

An Exploratory Study on Self-rated Health Status: The Case of Penang, Malaysia

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Abstract: This study examines the impact of socio-demographic and lifestyle-behavioural factors on self-rated health status. Using data from a primary survey in Penang, Malaysia of 398 observations, ordered probit model was applied to estimate the probabilities of individuals to rate their own health as poor, fair or excellent. Results suggest that high income individuals, residents in rural areas and those taking part in physical activity frequently are 42.6, 12.3 and 29.2 per cent more likely to rate their own health as excellent, respectively. On the other hand, older individuals are 0.6 per cent more likely to rate their own health as poor and 6.8 per cent more likely to rate their own health as fair. Similarly, those suffering from chronic diseases are 11.3 per cent more likely to self-rate their health as poor and 22.6 per cent more likely to self-rate their health as fair. Based on these outcomes, several policy implications are suggested *vis-à-vis* how individuals view their own health.

Keywords: Demography, Malaysia, ordered probit, Penang, self-rated health
JEL classification: I10

1. Introduction

Various types of health measurements have been established in the health literature. These include health utilities index, limiting longstanding illness and mortality rates (Kivimaki *et al.* 2003). However, it is claimed that these health measurements are too technical for the lay person and can only be assessed by certain trained professionals in the medical field. As a result, they are not commonly utilised in broad-based population surveys. Owing to such measurement difficulties, 'self-rated health' is proposed as a complementary measure.

In general, self-rated health is defined as how individuals perceive their own health condition. As emphasised by Lundberg and Manderbacka (1996) and Cousins (1997), self-rated health itself has relatively high reliability in measuring health and could be the most preferable method compared to other health measurements. Furthermore, Thorslund and Norstrom (1993) concluded that individuals are often able to summarise and report their health condition accurately. Previous empirical studies have also found that self-rated health can accurately predict chronic diseases incidence (Møller *et al.* 1996; Ferraro *et al.* 1997; Shadbolt 1997), recovery from illness (Wilcox *et al.* 1996), functional decline (Idler and Kasl 1995), use of medical services (Weinberger *et al.* 1986; Miilunpalo *et al.* 1997), morbidity (Branch and Ku, 1989) and mortality (Kaplan *et al.* 1988; Pijlis *et al.* 1993; Yu *et al.* 1998;

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Greiner *et al.* 1999). More importantly, Lundberg and Manderbacka (1996) state that self-rated health measurement is very easy to use and inexpensive.

One of the important objectives of developing countries like Malaysia is to promote a healthy society given that human capital is an important component of a country's development. However, this goal is not likely to be achieved without having effective health policies. In Malaysia, the prevalence of hypertension has increased from 14.4 per cent in 1986 to 32.2 per cent in 2006 (Institute for Public Health 2008c). Likewise, the prevalence of diabetes has increased from 6.3 per cent in 1986 to 11.5 per cent in 2006 (Institute for Public Health 2008b). Moreover, almost three-quarters (71%) of mortalities in Malaysia are related to chronic diseases (World Health Organization 2010). A study by Boles *et al.* (2004) has found that individuals with diabetes tend to have greater amount of time missed from productive work (i.e. absenteeism). Meanwhile, Burton *et al.* (2005), who explored the relationship between health risks and job productivity, also observed that individuals with more health risk factors like hypertension and hypercholesterolemia are more likely to have serious work limitations such as unproductive time while working (i.e. presenteeism).

To date, studies on the determinants of self-rated health have been widely considered in the context of Western countries (e.g. Cott *et al.* 1999; Denton and Walters 1999; Kawachi *et al.* 1999; Shields and Shooshtari 2001; Balabanova and McKee 2002; Lahelma *et al.* 2004; Subramanian *et al.* 2005), whereas little research attention has been devoted to examining this topic from the perspective of Asian developing regions. To the best of our knowledge, there appears to be only two studies on this topic in Malaysia (Ng *et al.* 2010; Haron *et al.* 2010). However, the studies only focus on exploring the socio-demographic determinants of self-rated health among the elderly. As such, findings of the studies may be too limited and not very useful for policy implications. Therefore, to improve the existing knowledge on determinants of self-rated health in Malaysia, more in-depth studies are required.

