The Cost of Healthcare among Malaysian Community-Dwelling Elderly

(Kos Penjagaan Kesihatan dalam kalangan Komuniti Warga Tua di Malaysia)

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ABSTRACT

The aim of this study is to provide a comprehensive estimate of the direct and indirect costs of healthcare services used in a nationally representative sample of community-dwelling elderly in Malaysia as well as the determinants of such health care costs. The rise of chronic non-communicable diseases (NCDs henceforth) is stemming from changes in lifestyle and diet, as well as ageing. The prevalence of NCDs basically increases with age and cause an increases in demand for healthcare services which are associated with higher healthcare costs among the elderly. A survey using multi-stage random sampling techniques recruited 2274 elderly people (60 years and above) in Johor, Perak, Selangor and Kelantan. Overall, a year on average of about RM426.50 of costs was determined to be borne by the sampled elderly Malaysian's in community-dwellings. The direct costs for outpatient care were RM141.24 and the costs for inpatient care were RM2,527. Meanwhile, the indirect costs for outpatient and inpatient care were RM31.44 and RM524.07 respectively. By using multi regression modelling, healthcare used in private facilities and chronic diseases such as cancer and kidney problem were the predictors that influenced the cost of healthcare among the elderly in the community-dwellings. The higher direct cost implies the higher of out-of-pocket health expenditure will borne by the elderly. The elderly who are unable to bear the healthcare cost should be financially support by the authoritie to protect them trapped into the catastrophic health expenditure. Therefore, these findings highlighted the importance of further research aimed at decreasing the prevalence and severity of these NCDs among the elderly in the Malaysian community-dwellings.

Keywords: Elderly; Ageing Population; Chronic Noncommunicable Diseases (NCDs); Healthcare Cost; Catastrophic Health Expenditure

ABSTRAK

Kajian ini bertujuan untuk menyediakan anggaran kos langsung dan tidak langsung secara komprehensif mengenai penggunaan perkhidmatan penjagaan kesihatan dalam sampel peringkat kebangsaan dalam kalangan warga tua di kediaman masyarakat dan juga penentu kos penjagaan kesihatan. Peningkatan penyakit tidak berjangkit (non-communicable disease-NCD) yang kronik adalah berpunca daripada perubahan gaya hidup dan diet, serta penuaan. Kelaziman NCD pada dasarnya meningkat seiring dengan usia dan menyebabkan peningkatan permintaan terhadap perkhidmatan penjagaan kesihatan dan dikaitkan dengan kos penjagaan kesihatan yang lebih tinggi di kalangan warga tua. Satu tinjauan menggunakan teknik pensampelan rawak pelbagai peringkat merekrut 2274 warga tua (60 tahun ke atas) di Johor, Perak, Selangor dan Kelantan. Secara keseluruhan, purata setahun kira-kira RM426.50 kos penjagaan kesihatan ditanggung oleh warga tua di kediaman masyarakat Malaysia. Kos langsung untuk penjagaan pesakit luar ialah RM141.24 dan RM2,527 untuk penjagaan pesakit dalam. Sementara itu, kos tidak langsung bagi pesakit luar dan pesakit dalam adalah RM31.44 dan RM524.07 masing-masing. Dengan pemodelan multiregression, penjagaan kesihatan yang digunakan di kemudahan swasta dan penyakit kronik seperti kanser dan masalah buah pinggang adalah penentu yang mempengaruhi kos penjagaan kesihatan di kalangan warga tua di kediaman masyarakat. Kos langsung yang lebih tinggi membayangkan perbelanjaan kesihatan yang keluar dari poket lebih tinggi akan ditanggung oleh warga tua. Warga tua yang tidak dapat menanggung kos penjagaan kesihatan seharusnya mendapat sokongan kewangan oleh pihak berkuasa untuk melindungi mereka daripada terperangkap dalam bencana perbelanjaan kesihatan. Oleh itu, penemuan ini menonjolkan kepentingan penyelidikan lanjut yang bertujuan untuk mengurangkan kelaziman dan keterukan NCD di kalangan warga tua di kediaman masyarakat Malaysia.

Kata kunci: Warga tua; populasi penuaan; penyakit tidak berjangkit; kos penjagaan kesihatan; bencana perbelanjaan kesihatan

INTRODUCTION

The ageing population has huge implications for virtually every aspect of Malaysian society. Thus, population ageing is one phenomenon that cannot be dismissed because of its great social, economic and cultural challenges for individuals, families and society as a whole. In demographic terms, the causes of population ageing are divided into three concepts namely a reduction in fertility, a decline in mortality which leads to the third concept which is any increases in life expectancy or longevity (Martin & Dirk 2012). It also shows that improvements in the healthcare system have yielded the fact that many people are now living healthier and longer lives (Cutler et al. 2006). Meanwhile, the United Nations (UN) (2002) examined the worldwide decline in fertility and mortality as the demographic determinants of population ageing. In Malaysia, older people are defined as those who are 60 years old and above, this definition was adopted in consensus with the United Nations during the World Assembly on Ageing, 1982, held in Vienna, Austria.

Malaysia as a fast-developing country has shown an increment in the trend of population ageing over the last few decades. For the year 1970, the population aged 60 years old and above was about 546,000 people. Since then, within 20 years, that number has doubled, to 1.03 million people in 1991. The Census of Malaysia (2000) reported that 6.3 per cent or 1.3 million people were 60 years old and above in the year 2000 and this was projected to reach 9.9 per cent or 3.4 million people in 2020. In addition, the UN reported that the projected percentage of older aged people in Malaysia in 2025 and 2050 would increase to 13.4 per cent and 20.8 per cent respectively. However, the population of Malaysia is still relatively young compared to the populations of other developed countries, but changes in the age structure resulting from a fertility decline and increased longevity are contributing to a population that is ageing. Kinsella and He (2009) found that Malaysia will be the fourth fastest ageing nation with an increase of 269 per cent between 2008 to 2040 just behind Singapore, Colombia and India. Hence, Malaysia is forecasted to become an ageing country in 2030 with 15 per cent of the population defined as elderly. This is consistent with the projection that the world will also be ageing as a whole by 2030 when 1.3 billion people or 15 per cent of the world's population are 'greying' people (DOS 2005).

