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The utilization of diagnostic tests among the elderly: Evidence from Malaysia

Yong Kang Cheah

Department of Economics, School of Economics, Finance and Banking, College of Business, Universiti Utara Malaysia, Malaysia

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ABSTRACT

Diagnostic test plays a major role in reducing the prevalence of non-communicable diseases (NCDs). The present study examines the relationships between the utilization of diagnostic tests and socioeconomic, insurance, lifestyle, and health factors among the elderly in Malaysia. Analyses based on the National Health and Morbidity Survey 2011 (NHMS 2011) suggest that high income and having private insurance are associated with a higher likelihood of utilizing diagnostic tests. However, low education levels, being employed and smoking are associated with a lower propensity to utilize. These results provide public health administrators with useful information on policy development. In particular, the proposed policies include providing the poor with nominal price of basic diagnostic tests, introducing various health education programmes to the public, creating health awareness campaigns to encourage elders who do not own private insurance to utilize diagnostic tests, as well as making basic diagnostic tests compulsory for all elders owning government insurance.

1. Introduction

The rise in non-communicable diseases (NCDs) is a serious public health issue across the globe. The majority of the mortality are associated with NCDs, most notably heart diseases and cancers. In 2012, NCDs were responsible for about 38 million deaths [1]. More than half of these deaths comprised the elderly in developing countries [1]. More alarming is that the total NCD induced deaths are estimated to reach 52 million by 2030. In addition, the total losses related to NCDs and the costs of implementing policies in developing countries are predicted to reach United States dollar (USD) 7 trillion and 11.2 billion, respectively, by 2025 [1].

In Malaysia, a substantial proportion of the elderly population suffer from chronic conditions, most notably hypertension and hypercholesterolemia [2]. This phenomenon is alarming as the elderly population is increasing at a fast pace. There is an evidence suggesting that the median age of the Malaysian population will increase from 26 years in 2010 to 37 years in 2040 [3]. The rise in the number of the elderly is likely to cause a huge spike in health expenditure as more funds will be allocated for senior health care. Both public and private health expenditures are expected to increase from Malaysian Ringgit (RM) 34 billion in 2010 to RM 59 billion in 2020 [3].

It is clearly evident that prevention can reduce the risk of developing NCDs. Although there are three categories of prevention (i.e. primary, secondary and tertiary), the focus of the present study is only secondary prevention [4]. The utilization of diagnostic tests is an

example of secondary prevention as it allows for early detections of diseases when treatments are possible. In particular, secondary prevention is an action that can prevent diseases but without lowering the likelihood of occurrence. While the utilization of diagnostic tests (i.e. secondary prevention) has commonly been studied in economic literature, few such studies have been done in developing countries, especially in Malaysia. Previous studies conducted in developed countries consistently found that economic, demographic, insurance and health factors are associated with consumer purchase decisions of diagnostic tests [5–10]; etc.). Although previous studies examined the utilization of diagnostic tests in detail, their findings may be different from those evidenced in the present study. This is because the scope of the present study is a developing country where people have less access to health care facilities. Furthermore, people in developing countries have poorer socioeconomic status and lower health awareness than those in developed countries. Moreover, developing countries have lower availability of health services and poorer transport facilities than developed countries, thus people in developing countries tend to face more constraints in utilizing medical care [11]. In the light of these factors, the present study anticipates that the tendency to utilize diagnostic tests among people in developed and developing countries is dissimilar.

Cheah [12] is among the few researchers who focuses on this topic in Malaysia. In the study, Cheah [12] did not examine the influences of private and government insurances on the utilization of diagnostic tests in great detail. Furthermore, he did not examine the insurance differences across socioeconomic factors in the utilization of diagnostic tests.

E-mail address: cheahykang@gmail.com.

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Hence, the question whether insurance will help to improve health outcomes or only drive up health expenditures remains unanswered. As pointed out by Bakar and Samsudin [13]; in an effort to increase the accessibility to high-quality health care, the Malaysian government has been encouraging people to own insurance. Insurance is an important source of finance for health care, especially given today's costly medical goods and services. It can provide people with better access to health care services. Even though public health care in Malaysia is heavily subsidised by the government, the insurance market has expanded dramatically [13]. This is because there is a growing number of people who prefer using private health care facilities. Another limitation of Cheah [12] was that the sample used in the study was collected in a specific district, hence, the findings could not be generalizable to the entire population in Malaysia.

The objective of the present study is to extend and add to the existing literature by examining the effects of socioeconomic, insurance, lifestyle and health factors on the utilization of diagnostic tests in Malaysia with a focus on the elderly population. The present study attempts to contribute to the existing literature in several ways. First, a nationally representative data consisting of a large sample size (2463 observations) is used, thus providing an in-depth statistical analysis. Second, the present study controls for smoking (lifestyle) and diabetes (health) variables in the regression model. Since lifestyle and health may affect individuals' health seeking behaviours, omission of these variables may cause some of the socioeconomic variables to be correlated with error terms in the regressions, thus generating biased results. Third, the impact of insurance on the utilization of diagnostic tests is thoroughly investigated. The present study uses private insurance and government insurance as the independent variables, and interacts them with the main socioeconomic variables. This will provide the government with better information on the role of insurance in health care, thus more effective policies can be implemented.