The present study attempts to fill this research void in three ways. First, the study focuses on various age groups of individuals rather than just the elderly. Second, besides socio-demographic variables, this study also looks at several lifestyle-behavioural variables such as physical exercise, smoking and drinking. Third, a rigorous micro-econometric manner (ordered probit model) is utilised to examine the probability of individuals rating their own health status as excellent, fair or poor. The main objective of the present study is to examine the socio-demographic and lifestyle-behavioural determinants of self-rated health in Malaysia.

2. Theoretical Basis

Several studies have consistently found that both health-seeking and lifestyle-behaviour are able to reduce the prevalence of chronic diseases (Paulik *et al.* 2010). In particular, individuals who participate in physical activity regularly are 20–30 per cent less likely to suffer from diabetes, stroke, cancer, obesity and cardiovascular diseases (Cheah 2011; World Health Organization 2011). Steinmetz and Potter (1996), Ness and Powles (1997) and Satia *et al.* (2005) suggested that a diet consisting of high amounts of fruits/vegetables and low amounts of fatty foods could significantly reduce the risk of chronic diseases. Sickles and Yazbeck (1998) found that a 10 per cent increase in the level of consumption of health-related goods and services may lead to approximately 0.3 per cent improvement in health.

Besides, Tian *et al.* (2010) claimed that use of preventive medical care services is able to lower the prevalence of hospital admission. There is also evidence suggesting that urbanites, who have better access to health care services, are less likely to be diagnosed with chronic conditions than the rural dwellers (Zhang *et al.* 2000).

From an economic point of view, health is defined as capital stock that can produce healthy time as output (Grossman 1972). The level of stock of health varies with each individual, and depends very much on an individual's genetics, lifestyle and environmental factors. Grossman (1972) emphasised that as individuals grow older, their stock of health will depreciate at an increasing rate due to the biological process of aging. Likewise, when individuals engage in an unhealthy lifestyle such as smoking and drinking, their stock of health will also depreciate rapidly. Worst of all, death would occur if the individual's health capital falls below the critical level. For these reasons, to reduce the depreciation of health capital, individuals need to invest in their health via various inputs such as medical care, diet, exercise and shelter (Grossman, 1972).

However, the assumption of complete certainty in health capital by Grossman (1972) is somehow unrealistic. Cropper (1977) argued that individuals often do not have perfect information about their own health. Therefore, they may need to consume preventive medical care services such as blood test and health screening in order to know more about their own health condition prior to making any health investments.

According to Grossman (1972), there exist two reasons to demand health. First, health can directly increase an individual's utility, as presence of illnesses could adversely affect the quality of life. Second, health can determine the amount of time that individuals will have for their future market and non-market activities such as working, home production, leisure and recreation. Grossman (1972) defined the former as 'consumption benefits of health', while the latter as 'investment benefits of health'.

Grossman (1972) pointed out that income is positively associated with the demand for health, which means individuals who earn a higher income would tend to demand more health as compared to the lower income individuals because they have a higher preference for a healthy time. On the other hand, it is claimed that higher educated individuals have a higher tendency to demand more health but less medical care than their lower educated counterparts. It is because they are more efficient at using medical care and other health promotion methods. In other words, they have a higher marginal product of the inputs for health capital (Grossman, 1972).

Muurinen (1982), who undertook a study on the criticisms of Grossman's model, argued that every individual possesses three different types of capital, namely health capital (health of physical body), human capital (skills and knowledge) and financial capital (wealth). To a certain extent, these types of capital are substitutable in performing occupational work. Therefore, higher educated individuals (high human capital), who often work in less physically demanding jobs (rely less on health capital), would tend to demand less health as compared to their lower educated counterparts.