Consequently, the main issue that society should be concerned about is the health of older people both physically and mentally. Moreover, the rise of chronic noncommunicable diseases (NCD henceforth) reflects changes in lifestyle and diet, as well as ageing. NCD also affect economic and societal costs aggressively with age and have the potential to influence economic growth. According to Price et al. (2015) and Bloom et al. (2011), about 23% of the global burden of diseases among older people are chronic NCD. NCD are also known as chronic diseases which are generated from a combination of genetic, physiological, environmental and behavioural factors that cause people to suffer for long periods (WHO 2017). The main types of NCD are cardiovascular diseases (such as heart attacks and strokes), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), diabetes mellitus, chronic kidney disease and neurological disorders.

As a result, the absolute number of years lived with disabilities from non-communicable diseases have been rising promptly all over the world, not only because of population growth, but also because of the ageing of populations (GBD 2016 Disease and Injury Incidence and Prevalence Collaborator 2017). Also a report from the Institute for Health Metrics and Evaluation (IHME) based in the University of Washington, USA, revealed that more than 7 out of 10 of the causes of death and premature death in Malaysia for the year 2016 were non-communicable diseases. Ischemic heart disease was the top cause of death or premature death, followed by cerebrovascular diseases, Alzheimer's disease, chronic obstructive pulmonary disease, lung cancer, diabetes and chronic kidney disease, colorectal cancer and congenital defects respectively. The report also suggested that the prevalence of disabling diseases increased steeply with age and caused an increase in the demand for health care services that were more expensive than interventions.

In point of fact, various efforts have been undertaken by Malaysia's government to ensure that all people of all ages have a healthy life. For example, The National Blue Ocean Strategy (NBOS) 7 – "1Malaysia Family Care" is an initiative by the government to provide holistic support specifically for elderly people with disabilities and single mothers. Besides physical health, the Ministry of Health Malaysia (MOH) has emphasised mental health as a critical component of healthcare and has ensured that mental health services have been integrated into primary health care services in public health clinics since the 1990s. The services available include wellness promotion, the prevention of mental disorders, mental health screening and the treatment and rehabilitation of patients affected by mental disorders. Promotional activities were undertaken as part of the Healthy Lifestyle Campaign (MOH 2012). In 2012, a total of 144,476 elderly people were screened for the risk of mental health problems using the Screening Health Status Form. A total of 0.4% of those screened were detected to have mental health problems. By December 2012, a total of 1,302,422 elderly had been registered at public health clinics across Malaysia, however, this accounted for only 55.7% of the entire elderly population. It was reported that 3.48 million elderly people attended public health clinics for new and repeat cases in the year 2012, compared to 1.14 million in the year 2010 and 1.18 million in the year 2008 (MOH 2012).

Meanwhile, when looking at the total expenditure on healthcare by public and private sectors, the numbers have been on an increasing trend. Between 2004 to 2014, the total expenditure on health for Malaysia ranged from RM19,037 million in 2004 to RM49,731 million in 2014. This shows that the costs have incremented by more than 160 per cent in a decade. Health expenditure as a percentage of the Gross Domestic Product (GDP henceforth) also increased from 4.02 per cent in 2002 to 4.49 per cent in 2014. Meanwhile, the health expenditure

per capita was RM990 (USD261) in 2004 and increased by about 64% in 2014 where the health expenditure per capita was RM1,625 (USD496). The highest contributors to total health expenditure came from expenditure by the Ministry of Health (MOH) in the range of 43 to 46 per cent between the years 2004 to 2014. It was followed by private household's out-of-pocket health expenditure (OOP) in the range of 33 to 39 per cent over the same period of time. Specifically, for the total OOP health expenditure among the elderly, The National Health and Morbidity Survey 2015 estimated that about 0.7 million elderly people spent about RM909 million in 2015 which was 7.8 per cent of the overall total OOP health expenditure. There was a total of about RM476 million for OOP inpatient care and RM377 million for outpatient care.

The elderly utilised the available health care services to obtain treatment for their illnesses. The five most common morbidities among the elderly seen in public health clinics, and this has followed the same pattern for the past five years, were hypertension, diabetes mellitus, joints, eye and respiratory problems. And additionally, dementia was listed in the top 10 new main diagnoses among the elderly who came to public health care clinics in 2012 (MOH 2012). Some researchers have agreed that the elderly do consume a greater volume of health care facilities than those who are younger, not because they are older, but because they are sick. Thus, they would spend more money on health care services to get better treatment for their illnesses (Cutler 2001; Moïse & Jacobzone 2003).

With the absence of sufficient income and possibly with some of them living alone, the elderly are vulnerable to catastrophic health expenditure (CHE henceforth), this particularly affects the poorer elderly. In China, the elderly were noted to be more sensitive to CHE, especially those with two or more chronic diseases (Wang et al. 2015). Health expenditure is considered to be catastrophic when the amount that the household spends on healthcare is more than some pre-specified threshold budget share (let's say z). Therefore, spending on healthcare that is equal or more than z is labelled as "catastrophic". In addition, CHE represents a household's financial capacity in an imperilled situation when the health expenditure is greater than the expenses for its subsistence needs (Kimani et al. 2016).

Due to financial hardship, living alone and having specific illnesses which require the utilisation of health care services, the elderly spend more on health expenditure compared to others and face the prospect of catastrophic health expenditure (Jacobs et al. 2016; Yang et al. 2016; Arsenijevic et al. 2016). One study that investigated the socioeconomic and medical correlation of health expenditure among the rural elderly in South India was carried out by Brinda et al. (2012). They found that a few diseases such as diabetes, tuberculosis, malaria, respiratory ailments, gastrointestinal diseases, dementia,

depression, and disability were associated with higher medical out-of-pocket expenditures among the elderly.

