residential areas on the use of preventive medical care. In the current model, a respondent who resides in a rural area (e.g. Balik Pulau, Bertam and Kepala Batas) is coded as 1 and 0 otherwise. The consideration is given to the study of Zhang et al. (17) who submitted with strong evidence that individuals who reside in rural areas are less likely to use preventive medical care than the urban dwellers. This is mainly due to the urban-rural differences in the supply of medical care services (37).

On the other hand, to account for the hereditary factor, a respondent who reports as having a history of serious family illnesses (e.g. hypertension, diabetes, cardio-heart disease, stroke, or sudden death) is entered into the model as 1 and 0 otherwise. This is in light of the fact that

an individual who has a history of serious family illnesses may tend to be more aware of his/her own health condition which could, in turn, affect his/her decision to use preventive medical care. In terms of the educational factor, it has been widely ascertained that well-educated individuals are more inclined to use preventive medical care compared to the less educated because they are more aware of the benefits of services (14,16–18,30–32). As such, a respondent's educational background is inserted into the model as three categories: primary, secondary and tertiary (base group).

Moreover, the positive relationship between income and the propensity to use preventive medical care is also found in previous studies (14,16–18,30–32). The explanation is that higher wages may bring about higher returns on health care investment in the future, thus the rich will be more likely to use preventive medical care in order to stay healthy (16). It is, therefore, a respondent's monthly income is included in the model as four groups: low income (RM 0 – RM 999), lower-middle income (RM 1000 – RM 2999) (base group), upper-middle income (RM 3000 – RM 5999) and high income (\geq RM 6000).

In order to capture the influence of the lifestyle factor, a respondent's physical activity participation is included in the current study. Following the measurement used by Kaplan et al. (38), a respondent who participates in at least 12 times of leisure-time physical activity lasting more than 15 minutes per session in a typical month is referred to as physically active (coded as 1), while less than 12 times is denoted as inactive (coded as 0). This is in light of the arguments of Tian et al. (13) and Lin (32) that physically inactive individuals are prone to have a lower likelihood of using preventive medical care than those who are active. Furthermore, findings from past literatures indicate that self-perceived health status is able to affect one's decision to use preventive medical care (13,34). In particular, individuals who perceive their own health as poor are found to be more likely to use preventive medical care than their counterparts with self-perceived better health conditions. Hence, in the current model, a respondent's self-perceived health status is taken into account as 1 if his/her health is rated as poor, while 0 if rated as fair or excellent.

Statistical analysis

The statistical analysis was performed using Stata version 9.0 (39). Data from a total of 398 respondents were analysed. We used mean (SD) and frequency (percentage) to describe the

numerical and categorical variables in our study respectively. To examine the odds ratio of using preventive medical care, the dependent variable of the present study was measured as a binary outcome. Coding of 1 was given if consumers had used preventive medical care in the past 12 months and 0 otherwise. The simple binary logistic regression was performed to obtain the crude odds ratio and its 95% confidence interval (40). The statistical test was deemed significant if the P values were below 5% at a 2-sided level.

Results

Distribution of factors between those who had and had not used the preventive medical care is presented in Table 1. Of the total 398 respondents, a total of 207 (52%) reported using preventive medical care in the past 12 months, while 191 (48%) did not. The average age of the respondents is about 36 years old. In terms of ethnic groups, 38% of the respondents were Malays, 41% were Chinese and 21% were Indians/others. The males made up almost half (44%) of the total respondents. This sample distribution of the respondents by ethnicity and gender corresponded quite closely to the population composition of Penang which consisted of 42% Malays, 41% Chinese and 18% Indian/others, and 49% males (28).

Almost half (50%) of the overall respondents were married, while among those who used preventive medical care, the majority (61%) were married. Around 21% in the sample were rural dwellers. Likewise, among those who used preventive medical care, only the minority (19%) were from rural areas. Approximately, 65% of the total respondents had medical insurance, and there existed a higher proportion (64%) of medical insurance holders among the preventive medical care users. About half (50%) of the overall respondents had a history of serious family illnesses. While, among those who used preventive medical care, the majority (60%) had a history of serious family illnesses. In terms of academic qualifications, 5% of the respondents had only primary education, 30% had secondary education and 65% had at least tertiary education.