3. Literature Review

A survey of literature shows that an individual's socio-demographic characteristics (age, gender, marital status, income, education level, ethnicity, employment status, presence of chronic diseases, house locality) and lifestyle (smoking, drinking, exercising) have significant

effects on self-rated health (Cott *et al.* 1999; Kawachi *et al.* 1999; Denton and Walters 1999; Shields and Shooshtari 2001; Franks *et al.* 2003; Subramanian *et al.* 2005).

As pointed out by Bobak *et al.* (1998), Denton and Walters (1999), Rose (2000), Lantz *et al.* (2001), Gilmore *et al.* (2002), Franks *et al.* (2003), Melchior *et al.* (2003) and Denton *et al.* (2004), older people were more likely to report poorer health compared to the younger cohorts. Case and Deaton (2005) used a 5-point scale of self-reported health status (1 = excellent; 5 = poor) to measure the changes of individual's health across age and had found that the mean of self-reported health index for men rose from 1.75 at the age of 20 to 2.5 at 60. As for women, the index increased from 2 to 2.5. This was due to the notion that older people such as retirees and women who reached menopause may have a pessimistic view of their own health (Shields and Shooshtari 2001).

In terms of gender, studies state that females tend to have lesser material resources compared to the males. Hence, they were more inclined to have a higher likelihood of reporting poorer health (Bobak *et al.* 1998; Cott *et al.* 1999; Franks *et al.* 2003; Denton *et al.* 2004; Molarius *et al.* 2006). The positive relationship between income and self-rating better health status has been well established (Cott *et al.* 1999; Denton and Walters 1999; Kawachi *et al.* 1999; Shields and Shooshtari 2001; Balabanova and McKee 2002; Lahelma *et al.* 2004; Subramanian *et al.* 2005). This was because wealthy individuals were more able to obtain the material resources that had a positive impact on their health such as shelter, food and health care.

High educated individuals were observed to be more likely to report better health than their lower educated counterparts. Perhaps, this was because they have better health knowledge and awareness (Cott *et al.* 1999; Denton and Walters 1999; Kawachi *et al.* 1999; Shields and Shooshtari 2001; Balabanova and McKee 2002; Lahelma *et al.* 2004; Subramanian *et al.* 2005). Bobak *et al.* (1998), Cott *et al.* (1999) and Subramanian *et al.* (2005) found that married individuals had a higher likelihood of reporting better health than the unmarried cohorts.

Previous studies had consistently found a significant relationship between self-rated health and an unhealthy lifestyle (overweight, physically inactive, drinking and smoking) (Cott *et al.* 1999; Denton and Walters, 1999; Johansson and Sundquist, 1999; Shields and Shooshtari, 2001). Particularly, unhealthy lifestyles were found to have an adverse impact on self-rated health. In terms of health factor, Shields and Shooshtari (2001) suggest that individuals with two or more chronic diseases had 50 – 60 per cent lower likelihood of reporting their health as excellent compared to their healthy counterparts.

Molarius *et al.* (2006) showed that the likelihood of reporting poorer health among the unemployed was higher than the employed. In essence, economic hardship could be the cause factor for this relationship. Moreover, individuals who resided in rural areas were found to have a higher tendency to report poorer health than the urbanites (Gilmore *et al.* 2002). As reasoned by Edelman and Menz (1996), rural dwellers tend to face more constraints in accessing health care services. In terms of ethnicity, Kawachi *et al.* (1999), Franks *et al.* (2003) and Subramanian *et al.* (2005) found that ethnic minorities (black) had a lower probability to report better health than the ethnic majorities (white).