Therefore, the aim of this study is to provide a comprehensive estimate of the direct and indirect costs of health care used in a nationally representative sample of community-dwelling elderly in Malaysia. Also, we analysed the determinants of health care costs that were incurred among the elderly in Malaysia by using socio-demographic, disease and health care utilisation variables. It is important to highlight this issue in determining the factors that could influence the financial condition of the elderly both directly and indirectly due to the burden of health care costs.

LITERATURE REVIEW

Any changes in the population's age structure will affect the level of consumption over time. One of the main impacts of population ageing is on the consumption of healthcare services. Health is demanded by consumers for two reasons; (i) 'good health' directly enters their utility function, and makes them feel better, and (ii) as an investment to increase the amount of time available for market and non-market activities, where, as the number of healthy days increases, people can go to work and earn an income (Grossman 1972). Prior to the Grossman Model, health was viewed as a durable capital stock which assumed that individuals inherited an initial stock of health which is denoted by healthy days and they are able to produce from that. However, the health capital stock will experience depreciation with age, but it can be increased by investment. Grossman also stated that because of the existence of a variety of possible time paths, it can be plausibly assumed that the rate of depreciation is positively correlated with age after some point in the life-cycle. This correlation shows that as individuals age, their physical strength and memory capacity deteriorates. Indeed, when the rate of depreciation increases in the stock of health, it is proved that the process of biological ageing has occurred.

Grossman's prediction regarding the relationship between some key variables, namely, age, wage rate, the price of medical services and the education level with the health demand and the demand for health services. Income and the price of medical services have the same direction of relationship as the demand for healthcare services and health demand with a positive and negative relationship respectively. However, age has a positive relationship with the demand for healthcare and is negative to health demand. While getting older, the demand for healthcare will increase which reflects that the health stock is decreasing. Otherwise, a higher level of education indicates someone who is more knowledgeable regarding health, diet and lifestyle which would improve their health stock. Thus, their demand for healthcare services would decrease. These key determinants of

health demand and the demand for healthcare services have been used in this study to determine the factors that influence the healthcare costs among the elderly.

A recent theory that has referred to this gerontological research is known as the theory of social gerontology, which is understood to be a "third generation" social gerontological theory. According to Bengtson, Burgess and Parrott (1997), the "third generation" of social gerontological theories are multidisciplinary, drawing from aspects of sociology, psychology, history, and economics. The theoretical development from the "first generation" to the "third generation" of social gerontological theories shows that various aspects should be considered when seeking to understand the field of ageing or gerontological research. This study refers to the three social gerontological theories for the development of the theoretical research framework as a guideline for the variables chosen in the model specification. First is the Social Exchange Theory of Ageing which explains the balance of what is received and given between generations. In the case of unbalanced social exchanges, the analysis turns to the perceived costs and benefits of the exchange and whether the calculations are rational and self-interested or altruistic in order to understand the structure of the exchange. For example, one line of inquiry might consider why elderly people withdraw from interaction with some people and increase interaction with others. In addition, the social exchange theory of ageing attempts to understand how exchange behaviours reflect the changing circumstances of the elderly and those with whom they interact, such as family members or others who are in their social support network. The social interaction between the elderly and the younger generation especially their spouses, children, grandchildren and other relatives or friends is important to give them full support in terms of emotions, guardianship and financial assistance. Thus, the number of children and the living arrangements of the elderly are two determinants which influence the condition of the elderly to the healthcare costs in this study.

Second, the Cultural Capital (CC) under the Life Course Capital Theory refers to the levels of proficiency in dominant, socially valued codes and practices, including linguistic, aesthetic, and interaction styles that are rewarded in the educational system and wider society. These serve to directly enhance human capital and personal capital and possibly to indirectly enhance economic and health status. Therefore, based on the review of these theoretical elements of life course capital, this study chose the number of diseases and types of chronic diseases as predictors of the healthcare costs among the demented elderly.

In the meantime, third, the perspective of the Political Economy of Ageing attempts to explain how the interaction of economic and political forces determines how social resources are allocated, and how variations in the treatment and status of the elderly can

be understood by examining public policies, economic trends, and social structural factors. One of the examples of this perspective that applies to ageing is the elderly's utilisation of healthcare services and managing their dependencies through the control of medical resources. Moreover, the current structure of the healthcare industry disadvantages subgroups of the older population such as minorities, women, and those who are poor. Hence, healthcare utilisation such as the number of visits, number of admissions and the type of healthcare facilities referred to are tested in this study to determine their relationship with the healthcare costs of the elderly.

From the body of empirical evidence, numerous studies on healthcare costs have shown that households with elderly and chronically ill people are more likely to suffer financial hardship and to be at risk of experiencing the problem of CHE (Yardim et al. 2009; Barros et al. 2011; Li et al. 2012; Minh et al. 2013; Li et al. 2014; Jacobs et al. 2016). There have also been quite a number of studies that have focused on the elderly who have been affected by CHE and its determinants. One of the most recent examples by Arsenijevic et al. (2016) proved that the elderly with chronic diseases faced CHE across 15 European countries. Interestingly, older people in some of the wealthier countries in Europe still faced CHE due to diabetes mellitus and cardiovascular diseases, specifically, in Portugal, Poland, Denmark, Italy, Switzerland, Belgium, the Czech Republic and Hungary. In addition, a number of socio-demographic factors such as gender, age, years of education, low income, household size and the number of children below 18 years old in a household were significant predictors of CHE in the ordinary least squares (OLS) regression that was carried out. They also highlighted the indicators of chronic diseases since both variables are characterised by a joint causality. The results showed that having diabetes mellitus, cardiovascular disease and cancer were connected with older people who were smokers and those with a high body mass index. Thus, due to people's bad lifestyles, they were more likely to sustain chronic diseases and this would consequently lead to high healthcare expenditure trapping them into catastrophic health expenditure and leading to poverty in the longer term.