In terms of income, 32% of the respondents were from the low-income category, 45% and 19% were from lower-middle and upper-middle income category, respectively, and only 4% fell within the high-income category. Meanwhile, the lower-middle income cohort stood as the biggest proportion (42%) among those who used preventive medical care. The high-income

Table 1: Distribution of factors between those who have and have not used the preventive medical care

Variables	N (percentage) or mean (standard deviation)		
	Those who used preventive medical care (n = 207)	Those who did not use preventive medical care (n = 191)	Total sample (n = 398)
Age	40.04 (14.71)	32.79 (11.13)	36.56 (13.60)
Ethnicity			
Malay	59 (28%)	92 (48%)	151 (38%)
Chinese	99 (48%)	64 (34%)	163 (41%)
Indian/others	49 (24%)	35 (18%)	84 (21%)
Gender			
Male	90 (43%)	86 (45%)	176 (44%)
Female	117 (57%)	105 (55%)	222 (56%)
Marital status			
Married	127 (61%)	71 (37%)	198 (50%)
Unmarried	80 (39%)	120 (63%)	200 (50%)
Medical insurance			
Yes	132 (64%)	128 (67%)	260 (65%)
No	75 (36%)	63 (33%)	138 (35%)
Residential area			
Rural	39 (19%)	45 (24%)	84 (21%)
Urban	168 (81%)	146 (76%)	314 (79%)
History of serious family illness			
Yes	125 (60%)	76 (40%)	201 (50%)
No	82 (40%)	115 (60%)	197 (50%)
Education			
Primary	11 (5%)	8 (4%)	19 (5%)
Secondary	67 (33%)	54 (28%)	121 (30%)
Tertiary	129 (62%)	129 (68%)	258 (65%)
Income			
RM 0 – RM 999	66 (32%)	62 (32%)	128 (32%)
RM 1000 – RM 2999	88 (42%)	91 (48%)	179 (45%)
RM 3000 – RM 5999	37 (18%)	37 (19%)	74 (19%)
≥ RM 6000	16 (8%)	1 (1%)	17 (4%)
Physical activity participation			
Active	50 (24%)	34 (18%)	84 (21%)
Inactive	157 (76%)	157 (82%)	314 (79%)
Self-perceived health			
Poor	17 (8%)	3 (2%)	20 (5%)
Fair/excellent	190 (92%)	188 (98%)	378 (95%)

Note: For continuous variable, the value refers to mean (SD), whereas for categorical variables, the value refers to n (%).

earners were the least cohort (8%) among those who used preventive medical care. Overall, those who were physically active comprised about 21% of the total sample. Similarly, among those who used preventive medical care, only the minority

(24%) were physically active. Furthermore, only a small number of respondents (5%) perceived their health as poor, and there also existed a small proportion (8%) of preventive medical care users who self-perceived their health as poor.

Table 2: Factors related to the use of preventive medical care

Variables	Crude odds ratio (95% confidence interval)	P value
Age	1.02 (1.00, 1.05)	0.081
Ethnicity		
Malay	0.55 (0.30, 1.01)	0.053
Chinese	1.13 (0.61, 2.09)	0.706
Indian/others	1.00	–
Gender		
Male	0.73 (0.46, 1.16)	0.187
Female	1.00	–
Marital status		
Married	1.94 (1.13, 3.32)	0.017
Unmarried	1.00	–
Medical insurance		
Yes	0.99 (0.58, 1.68)	0.971
No	1.00	–
Residential area		
Rural	1.14 (0.65, 1.97)	0.652
Urban	1.00	–
History of serious family illness		
Yes	2.14 (1.37, 3.36)	0.001
No	1.00	–
Education		
Primary	0.23 (0.06, 0.95)	0.042
Secondary	0.83 (0.46, 1.53)	0.562
Tertiary	1.00	–
Income		
RM 0 – RM 999	0.92 (0.53, 1.58)	0.752
RM 1000 – RM 2999	1.00	–
RM 3000 – RM 5999	0.69 (0.36, 1.30)	0.250
≥ RM 6000	8.71 (1.03, 73.59)	0.047
Physical activity participation		
Active	1.28 (0.71, 2.31)	0.412
Inactive	1.00	–
Self-perceived health		
Poor	4.78 (1.09, 21.00)	0.038
Fair/excellent	1.00	–

Factors relating to the use of preventive medical care are illustrated in Table 2. The results revealed that among all the variables, marital status, history of serious family illnesses, education, income and self-perceived health status were statistically significant and most probably related to using preventive medical care.