4. Methods

4.1 Econometric Specification

Following closely the methodology from the study by Tan *et al.* (2012), the dependent variable of this study, self-rated health, is categorical and ordinal with a clear ordering. Hence, use of ordered probability model is appropriate as it can explain the variations on such self-rated health status (McKelvey and Zavoina 1975; McCullagh 1980; Wooldridge 2002):

$$\begin{aligned} \text{Self-rated health} &= \text{poor, if } -\infty < x\beta + u \leq 0 \\ &= \text{fair, if } 0 < x\beta + u \leq \mu_1 \\ &= \text{excellent, if } \mu_1 < x\beta + u \leq \mu_2 \end{aligned} \quad (1)$$

where x is a vector of explanatory variables, β is a vector of parameters, u is a random error term and the μ 's are threshold parameters delineating the self-rated health status. The probability of each category can be derived from (1). For instance, the probability of rating health as excellent is:

$$\Pr(\text{excellent}) = F(\mu_2 - \chi\beta) - F(\mu_1 - \chi\beta) \quad (2)$$

where $F(\cdot)$ is a cumulative distribution function (cdf). The probabilities of other self-rated health status are similar, with the use of proper threshold parameters. To complete the econometric specification, a distributional assumption of the error term is needed. If the error term is assumed to be distributed as the standard normal distribution, the probability $F(\cdot)$ is the standard normal cdf, such model is known as the ordered probit model.

4.2 Data

Data used in present study was collected based on convenient sampling method. Nevertheless, efforts were made to stratify the sample according to the ethnic and gender composition of the Penang population. The survey, from August to October, 2010, was conducted in various places in Penang (Malaysia) such as shopping malls, offices, cafes and residential areas. Prepared bi-lingual (Bahasa Malaysia and English) questionnaires were distributed to the respondents of different races aged 21 years and above. The reason for choosing Penang is mainly because Penang is reported as one of the states in Peninsular Malaysia that has very high prevalence of diabetes (8.8%) and alcohol consumption (9.6%) (Institute for Public Health 2008a; b). Hence, it would be interesting for the policy makers to obtain a clearer picture on Penangites' health status. In the survey, respondents were asked "In general, how would you describe your health status?" The choices provided were 'Excellent', 'Fair' and 'Poor'. Besides, the respondents were also canvassed on their socio-demographic and lifestyle profiles. From a total of 415 responses initially collected, 398 were retained in the final analysis (total response rate of 95.9%) after rejecting those with incomplete information.

4.3 Explanatory Variables

Definition of the variables is shown in Table 1. Respondent's age is included as a continuous variable in the current model. Respondent's gender is represented by 1 if male and 0 if

female. Ethnicity is categorised into Malay, Chinese and Indian/others. Respondent's marital status is denoted by 1 if married and 0 if single/divorcé/widow(er). Respondent's employment status is entered as 1 if employed and 0 if unemployed (i.e. not working, student, homemaker and retiree).

Table 1. Definition of variables

Variables	Definition of variables
Age	Respondent's age in years
Gender	
Male	Respondent is male
Female*	Respondent is female
Ethnicity	
Malay	Respondent is Malay
Chinese	Respondent is Chinese
Indian/others*	Respondent is Indian/other
Marital status	
Married	Respondent is married
Single/divorcé/widow(er)*	Respondent is single/divorcé/widow(er)
Employment status	
Employed	Respondent is employed
Unemployed*	Respondent is unemployed
Income	
Low*	Monthly individual income is RM0 - RM999
Lower-middle	Monthly individual income is RM1000 - RM2999
Upper-middle	Monthly individual income is RM3000 - RM5999
High	Monthly individual income is \geq RM6000
Education	
Primary*	Respondent has primary education
Secondary	Respondent has secondary education
Tertiary	Respondent has tertiary education
Location of residence	
Rural	Respondent lives in rural areas
Urban*	Respondent lives in urban areas
Chronic disease	
Yes	Respondent has chronic diseases
No*	Respondent does not have chronic diseases
Smoking status	
Smoker	Respondent is a smoker
Non-smoker*	Respondent is a non-smoker
Drinking status	
Drinker	Respondent is a alcohol drinker
Non-drinker*	Respondent is a non-alcohol drinker
Physical activity	
Regular	\geq 12 times of physical activity participation per month
Infrequent	4-11 times of physical activity participation per month
Inactive*	<4 times of physical activity participation per month

Note: * Refers to reference category

Monthly individual income was divided into four income brackets: low [RM0–999 (USD0–322.26)], lower-middle [RM1000–2999 (USD322.58–967.42)], upper-middle [RM3000–5999 (USD967.74–1935.16)] and high [\geq RM6000 (\geq USD1935.48)].¹ The respondent's highest academic qualification was categorised into those with primary, secondary and tertiary education.