Similarly, a study in China performed by Wang et. al (2015) indicated a 30.57% incidence of CHE among rural elderly households with chronic diseases. They also marked a policy recommendation to address the socio-economic factors of healthcare outcomes among the elderly by reducing the CHE problem and its inequality. Some socio-economic factors which were significantly associated with CHE were household size, per capita income and having household members with more than two chronic diseases and those more than 65 years old.

An interesting finding for some of the determinants of CHE among elderly households in urban Nigeria was revealed by Adisa (2015). The author found that female-headed households were less likely to bear CHE compared to male-headed households. But when he used the interaction terms age and female gender, the sign of the coefficient turned to a positive relationship and proved that women were more likely to incur CHE with age. However, he justified that in the context of African women, they commonly spent less on health due to their low-income status and this was also shown by the level of OOP for females which was less than for males. Besides, households in the higher income quintile showed significantly less effect from CHE. It has been proven that the elderly with lower income status, categorised as poor, bore the most CHE. If viewed in terms of education, the result is contrary to Grossman's theory where the finding indicated that more highly educated households are associated with CHE. Theoretically, more highly educated households are likely to be more efficient in maintaining health over time and well informed of the harmful effects of a bad lifestyle, and hence are less likely to be vulnerable to the serious health conditions which lead to CHE. However, Adisa gave one possible explanation for this contradictory finding, in that urban elderly households in Nigeria may be more educated in other fields rather than in healthcare expenditure. The inefficient use of modern medicine and uncontrolled health spending may lead to CHE even for those with a high level of education.

One vital comparative analysis study regarding empty-nests and non-empty-nests among elderly households in China was carried out by Yang et al. (2016). Elderly empty-nest households referred to those households housing elderly with no children or where their children had already left home and lived separately. This category was sub-divided into two; (i) empty-nest single (elderly who live alone); (ii) empty-nest couple (elderly who live with a spouse). The study indicated that the incidence of CHE for empty-nest singles and empty-nest couples was higher than that of non-empty-nest households with the incidence at 59.3% and 52.9% respectively compared to an incidence of 31.4% of CHE among elderly non-empty-nest households. By using binary logistic regression models, they examined the risk factors of each CHE subgroup separately. The key risk factors were found in all subgroups which were present in one or more households of elderly with NCD, the hospitalisation of one or more elderly household members and a lower household income. Again, NCD were an important predictor for elderly households to incur CHE. However, this study did not mention the type of NCD that the elderly contracted. The study successfully demonstrated that the empty-nest elderly households were at a higher risk from incurring CHE compared to non-empty-nest elderly households. According to Yang and colleagues, the China Research Center on Aging (CRCA) reported that the number of empty-nest elderly reached 100 million in 2013 (50% of the total elderly population) and the same figure also had NCD among the elderly in China. This will result in an increase

in healthcare utilisation and healthcare expenditure among the elderly. By 2030, the proportion of empty-nest elderly households is estimated to reach 90% of the total elderly population and surely, the numbers of elderly with NCD will also rise accordingly. This study impacted China's policymakers to develop financial and social protection among the different types of elderly households.

Most of the findings discussed above show that the key determinants of CHE were the presence of chronic diseases; lower levels of income; the level of education; living in a rural area; and that the female elderly were more likely to incur CHE. These results emphasised the need for supportive financial and social protection for the elderly who are commonly vulnerable to CHE. These kinds of aid are essential so that the elderly can pursue the remnants of their lives in peace without the burden of healthcare expenditure which can trap them into CHE and impoverishment.

METHODOLOGY

STUDY DESIGN AND SAMPLE SIZE

This study employed a cross-sectional design based in the community setting and used a multi-stage proportional cluster random sampling technique to obtain a representative sample of community-dwelling Malaysian older adults. The sampling frame for this survey field, in the community setting, referred to the National Population and Housing Census 2010. Based on the frame provided by the Department of Statistics Malaysia (DOSM), Malaysia was divided into Census Circles (CCs) which were geographically contiguous areas with identified boundaries. There were 10,822 CCs in Malaysia in the year 2010. Each Census Circle contained about 7 Enumeration Blocks (EBs), where in turn each EB contained between 80 to 120 living quarters (LQs). However, for this survey, the frame only included CCs with an elderly population that made up of at least 10% of the total population in the CCs from four states in Malaysia that had the highest numbers of older adults aged 60 years and above based on the National Population and Housing Census 2010. The states sampled were Johor, Perak, Selangor and Kelantan. In the next stage, 35 Census Circle (CC) clusters were sampled from each state. Finally, 20 Living Quarters (LQs) were selected from each CC cluster selected in the second stage. The elderly in these LQs were randomly interviewed. Only one resident aged 60 years and above from each household was interviewed, and if more than one person in a household qualified, the person interviewed was randomly chosen. The interviews were conducted at places such as school halls, mosques or community halls in their LQ area. The date, time and venue of the interview were stated on the invitation card

that was given to the respondent during the first visit at the respondent's house. A phone call was made, as a reminder, a day before the interview session was to be held. A face to face interview with the respondents using a questionnaire form was conducted by trained enumerators. The data collection was conducted from May 2013 to April 2014. This multi-stage design resulted in a final sample of 2274 out of the 2322 older adults who were recruited for this study, after we excluded the incomplete questionnaires.

Inclusion and exclusion criteria were employed during the data collection process in the community setting. The inclusion criteria for the sample were that respondents must be at least 60 years old and above, and Malaysian. The exclusion criteria for the sample were respondents who were less than 60 years old, suffered alcohol abuse, had serious physical disabilities (bedridden, wheelchair) and the terminally ill.

DATA COLLECTION

A pre-tested questionnaire was used to interview the respondents in the community setting. This questionnaire was modified, adjusted and customised from a questionnaire originally from the UNU-IIGH Malaysia (currently known as the International Centre for Casemix and Clinical Coding (ITCC) Universiti Kebangsaan Malaysia) research team which is led by Prof. Dato' Dr Syed Mohamed Aljunid (Principle Investigator for Provider Cost in LRGS-TUA). The questionnaire was tested and established to estimate the direct and indirect costs for health care utilisation (M Dahlui et al., 2007; Ezat SW et al., 2013). It contained details of socio-economic backgrounds, information on morbidity that had been diagnosed by medical practitioners, outpatient care for the past six months and inpatient care over the past year. All of the costs for outpatient care were multiplied by two to estimate the annual patients' costs.