The results showed that being married was associated with the higher odds of using preventive medical care as compared to those unmarried (OR: 1.94). In terms of hereditary factor, the odds of using preventive medical care among those who had serious family illnesses were greater compared to those without such family background (OR: 2.14). In reference to the level of education variable, individuals who had primary education had lower odds of using preventive medical care than their counterparts having tertiary education (OR: 0.23). There were no significant differences in the odds of using preventive medical care between individuals having secondary and tertiary education. Results indicated that the odds of using preventive medical care among the high-income individuals were higher than the lower-middle income individuals (OR: 8.71). However, other income groups such as the low and upper-middle were found to have no statistically significant effects on the use of preventive medical care. Lastly, individuals who perceived their own health as poor were observed to have higher odds of using preventive medical care than their counterparts whose health are perceived as fair or excellent (OR: 4.78).

Discussion

Contrary to the arguments of Larison and Swint (16) and Hsieh and Lin (33), no significant differences were found between males and females in using preventive medical care. On one hand, the significant effect of marital status was consistent with the findings of Tian et al. (13) and Deb (34). It was because the individuals' quality of life could be directly affected if their spouse was suffering from diseases. In other words, married individuals may provide lesser social and economic supports to their spouse if they were sick. Meanwhile, married individuals did also carry more responsibilities to look after their family. As a result, married individuals were more aware of their own health than the unmarried.

The result showed that there was no significant relationship between medical insurance and the likelihood of using preventive medical care, thus suggesting that the problem of moral hazard did not exist in the case of the

present study. On the other hand, in contrast to the prior arguments of Zhang et al. (17), no significant impact of residential areas was found. This may be due to the rapid development of rural areas, whereby, the medical centres had been extensively improved upon for supplying more medical services to the residents.

Conforming to the prior anticipation, individuals with a history of serious family illnesses were observed to have a higher propensity to use preventive medical care as compared to those who did not. The explanation was that individuals who had a history of serious family illnesses tended to be more aware of the consequences of ill health, given their greater probabilities to suffer from hereditary illnesses. Hence, such phenomenon in turn increased their tendency to use preventive medical care for early detection of those preventable illnesses.

As revealed in the current findings, tertiary educated individuals were more likely to use preventive medical care than their primary educated counterparts. Two plausible reasons might explain such observed outcomes. Firstly, tertiary educated individuals tended to have greater health awareness and knowledge about the potential benefits of preventive medical care, and consequently were more inclined to use the services (14). Secondly, tertiary educated individuals may value their future greater than those with primary education. In terms of policy implication, public health authorities could think of organising more health awareness programs or campaigns to advertise the importance of staying healthy and the potential health benefits of using preventive medical care. Meanwhile, to further enhance the effectiveness of such health awareness programs, it is suggested to be held based on a multi-lingual format (e.g. Bahasa Malaysia, English, Chinese, Tamil) in order to provide better understanding to the different races.

It was worthwhile to note that only the high income variable was significantly positively associated with the likelihood of using preventive medical care. This may be due to the benefits for the high-income individuals to use preventive medical care were greater than the lower-middle income individuals, given their higher returns (higher wages) on health capital investment (16). The fact of the matter was that, when high-income individuals are healthier in the future, they could have more healthy time for income-earning activities. Furthermore, preventive medical care did also pose as a normal good in the market, whereby those high-income individuals may face

lesser budget constraints in using the services than the lower middle-income earners. Based on these findings, public health administrators should encourage the involvement of third parties such as non-government organizations (NGO) and other charity bodies to provide preventive medical care services to the society on a free-of-charge (FOC) basis. These include the basic medical examination such as blood pressure test, blood sugar test and cholesterol test. Alternatively, co-payments from the employers and private medical insurers can be considered to be implemented to cover certain amounts of the cost of utilizing the preventive medical care services, so that those lower income earners would find it more affordable to obtain the services.