Location of residence was categorised as 1 for rural (e.g. Balik Pulau, Batu Kawan and Bertam) and 0 for urban areas. The presence of chronic diseases was detected by asking the respondent if he/she had been informed by a medical doctor or health professional that he/she had any long-lasting diseases (e.g. hypertension, diabetes, stroke, cancer, kidney disease, etc.). In terms of smoking status, smoker was represented by 1 while non-smoker by 0. Similarly, a respondent who drinks alcohol was coded as 1 whereas a non-alcohol drinker was coded as 0.

Physical activity participation was classified based on the frequency of leisure-time exercises that lasted at least more than 15 minutes per session. In this case, respondents who participated in physical activity more than 11 times a month were categorised as regular, while those who participated between 4 to 11 times and 3 times or less were considered as infrequent and inactive, respectively. Further details about this physical activity measurement are described elsewhere (Kaplan *et al.* 2001; Shields and Shoostari 2001).

5. Results and Discussion

5.1 Characteristics of Survey Respondents

Descriptive analysis of variables in the statistical model is presented in Table 2. Of the total 398 respondents, 143 (36%) rated their own health as excellent, 235 (59%) rated as fair and only 20 (5%) rated as poor. The average age of the respondents was around 37 years. In terms of gender, 44 per cent of the total sample were males and 56 per cent were females. Meanwhile, the ethnic breakdown consisted of 38 per cent Malays, 41 per cent Chinese and 21 per cent Indians and those of other ethnic background.² These ethnic and gender structures closely reflect the scenario in Penang given that the population of the state consists of 41.6 per cent Malays, 40.9 per cent Chinese and 17.5 per cent Indian/other ethnicity, along with 49.3 per cent males and 50.7 per cent females (SERI 2010).

About 50 per cent of the respondents were married and 78 per cent were employed fulltime. Based on the breakdown of income groups, 32 per cent of the respondents were in the low income category, 50 per cent in lower-middle, 19 per cent in upper-middle and only 4 per cent in the high income category. The total sample comprised of 5 per cent who stated primary education as their highest level of education obtained, and 30 per cent had at least secondary education, while 65 per cent had tertiary education. Around 21 and 79 per cent of the respondents resided in rural and urban areas, respectively. About 18 per cent of the entire sample reported having chronic diseases. In terms of lifestyle variables, 15 and 32 per cent of the entire sample were smokers and drinkers, respectively. Approximately 21 per cent of the overall respondents participated in physical activity regularly, whereas 34 and 45 per cent fell into the infrequent and inactive physical activity categories, respectively.

¹ USD 1.00 = RM 3.10 (approximately as of 24 September 2010).

² Ethnic Indians and those of other ethnicities are combined to represent the ethnic minority in Malaysia, given their minority status in Malaysia.

Table 2. Percentage distribution of self-rated health status by variables in the statistical model

Variables	Percentage or mean*			
	Excellent (n ₁ = 143)	Fair (n ₂ = 235)	Poor (n ₃ = 20)	Total (n = 398)
Age	34.15 [11.92]	35.83 [12.06]	62.3 [16.12]	36.56 [13.59]
Gender				
Male	39	55	6	44
Female	33	63	4	56
Ethnicity				
Malay	38	60	2	38
Chinese	33	60	7	41
Indian/others	38	56	6	21
Marital status				
Married	34	60	6	50
Single/divorcé/widow(er)	37	59	4	50
Employment status				
Employed	36	61	3	78
Unemployed	36	51	13	22
Income				
Low	35	55	10	32
Lower-middle	30	68	2	50
Upper-middle	47	50	3	19
High	59	41	0	4
Education				
Primary	5	47	48	5
Secondary	32	62	6	30
Tertiary	40	58	2	65
Location of residence				
Rural	44	54	2	21
Urban	34	61	5	79
Chronic disease				
Yes	9	66	25	18
No	42	57	1	82
Smoking status				
Smoker	36	59	5	15
Non-smoker	36	59	5	85
Drinking status				
Drinker	44	53	3	32
Non-drinker	32	62	6	68
Physical activity				
Regular	46	50	4	21
Infrequent	39	59	2	34
Inactive	28	63	9	45