The outpatient and inpatient care data were detailed from the frequency rate of treatment or admission at healthcare facilities like government hospitals and clinics, private hospitals and clinics, traditional medicine healers and alternative health care providers. In addition, the type of referral disease, the reason for admission, the time spent in the facility, the length of stay, the number of days absent from work after discharge, the cost of transportation, meal expenditures, clinic charges and other related expenditure were also included in the questionnaire. All of the costs were important to get the total cost of health care utilisation from the respondents in the community setting. The total cost of health care utilisation including direct medical costs, direct non-medical costs and indirect costs. The total cost was calculated as a combination of all of the costs that were incurred by the elderly in the community setting including the opportunity costs of the time forgone by the respondents during treatment.

Direct medical costs consisted of self-reported clinical and hospital charges including prescription charges, consultation, diagnostic and procedure charges by the respondents. Meanwhile, the direct non-medical costs were the costs of transportation, meal expenditures and other related expenditure (supplemental foods or other alternative treatment) incurred by the elderly. For transportation costs, we used the fare costs which were self-reported by respondents or a mileage cost of (RM0.50[1] x kilometres (distance from home)). The indirect costs only consisted of the opportunity cost of the time forgone by the respondents. The time-based opportunity costs were estimated using the self-reported wages for respondents who were still working or who had any sources of income. For those who were nonworking and had no sources of income, the national minimum wage was used. The minimum wage that was used in this study was RM900 per month (Ibrahim & Said 2015). Thus, the cost per day was RM34.62 and RM4.33 was the cost per hour for the minimum wage according to Akta Majlis Perundingan Gaji Malaysia 2011 that was gazetted on July 1, 2012, and became effective in January 2013.

ANALYSES

The descriptive analysis of the socio-demographic characteristics and the economic profile for all of the respondents are described in the next section. Also a standard descriptive statistics summarized respondents' healthcare utilization and the costs. A multiple regression analysis was conducted among those of the elderly who bore the total health care costs. The model was based on the ordinary least squares (OLS) method to predict the common logarithms of the annual total costs of healthcare among the elderly who only had positive expenditures. The total cost variables were highly skewed violating the assumption of a normal distribution of the dependent variable. Then, a transformation using a logarithmic equation was used to minimise these problems and subsequently, the OLS method was applied. To find the OLS estimators, the basis of the multiple regression equation was as follows:

$$\hat{Y} = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n \qquad (1)$$

where $\hat{Y}$ was the expected value of the dependent variable while X_1 through X_n were independent variables or predictor variables. α was the value of the dependent variable when all of the independent variables were equal to zero and β_1 through X_n were the estimated regression coefficients. Each regression coefficient represented the change in Y relative to a one-unit change in the respective independent variable (X_1 through X_n). For instance, β_1, was the change in Y relative to a one-unit change in X_1, by holding all of the other independent variables constant.

To answer the main objective of the study, the following multiple regression model was formulated to analyse the impacts of the key independent variables which were age (Age), income (Inc) and education (Edu) that were highlighted by the Grossman Model on the total cost of health expenditure among the elderly. This study also added other predictors such as healthcare utilisation (HCU) such as the number of visits and admissions and the types of facilities referred to. Meanwhile, the chronic diseases referred variable (CD) included diseases such as hypertension, diabetes, heart disease, cancer, kidney problems and combinations of diseases referred as well as the number of diseases among the elderly (Yardim et al. 2009; Barros et al. 2011). Other demographic indicators (ODE) also included items such as gender, marital status, location, number of children and living arrangements (Arsenijevic et al. 2016; Wang et al. 2015; Yang et al. 2016) as depicted in Equation (2).

$$\log(\text{Total Cost}) = \alpha_0 + \beta_1 \text{Age} + \beta_2 \text{Edu} + 3 \log(\text{Inc}) + \delta_i \sum_{i=1}^{3} \text{HCU} + \delta_i \sum_{i=1}^{7} \text{CD} + \delta_i \sum_{i=1}^{5} \text{ODE} + \mu \qquad (2)$$

For more clarity, the following table, Table 1 presents the notation and a description of the variables used in the OLS regression model as alluded to above. The questionnaires were then subjected to SPSS analysis and the following results were obtained.

RESULTS AND DISCUSSIONS

The multi-stage design of the data collection process resulted in a final sample of 2274 respondents out of the 2322 older adults who were recruited for this study, after excluding the incomplete questionnaires. Table 2 and Table 3 show the descriptive analysis of the socio-demographic characteristics and the economic profiles for all of the respondents respectively. Most of the respondents were from Kelantan (31.5%) and only 20.8% were from Johor. Meanwhile, Perak and Selangor had approximately 23% and 24% of the respondents respectively. The mean age was 69 years old, which was in the young old category (60-69 years old). About half of the respondents were in that category of age. About 833 (36.6%) people were in the old-old category of age and only 6% (136 persons) were in the oldest old category.