2. Theoretical framework

Analysis of the present study is motivated by the Grossman's [14] health capital model. According to Grossman, health serves two purposes (i.e. consumption commodity and investment commodity). Similar to physical capital, health capital depreciates over time. Hence, people need to invest in their health. The investment in health is determined by consumption of medical care, time spent in using medical care, as well as health-related behaviours, such as exercise, smoking and alcohol drinking. Thus, the function of health investment can be written as:

$$I_i = \delta_i(m_i, T_i, b_i) \quad (1)$$

where I is health investment, m is the amount of medical care consumed, T is the time spent in consuming medical care, b is health-related behaviour and subscript i indicates i th individual ($i = 1, 2, 3, \dots, n$). m and T are positive associated with I , while b can be negative or positively correlated with I (depends on the type of health-related behaviours).

Since the scope of the present study is consumption of medical care, m , other factors that affect I are assumed to be held constant. Grossman [14] predicts that m is affected by both economic and non-economic factors. Mathematically, the equation of m can be expressed as:

$$m_i = \gamma_i(r_i, a_i, w_i, e_i) \quad (2)$$

where r is the price of medical care, a is age, w is wage and e is education level.

The price of medical care is negatively associated with medical care consumption. This means that a decrease in price of medical care increases the quantity demanded, thus improving health outcomes. The relationship between wage and demand for medical care is ambiguous. On one hand, wage increases the opportunity cost of non-working time, causing the shadow price of medical care to rise. As a result, people

earning a higher wage tend to consume less medical care than their counterparts earning a lower wage. On the other hand, wage raises the value of healthy day because an individual can earn more money if he/she is able to work. Therefore, a higher wage leads to a greater consumption of medical care.

Owing to biological process of aging, the rate of depreciation of health increases with age. Assuming health investment is constant, as age increases, the amount of health capital reduces due to a higher rate of depreciation. Hence, in order to increase the stock of health capital, consumption of medical care is needed. There is a negative relationship between education and demand for medical care. Education improves productive efficiency. Well-educated people are more aware of their health status and have better medical related knowledge than their less-educated counterparts, and consequently have a higher marginal product of medical care. As a result, a well-educated individual consume less medical care in order to achieve the optimum stock of health capital.

3. Empirical studies

Using a nationwide data of United States (US), Lairson et al. [15] found that older women are less likely to utilize breast cancer screening than their younger counterparts. More recently, Elit et al. [16] also observed that older people have a lower likelihood of utilizing diagnostic tests than their younger counterparts in Canada. In terms of income, Lairson et al. [15] found that higher income earners are more likely to utilize diagnostic tests than lower income earners. Similar findings were obtained by Halliday et al. [17]; who used a nationwide Hawaiian data. Using a proxy for income, Seeginli and Nahcivan [18] found that having good perception of income is associated with a higher likelihood of utilizing diagnostic tests, which is consistent with the prediction of Grossman [14] that income is positively associated with the value of health.

The effect of education on the utilization of diagnostic tests is interesting. Using the National Health Interview Survey, Abraido-Lanza et al. [19] found that year of schooling is positively associated with the likelihood of using breast and cervical cancer tests. Belkar et al. [20] observed that well-educated Australian women are more devoted to test for cancers than their less-educated counterparts. In Taiwan, Lin [9] revealed that the propensity to test for chronic diseases is lower among individuals with low education level. The positive relationship between education and the utilization of diagnostic tests is attributable to the fact that education improves allocative efficiency. As pointed out by Kenkel [4]; well-educated individuals are more aware of the importance of health inputs than less-educated individuals. Since diagnostic test is an input into health production, well-educated individuals have a higher tendency to utilize it than less-educated individuals.

Based on a nationwide survey in France, Sing et al. [10] found that people who have insurance are more likely to test for colorectal cancer than their counterparts who do not have insurance. Using data of US and Namibia, respectively, Lairson et al. [15] and Kangmennaang et al. [7] shared similar outcomes. This is because use of price-reduced medical treatment is the benefit of insurance. In order to reap the benefit, people need to have their health diagnosed in the first place [8]. Another explanation is that health cannot be restocked completely once it deteriorates [4]. Therefore, people are likely to opt for prevention rather than cure.

Although the effects of smoking on the utilization of diagnostic tests were seldom examined in previous studies, they should be given attention. The relationship between smoking and the utilization of diagnostic tests can be explained by the 'third variable', that is, time preference. As pointed out by Ida and Goto [21]; smokers have a higher rate of time preference than non-smokers because they are more concerned about the current utility generated by smoking than suffering from smoking-induced illnesses in the future. Hence, smokers are expected to have a lower likelihood of utilizing diagnostic tests than non-

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