With regard to the lifestyle variable, the relationship between physical activity participation and the likelihood of using preventive medical care was found not significant in the present study. Such outcome appeared not to collaborate with the findings of Tian et al. (13) and Lin (32), and thus concluding that having a healthy lifestyle may not necessarily lead to using preventive medical care.

Lastly, the observed positive relationship between self-rated poor health and the propensity to use preventive medical care has led to suggest that individuals who were in weak health were more health-conscious as compared to those who were healthy. In essence, these evidences were in agreement with the findings of Tian et al. (13) and Deb (34), whereby, individuals who were healthy were prone to take their health for granted, and thus ignoring the importance of preventive medical care. It is, therefore, suggested that the public health policy should aim at highlighting the importance of preventive medical care to the community with particular attention on the healthy individuals. This is in light of the evidence that they are more inclined to ignore the benefits of preventive medical care. More detailed information about the risk of chronic diseases that could happen in healthy adults should be revealed to the public through the mass media (e.g. newspaper, radio, television, magazine). Particularly, the fact that chronic diseases do not discriminate healthy individuals has to be better understood.

Given the budget and time constraints, several inherent limitations of the current study are documented. First, the size of the sample used in the current study is somewhat limited and is collected based on non-probability sampling, and thus cannot represent the country as a

whole. Second, detailed investigations of the use of different types of preventions (i.e. primary, secondary and tertiary prevention) are not included in the study. In summary, suggested future research should extend the study by having the data collected from various regions in Malaysia, as well as broaden the scope of study to include the examinations of various types of preventive medical cares.

Conclusion

Findings of the current study illustrate that there are about 52% of preventive medical care users in the sample. Marital status, history of family illnesses, income, self-perceived health, gender and education are all found to affect the likelihood of using preventive medical care. As such, it can be concluded that certain socio-demographics and health factors have an important relationship with the use of preventive medical care.

Based on the current findings, though exploratory, several policy implications are discussed. First, government interventions should focus on organising more health awareness programmes to the lower educated segments of the populations given that they lack health knowledge. Second, the government should provide more financial support to the poor. Third, the government is suggested to promote the importance of using preventive medical care to the healthy individuals who often take their health for granted.