Overall, the majority of the elderly were Malay (62%) and Muslim (63%) and 51.7% (1,175 elderly people) lived in an urban area. Following the national statistical data, the percentage of elderly women (52.2%) was higher than for elderly men (47.8%), but the difference was small at just 4.4%. In 2014, the DOSM reported that the total number of the elderly in Malaysia was 1,696,300, where males were 49.1% and females were 50.9%. The longer life expectancy of females compared to males was the main factor which influenced why the percentage of females was higher than males among the elderly in Malaysia. The WHO stated in 2015

TABLE 1. Notation and description variables

Notation	Variables of Interest	Description
Main Variables		
Age	Age	Young older (60-69 years) (Reference)
		Old-old (70-79 years)
		Oldest old (80 years and above)
Edu	Education level of the elderly	1=No formal education; 0=Else
	Yearly household income of elderly	
Inc		Continuous data on the yearly household income of the elderly (logarithm)
Other Variables		
HCU	Healthcare Utilisation	
	Number of visits	Number (continuous data)
	Number of admissions	Number (continuous data)
	Type of facilities	Government facilities (Reference)
		Private facilities
CD	Chronic Disease	
	Number of diseases	Number (continuous data)
	Diabetes Mellitus	1=Yes ; 0=Else
	Hypertension	1=Yes ; 0=Else
	Cardiovascular	1=Yes ; 0=Else
	Cancer	1=yes ; 0=Else
	Kidney failure	1=yes ; 0=Else
	Combination of diseases	1=yes ; 0=Else
	(Combination of diseases is while respondents visit to the healthcare services with combination of diseases referred such as diabetes and hypertension in the same time)	
ODE	Other Demographic Indicators	
	Gender	1=Female ; 0=Male
	Marital status	1= Married; 0=Else
	Location	1=Rural ; 0=Urban
	Living arrangement	1=Living with; 0=Living alone
	Number of children	Number (continuous data)

that the life expectancy, in Malaysia, for males was 72.7 years and 77.3 years for females.

As depicted in Tables 2 and 3, more than 50% of the elderly were married and still had their spouse, they had an education but at less than high school level, they were retired and had one to three income earners from their household members'. There were 40% of respondents who had 4 to 6 children and 57% of the elderly lived with their children and 62.5% still lived with their spouse. About 12.7% of the elderly were self-employed and 11.3% were housewives.

In the household income category, the majority of the elderly earnt a household income of less than RM1,000 a month. This situation caused them to be trapped into poverty – with a household income of RM950 and below, and; hardcore poverty – with a household income of RM600 and below. These two categories of poverty fall under the B40 classification level of household income. A total of 1079 (47.4%) of the elderly were in hardcore poverty and 195 elderly (9%) were in the poor category from the total of 94% of the sampled elderly who fell under the B40 category. Meanwhile, 4.4% and 1.2% of the elderly sampled fell under the M40 and T20 categories respectively. A lower number of earners in the household, retired status, being a housewife and not working were more likely to contribute to a lower income among the respondents. Briefly, the B40 income group comprised the households with an income below RM3,860. Meanwhile, the M40 group comprised of the households with an income level between RM3,860 to RM8,319. The T20 income group comprised of the households with an income of RM8,320 and above (Household Income and Expenditure Survey 2014, 2015).

TABLE 2. Descriptive analysis on socio demographic characteristics for elderly

Variables	n	%	Mean (S.D)
State and Strata			
Johor	472	20.8	
Perak	530	23.3	
Kelantan	717	31.5	
Selangor	555	24.4	
Location			
Rural	1099	48.3	
Urban	1175	51.7	
Gender			
Male	1088	47.8	
Female	1186	52.2	
Marital Status			
Single	37	1.6	
Married	1555	68.4	
Widow/Widower/Divorcee	682	30.0	
Age Group			69 (6)
Young Old (60-69)	1305	57.4	
Old-Old (70-79)	833	36.6	
Oldest Old (80 and above)	136	6.0	
Ethnicity			
Malay	1430	62.3	
Chinese	725	31.3	
Indian	114	5.0	
Others	5	0.2	
Religion			
Muslim	1435	63.1	
Buddhist	604	26.6	
Hindu	94	4.1	
Christian	94	4.1	
Others	47	2.1	
Education			
No Formal Education	475	20.9	
Less Than High School	1316	57.9	
High School Graduate	372	16.4	
More Than High School	111	4.9	
Number of Children			5.4 (2.9)
None	67	2.9	
1 to 3 Children	533	23.4	
4 to 6 Children	955	42.0	
7 to 9 Children	510	22.4	
10 to 12 Children	170	7.5	
More than 13 Children	39	1.7	

cont.

...cont. TABLE 2

Living Arrangement		
Alone	239	10.5
With Spouse	1421	62.5
With Children	1308	57.5
With Others	444	19.5

TABLE 3. Descriptive analysis on economic profile for elderly

Variables	n	%	Mean (S.D)
Employment Status			
Not working	176	7.7	
Employed full time	135	5.9	
Employed part time	95	4.2	
Self employed	289	12.7	
Help family members	9	0.4	
Others	3	0.1	
Students/Trainees/ Vocational school	1	0.0	
Retired	1309	57.6	
Housewife	257	11.3	
Disability	0	0.0	
Number of Earner			1.1 (1.3)
None	830	37.1	
1 to 3 households	1309	58.5	
4 to 6 households	85	3.8	
7 to 9 households	11	0.5	
More than 10 households	3	0.1	
Household Income (RM)			1,325.71 (2,362.46)
Less than RM400	700	30.8	
RM400-RM499	101	4.4	
RM500-RM699	291	12.8	
RM700-RM999	188	8.3	
RM1000-RM1999	539	23.7	
RM2000-RM2999	208	9.1	
RM3000-RM3999	119	5.2	
RM4000-RM4999	42	1.8	
More than RM5000	86	3.8	
Range Income			
B40	2145	94.3	
M40	101	4.4	
T20	28	1.2	

Meanwhile, almost 90% of the elderly self-reported that they were in a healthy condition. However, this study found that almost 50% of the elderly in community-dwellings were suffering from 1 to 2 diseases and only 30% were totally free from any diseases. As shown in Table 4, the top diagnosed disease was hypertension, followed by diabetes mellitus and high cholesterol. Heart disease, cancer and kidney failure were only 8.8%, 1.1% and 1.4% respectively. Because of their sicknesses and because they suffer from diseases, the elderly will seek treatment at the nearest healthcare services such as government hospitals and clinics, private hospitals and clinics, traditional medicine healers, alternative healthcare providers or over the counter services like pharmacies and 'sensei' shops. Table 5 presents the status of health care utilisation of the health care facilities among the elderly as outpatients or inpatients at 56.8% and 1.9% respectively. Besides that, some elderly (3.7%) utilised both outpatient and inpatient care, otherwise, 37.6% of the elderly had not used any health care services for a one year period before the survey was conducted.