Note: * For age, the entries refer to mean [standard deviation]. For other variables, the entries refer to percentage.

On average, those aged 35 or less rated their health as fair or excellent. A larger proportion of the male respondents (39%) rated their health as excellent as compared to female respondents (33%). About 38 per cent of Malays and Indians/others, respectively, rated their health as excellent compared to only 33 per cent Chinese. As compared to the married respondents (34%), a higher percentage of unmarried respondents (37%) rated their health as excellent. An equal percentage of employed (36%) and unemployed (36%) respondents rated their health as excellent. A larger proportion of high income respondents (59%) rated their health as excellent as compared to the upper-middle (47%), low (35%) and lower-middle income (30%) respondents.

Around 40 per cent of the tertiary educated respondents rated their health as excellent compared to only 32 per cent secondary and 5 per cent primary educated respondents. As compared to the urban dwellers (34%), a higher percentage of rural dwellers (44%) rated their health as excellent. Approximately 42 per cent of the respondents who did not have chronic diseases rated their health as excellent compared to only 9 per cent of those with chronic diseases. The percentage of excellent health rating is equal between smokers (36%) and non-smokers (36%). A larger proportion of drinkers (44%) rated their health as excellent compared to the non-drinkers (32%). About 46 per cent of the respondents who participated in physical activity regularly rated their health as excellent compared to 39 per cent of those who participated in physical activity infrequently and 28 per cent of inactive respondents.

5.2 Marginal Effects of Explanatory Variables

The marginal effects of explanatory variables on self-rated health are demonstrated in Table 3. The results show that age is statistically significant in affecting the probability of self-rated health as an additional ten years of age increases the probability of rating ones' health to be poor by 0.6 per cent and fair by 6.8 per cent. Similarly, a ten-year increase in age results in 7.4 per cent lower probability of rating oneself to be in excellent health. These outcomes are consistent with the findings of Bobak *et al.* (1998), Shields and Shooshtari (2001), Gilmore *et al.* (2002), Melchior *et al.* (2003), Lahelma *et al.* (2004) and Molarius *et al.* (2006) that as individuals grow older, they are more likely to rate themselves to be in poor health, given decreases in their fitness levels.

Monthly individual income is statistically significant in affecting the probability of self-rated health. Individuals in the upper-middle income group are 1.2 and 22.4 per cent less likely to rate their health as poor and fair, respectively, compared to those in the low income group. This is followed by a 23.6 per cent higher probability of those in the upper-middle income bracket to rate their health as excellent compared to their low income counterparts. Likewise, individuals in the high income group are less likely to rate their health as poor (1.2%) and fair (41.5%) but are 42.6 per cent more likely to rate their health as excellent compared to the low income cohort. These results are in line with the findings of Cott *et al.* (1999), Denton and Walters (1999), Kawachi *et al.* (1999), Balabanova and McKee (2002) and Subramanian *et al.* (2005). The reason is that individuals in low income group face more budget constraints in accessing material resources such as food, shelter and medical care and are thus likely to suffer from poor health.