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References

1. Strauss J, Thomas D. Health, nutrition, and economic development. *J Econ Lit.* 1998;**36(2)**:766–817.
2. Bloom DE, Canning D, Sevilla J. The effect of health on economic growth: A production function approach. *World Devel.* 2004;**32(1)**:1–13.
3. Weil DN. Accounting for the effect of health on economic growth. *Quart J Econ.* 2007;**122(3)**:1265–1306.
4. Roemer MI. *National Health Systems of the World.* New York: Oxford University Press; 1991.
5. Institute for Public Health (IPH). *The third national health and morbidity survey (NHMS III) 2006, health expenditure.* Malaysia: Ministry of Health; 2008.
6. Barraclough S. Constraints on the retreat from a welfare-oriented approach to public health care in Malaysia. *Health Pol.* 1999;**47(1)**:53–67.
7. Ministry of Health Malaysia. *Malaysia burden of disease and injury study.* Malaysia: Ministry of Health; 2004.
8. Institute for Public Health (IPH). *The third national health and morbidity survey (NHMS III) 2006, diabetes mellitus.* Ministry of Health, Malaysia; 2008.
9. Institute for Public Health (IPH). *The third national health and morbidity survey (NHMS III) 2006, hypertension and hypercholesterolemia.* Ministry of Health, Malaysia; 2008.
10. World Health Organization (WHO). *The impact of chronic disease in Malaysia* [Internet]. World Health Organization; 2010 [cited 2010 September 22]. Available from: http://www.who.int/chp/chronic_disease_report/media/impact/malaysia.pdf
11. Sindelar JL. Differential use of medical care by sex. *J Polit Economy.* 1982;**90(5)**:1003–1019.
12. Burton LC, Steinwachs DM, German PS, Shapiro S, Brant LJ, Richards TM, Clark RD. Preventive services for the elderly: would coverage affect utilization and costs under Medicare? *Am J Public Health.* 1995;**85(3)**:387–391.
13. Tian WH, Chen CS, Liu TC. The demand for preventive care services and its relationship with inpatient services. *Health Pol.* 2010;**94(2)**:164–174.
14. Kenkel DS. The demand for preventive medical care. *Appl Econ.* 1994;**26(4)**:313–325.
15. Newhouse JP, Friedlander LJ. The relationship between medical resources and measures of health: some additional evidence. *J Human Res.* 1980;**15(2)**:200–218.
16. Larison DR, Swint M. A multivariate analysis of the likelihood and volume of preventive visit demand in a prepaid group practice. *Med Care.* 1978;**16(9)**:730–739.
17. Zhang P, Tao G, Irwin KL. Utilization of preventive medical services in the United States: A comparison between rural and urban populations. *J Rural Health.* 2000;**16(4)**:349–356.
18. Abraido-Lanza AF, Chao MT, Gammon MD. Breast and cervical cancer screening among Latinas and Non-Latina Whites. *Am J Public Health.* 2004;**94(8)**:1393–1398.
19. Halliday T, Taira DA, Davis J, Chan H. Socioeconomic disparities in breast cancer screening in Hawaii. *Prev Chronic Dis.* 2007;**4(4)**:1–9.
20. Tan, MY. The relationship of health beliefs and complication prevention behaviors of Chinese individuals with Type 2 Diabetes Mellitus. *Diabetes Res Clin Pract.* 2004;**66(1)**:71–77.
21. Dunn RA, Tan AKG. Cervical cancer screening in Malaysia: Are targeted interventions necessary? *Soc Sci Med.* 2010;**71(6)**:1089–1093.
22. Callahan D. The WHO definition of ‘health’. *Hastings Cent Stud.* 1973;**1(3)**:77–87.
23. Grossman M. On the concept of health capital and the demand for health. *J Polit Economy.* 1972;**80(2)**:223–255.
24. Cropper ML. Health, investment in health, and occupational choice. *J Polit Economy.* 1977;**85(6)**:1273–1294.
25. Ehrlich I, Becker G. Market insurance, self-insurance, and self-protection. *J Polit Economy.* 1972;**80(4)**:623–649.
26. Russell LB. *Is prevention better than cure?* Washington, DC: The Brooking Institution; 1986.
27. Phelps CE. Illness prevention and medical insurance. *J Human Res.* 1978;**13(2)**:183–207.
28. SERI (Socioeconomic & Environmental Research Institute). *Penang statistic.* [Internet]. Socioeconomic & Environmental Research Institute; 2010 [cited 2010 October 21]. Available from: www.seri.com.my.
29. Ministry of Health Malaysia. *Malaysia NCD Surveillance-1 2005/2006: NCD risk factors in Malaysia.* Malaysia: Disease Control Division, Ministry of Health; 2006.
30. Lairson DR, Chan W, Newmark GR. Determinants of the demand for breast cancer screening among women veterans in the United States. *Soc Sci Med.* 2005;**61(7)**:1608–1617.
31. Belkar R, Fiebig DG, Haas M, Viney R. Why worry about awareness in choice problems? Econometric analysis of screening for cervical cancer. *Health Econ.* 2006;**15(1)**:33–47.
32. Lin SJ. Factors influencing the uptake of screening services for breast and cervical cancer in Taiwan. *J R Soc Promot Health.* 2008;**128(6)**:327–334.

33. Hsieh CR, Lin SJ. Health information and the demand for preventive care among the elderly in Taiwan. *J Human Res.* 1997;**32(2)**:308–333.
34. Deb P. A discrete random effects probit model with application to the demand for preventive care. *Health Econ.* 2001;**10(5)**:371–383.
35. Sindelar JL. Differential use of medical care by sex. *J Polit Economy.* 1982;**90(5)**:1003-1019.
36. Pauly M. Taxation, health insurance and market failure. *J Econ Lit.* 1986;**24(2)**:629–675.
37. Hicks LL. Availability and accessibility of rural health care. *J Rural Health.* 1990;**6(4)**:485–506.
38. Kaplan MS, Newsom JT, McFarland BH, Lu L. Demographic and psychosocial correlates of physical activity in late life. *Am J Prev Med.* 2001;**21(4)**: 306–312.
39. StataCorp. *Stata statistical software.* Release 9.2. Texas: Stata Corporation; 2005.
40. Greene WH. *Econometric analysis.* 6th ed. New York (NY): Prentice Hall; 2007.