Generally, many of the elderly had more than one disease diagnosed as shown in Table 6 where the combination of diseases referred was the second highest percentage (19%) in outpatient care, just after hypertension which affected 36.7% of the elderly. Other NCD or chronic diseases affected small percentages of the elderly such as cancer, kidney problems, heart disease and strokes. Overall, on average, the elderly sought outpatient care four to seven times per year and the length of stay in hospital was one day per year for inpatient care for all types of health care facilities respectively, as depicted in Table 7. However, other facilities such as over the counter services had on average eight visits per year by the elderly. Sometimes, they simply wanted fast treatment by buying medicines at a pharmacy or 'sensei' shop which is usually quick and easy.

When looking at the main issue of the cost of healthcare, Table 8 shows that on average, the health

TABLE 4. Health status and disease diagnosed for elderly

Variables	n	%
Physical Health Status		
Self-Rated: Healthy	2034	89.4
Self-Rated: Unhealthy	240	10.6
Number of Disease Diagnosed		
None	727	32.0
1-2 diseases	1065	46.8
3-4 diseases	433	19.0
More than 5 diseases	49	2.2
Diseases Diagnosed		
Hypertension	1042	45.8
Diabetes Mellitus	540	23.7
High Cholesterol	587	25.8
Heart Disease	199	8.8
Cancer	26	1.1
Asthma	115	5.1
Cataract	144	6.3
Kidney Problem	31	1.4
Arthritis	240	10.6
Stroke	28	1.2
Tuberculosis	7	0.3
Hearing/Vision Problem	110	4.8
Thyroid	32	1.4
Others Diseases	109	4.8

TABLE 5. Healthcare utilization among all elderly

Healthcare Utilization	n	%
None	855	37.6
Outpatient	1291	56.8
Inpatient	43	1.9
Both	85	3.7
Total	2274	100.0

TABLE 6. Outpatient care, inpatient care and diseases referred by elderly

Healthcare Utilization	Outpatient Care		Inpatient Care	
	n	%	n	%
Number of Visit/Admit	1376	60.5	128	5.6
Mean (SD)	5.7 (3.4)		1.3 (0.8)	
No Visit/No Admit	898	39.5	2146	94.4
Less than 4 times	748	32.9	126	5.5
5 to 9 times	270	11.9	2	0.1
More than 10 times	358	15.7	0	0
Diseases Referred				
Hypertension	835	36.7	11	0.5
Diabetes Mellitus	133	5.8	5	0.2
Heart Disease	31	1.4	12	0.5
Cancer	12	0.5	2	0.1
Asthma	32	1.4	6	0.3
Cataract	5	0.2	10	0.4
Kidney Problem	3	0.1	3	0.1
Arthritis	55	2.4	1	0.0
Stroke	2	0.1	1	0.0
Tuberculosis	2	0.1	-	-
Hearing Problem	2	0.1	-	-
Vision Problem	9	0.4	4	0.2
Others Diseases	338	14.9	71	3.1
Combination of Diseases	451	19.8	5	0.2

TABLE 7. Outpatient Care, Inpatient Care and Facilities Referred by Elderly

Facilities	Outpatient Care			Inpatient Care		
	n	%	Mean Visit (S.D)	n	%	Mean Admit (S.D)
Government Clinics	825	36.3	5.82 (3.30)	-	-	
Government Hospitals	384	16.9	5.56 (3.43)	106	4.7	1.36 (0.90)
Private Clinics	175	7.7	5.62 (3.69)	-	-	
Private Hospitals	25	1.1	4.96 (3.56)	22	1.0	1.23 (0.53)
Traditional Medicine Healer	11	0.5	5.09 (3.73)	-	-	
Alternative Healthcare Provider	3	0.1	5.33 (4.16)	-	-	
Others	35	1.5	7.83 (4.18)	-	-	

TABLE 8. The annual cost of outpatient and inpatient care for all elderly

Healthcare Utilization	n	Direct Cost	Indirect Cost	Total Cost
		Mean ± SD (Median)	Mean ± SD (Median)	Mean ± SD (Median)
Outpatient Care	1376	141.24 ± 1433.47 (23.20)	31.44 ± 89.41 (13.13)	172.68 ± 1437.93 (49.10)
Inpatient Care	128	2527.23 ± 10379.84 (18.92)	524.07 ± 1467.59 (163.46)	3051.31 ± 10568.10 (268.92)

care cost for inpatient care incurred by the elderly was more expensive than the outpatient care at RM172.68 and RM3,051 respectively. Overall, on average RM426.50 per year in costs were borne by the elderly in Malaysian community-dwellings for healthcare utilisation in either outpatient or inpatient care. Specifically, the direct cost for outpatient care was RM141.24 and RM2,527 for inpatient care. Meanwhile, the indirect costs for outpatient and inpatient care were RM31.44 and RM524.07 respectively. Some of the elderly who used private facilities chose to bear the higher costs when compared to government facilities. Obviously, the direct costs were higher than the indirect costs. This shows that the elderly incur high OOP expenses for their healthcare whether in government or private facilities. This study indicated the direct cost which is implies the OOP health expenditure was increased from the previous report by National Health and Morbidity Survey (NHMS) 2015 in term of OOP health expenditure per capita is only in range RM12 to RM15 for outpatient and inpatient care respectively.

Table 9 reports the result of the multiple regression model on the total healthcare costs among the elderly. Household income was the only main determinant that was significantly associated with total healthcare costs. The elderly with high household income spent more on healthcare than those elderly who had a lower household income. This relationship was in line with the Grossman Model which stated that income had a positive effect on the demand for healthcare services. Unfortunately, age and educational level were not statistically significant to the total healthcare costs. However, all of the healthcare

utilisation variables were statistically significant to healthcare costs. The variables were namely, the annual number of visits ($p<0.000$) and admissions ($p<0.000$) where the value of the coefficient for the number of admissions was almost 0.5 units. That meant that with a one unit increase in the number of admissions, the healthcare cost would increase by 0.5 units. As expected, the private healthcare services used were strongly significant ($p<0.000$) with a high coefficient which showed that for each unit of private facilities chosen by the elderly, that the healthcare cost would increase by 0.9 units as opposed to the government facilities. Even though the elderly were more likely to be referred to the government facilities rather than private facilities, but in terms of cost, the private facilities referred to were the most influential with regards to total healthcare costs among the elderly (Razali et al. 2012; Koris et al. 2017).