Individuals who possess secondary education as their highest education level are 45.2 per cent more likely to rate their own health as excellent, compared to those with only primary education. Further, they also have a lower probability to rate their health as poor

Table 3. Marginal effects of explanatory variables on self-rated health probabilities

Variables	Poor	Fair	Excellent
Age ($\div 10$)	0.006 (0.003)*	0.068 (0.025)***	-0.074 (0.027)***
Gender			
Male	0.002 (0.004)	0.020 (0.049)	-0.022 (0.053)
Female	–	–	–
Ethnicity			
Malay	0.001 (0.005)	0.002 (0.061)	-0.002 (0.066)
Chinese	0.008 (0.007)	0.081 (0.057)	-0.089 (0.063)
Indian/others	–	–	–
Marital status			
Married	-0.005 (0.005)	-0.055 (0.051)	0.059 (0.055)
Single/divorcé/widow(er)	–	–	–
Employment status			
Employed	0.006 (0.006)	0.087 (0.094)	-0.093 (0.100)
Unemployed	–	–	–
Income			
Low	–	–	–
Lower-middle	-0.003 (0.007)	-0.035 (0.077)	0.038 (0.084)
Upper-middle	-0.012 (0.006)**	-0.224 (0.109)**	0.236 (0.112)**
High	-0.012 (0.005)**	-0.415 (0.151)***	0.426 (0.151)***
Education			
Primary	–	–	–
Secondary	-0.027 (0.012)**	-0.425 (0.121)***	0.452 (0.127)***
Tertiary	-0.036 (0.026)	-0.239 (0.088)***	0.275 (0.111)**
Location of residence			
Rural	-0.008 (0.004)*	-0.116 (0.059)*	0.123 (0.062)**
Urban	–	–	–
Chronic disease			
Yes	0.113 (0.037)***	0.226 (0.035)***	-0.338 (0.034)***
No	–	–	–
Smoking status			
Smoker	0.007 (0.009)	0.063 (0.058)	-0.070 (0.066)
Non-smoker	–	–	–
Drinking status			
Drinker	-0.006 (0.005)	-0.077 (0.059)	0.083 (0.063)
Non-drinker	–	–	–
Physical activity			
Regular	-0.015 (0.006)**	-0.278 (0.069)***	0.292 (0.070)***
Infrequent	-0.011 (0.005)**	-0.143 (0.052)***	0.154 (0.055)***
Inactive	–	–	–

Note: Asymptotic standard errors in parentheses. *** indicates significance at 1% , **5% , and *10% levels.

(2.7%) and fair (42.5%). The results also show that tertiary educated individuals were 23.9 per cent less likely to rate their health as fair and 27.5 per cent more likely to rate themselves as in excellent health, compared to those with only primary education. Taken together, these outcomes corroborate the findings by Cott *et al.* (1999), Denton and Walters (1999), Kawachi *et al.* (1999), Shields and Shooshtari (2001), Balabanova and McKee (2002), Lahelma *et al.* (2004) and Subramanian *et al.* (2005) that higher education levels are associated with better health outcomes.

In terms of location of residence, rural dwellers were found to be 0.8 and 11.6 per cent less likely to rate their own health as poor and fair, respectively, than their urban counterparts. Meanwhile, rural dwellers were also 12.3 per cent more likely to rate their own health as excellent compared to the urbanites. These results are inconsistent with the study of Gilmore *et al.* (2002). One plausible explanation is that rural dwellers live a less hectic lifestyle and may perceive themselves to be in better health as opposed to the urbanities with busy schedules.

The presence of chronic diseases is a statistically significant factor in affecting the probability of self-rated health as individuals who had chronic diseases are 11.3 and 22.6 per cent more likely to rate their own health as poor and fair, respectively, than those who are healthy. Similarly, those who had chronic diseases are 33.8 per cent less likely to rate their own health as excellent than those who are healthy. These outcomes follow the findings by Shields and Shooshtari (2001) that individuals with chronic diseases tend to have lower odds of reporting very good or excellent health than those without such diseases.

Physical activity participation is statistically significant in affecting the probabilities of self-rated health. The results demonstrate that individuals who engaged in physical activity regularly had a lower probability to rate their health as poor (1.5%) and fair (27.8%) than those who were physically inactive. Instead, they were also found to be 29.2 per cent more likely to rate their health as excellent compared to those who are inactive. On the other hand, individuals who take part in physical activity infrequently have a lower probability to report their health as poor (1.1%) and fair (14.3%) than those who were inactive. Besides, they were 15.4 per cent more likely to rate their health as excellent compared to those who did not engage in physical activity. These findings are consistent with the findings by Cott *et al.* (1999), Denton and Walters (1999), Johansson and Sundquist (1999), and Shields and Shooshtari (2001) that physical activity is able to boost one's perception of self-rated health.

It is surprising to find that ethnicity had no significant impact on self-rated health. Hence, one may conclude that there are no cultural differences in how individuals perceive their health. Besides, gender and marital status variables were also found to be not significant in affecting an individual's self-rated health, so was the employment status variable. In today's rapid urbanising society, the majority are prone to engage in a fast paced and hectic lifestyle regardless of their socio-economic background, and consequently would be equally concerned about their own health. In terms of lifestyle variables, the results showed that both smoking and drinking behaviours were not significantly correlated with self-rated health. The absence of the effect of lifestyle on self-rated health status may be due to limited information on the respondents' smoking and drinking status. Detailed information on whether the respondents were ex-smokers, heavy smokers, social drinker or habitual drinker had not been included in present study for analysis.

6. Conclusion

The findings of the present study indicate that several socio-demographic and lifestyle factors have a statistically significant influence on self-rated health in Malaysia. Specifically, highly educated and high income individuals, residents of rural areas and those who take part in physical activity frequently have a higher likelihood of rating their own health as excellent. Meanwhile, older individuals and those with chronic diseases are more likely to rate their own health as poor or fair. However, gender, marital status, employment status, ethnicity, drinking and smoking behaviours are all found to have no significant impact on self-rated health.

Based on these findings, several observations in terms of comparisons to other studies and policy implications are noted. First, given that older individuals are more likely to rate their own health less favourably compared to those in the younger age brackets, public health policies aimed at improving the health of the elderly could be very effective. For instance, public health authorities should introduce exercise campaigns to encourage the elderly to undertake regular physical activity. Other suggested programmes catering to those in their golden years should include health awareness talks on how they should take care of their health. By doing so, the elderly would not feel neglected and may have more knowledge on how to take proper care of their health.

Second, as noted in this study, chronic diseases is a contributor to poor health. Hence, as a measure towards reducing the number of individuals suffering from chronic diseases, successful policies should encourage people to undergo preventive medical care services by highlighting the importance of preventive medical care to the community. This is in light of Kenkel's (1994) argument that the probability of suffering from chronic diseases would be reduced by continued access to preventive medical care services (e.g. flu vaccination, medical examination).

Third, one of the possible reasons why low income individuals are less likely to rate their health as excellent compared to their higher income counterparts is because they cannot afford a wide range of medical care services. Therefore, the government should provide wider health coverage to the poor even by subsidising selected treatments at private hospitals. Alternatively, food aid programmes, such as the distribution of food stamps to the poor, can be introduced. Hence, the poor would be able to sustain a nutritious diet and would be able to enjoy a healthier lifestyle.

Last but not least, public health authorities should create health awareness among urbanites, since they are more likely to rate their health as poor compared to those who reside in rural areas. One could relate this to the hectic schedules associated with working in an urban surrounding compared to the more sedentary lifestyle in rural areas. As such, programmes designed to promote regular exercises, less stressful lifestyles and healthy diets among urban households could be implemented. For instance, community fitness centres and healthy diet restaurants should be made more easily available throughout the urban areas.

This study should serve as a catalyst for further research on self-rated health in Malaysia. However, several limitations are acknowledged due to time and budget constraints. First, data for the present study may not represent the country as a whole, given the small sample size. Second, other important variables such as respondent's body mass index (BMI) and

waist-height ratio (WHR) were excluded in the present study due to lack of measuring instruments. One possible solution to these constraints, and as a suggestion for future studies, would be to replicate the present analysis by using follow-up interview data, comprehensive nationwide data, or longitudinal panel data to assess the robustness of the current findings.

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