For the diseases referred variable, only cancer and kidney problems positively and significantly influenced the healthcare costs among the elderly at the 1% significance level and higher value of the coefficient. Even though cancer and kidney problems had small percentages of prevalence among the elderly, they were significant influences on the total cost of healthcare among the elderly. Koris et al. (2017) indicated that an elderly person with cancer was 10.3 times more likely to experience higher direct costs than a person without cancer or other diseases. The high cost of cancer treatment leads the elderly to incur higher healthcare costs because as is well known the treatment and medication for cancer is expensive compared to other diseases like hypertension,

TABLE 9. Determinants of health care cost among elderly

Variables	Logarithma Transformed Total Healthcare Costs		
	B	S.E.	p
Main Predictors Variables			
Old-old (70-79 years)	0.029	0.026	0.262
Oldest old (80 years and above)	-0.046	0.055	0.406
No Formal Education	0.017	0.118	0.617
Household Income	0.435***	0.026	0.000
Healthcare Utilisation Variables			
Number of Visits	0.066***	0.004	0.000
Number of Admissions	0.492***	0.027	0.000
Private Facilities Used	0.977***	0.068	0.000
Chronic Disease Variables			
Number of Diseases Diagnosed	0.006	0.010	0.534
Diabetes Mellitus	-0.055	0.043	0.200
Hypertension	-0.101***	0.031	0.001
Cardiovascular	0.030	0.072	0.676
Cancer	0.756***	0.125	0.000
Kidney Failure	0.618***	0.201	0.002
Combination of Diseases Referred	0.034	0.030	0.267
Other Demographic Variables			
Female	0.012	0.027	0.654
Married	-0.021	0.031	0.491
Rural	0.012	0.025	0.624
Living arrangement	0.063	0.044	0.147
Number of children	0.001	0.004	0.788
Constant	-0.417***	0.118	0.000
Cases in Model (n)	1419		
F-statistic; R^2	71.62; 0.493		

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

diabetes mellitus and cardiovascular disease. This situation can also cause the elderly to become trapped into CHE and poverty (Li et al. 2012; Minh et al. 2013; Li et al. 2014); Jacobs et al. (2016). Meanwhile, for hypertension, the negative sign at the 1% significance level showed that the disease had a lower impact compared to other diseases against the healthcare costs among the elderly. The lower impact of hypertension may be because the treatment and medication are normally fully subsidised for patients in government facilities. For instance, when compared to cancer treatment where the patient has to

pay for certain medicines and treatments even though they are being treated at government facilities and while in private facilities they have to pay the entire costs. On the other hand, all of the variables for other demographic indicators such as gender, marital status, living location, number of children and living arrangements were not significant determinants of healthcare cost. Overall, the model with all of the predictors produced $R^2 = 0.493$, F $(19, 1399) = 71.62$ ().

This discovery was established by the findings of Cutler (2001) and Moïse and Jacobzone (2003) which detailed that the elderly would consume a greater volume of healthcare facilities and spend more money on healthcare services compared to younger people, not because they were older, but because they were sick.

CONCLUSION

The ageing challenges that most countries are facing include the higher prevalence of comorbidities among the elderly which influence higher costs of healthcare expenditure. The delivery of appropriate medical and welfare care to the elderly, the human resources required for long-term caregiving and the funding for such care also cause a significant impact on society and the government. This community survey enabled study on various aspects of older people in Peninsular Malaysia such as their sociodemographic profile, health status and health care utilisation. Besides that, the cost of healthcare was also highlighted and the determinant of healthcare costs were explored. Generally, the direct costs of healthcare utilisation were higher when compared to the indirect costs when the elderly sought treatment as outpatients whether in government or private facilities.

In terms of financial hardship, for those among the elderly with comorbidities who are trapped into catastrophic health expenditure, the authorities should provide specific insurance for the elderly where a portion of the insurance premium payment should be shared by each of their children. Appropriate insurances such as medical care insurance which covers all outpatient and inpatient care expenses and long-term care insurance covering the absence of post-discharge carers or a lack of adequate care facilities are essential for the elderly. The current insurance scheme does not cover outpatient care and medication expenses. Most OOP healthcare expenditure, especially for private facilities, is incurred by the elderly or their families. This recommendation implies a social exchange between the elderly and their children to strengthen the relationships.

Consequently, subsidised healthcare expenditure by the government would help the disadvantaged subgroups of the older population such as minorities, women, and those who are poor, to seek outpatient treatment in private facilities. The findings from this study indicated

that the elderly spent around RM426.50 as the overall cost of healthcare facilities per year. Thus, the effort from the State Government of Selangor which provides the Healthy Care Scheme (*Skim Peduli Sihat*) for the people of Selangor is exemplary and should be expanded throughout Malaysia. The scheme provides RM500 for families and RM200 for individuals annually to cover unlimited medical treatment in private facilities. This amount is at least able to lighten the financial burden for those elderly who are trapped into CHE and who are unable to bear the burden of their healthcare costs. Not only that, the carers who are taking care of the elderly also receive the benefits of this scheme.

The impact of diseases and the burden of health care costs for the elderly physically, psychologically and economically on patients, caregivers, families and finally society should be taken seriously and considered when devising public health policies for the future. Consequently, although the percentage of Malaysian total health care expenditure to GDP is less than 5 per cent, however, the trends of ageing and the burden of the costs of its associated diseases that have been discussed above have given an impact that is alarming and should be recognised by individuals and society. By quantifying the costs of health care expenditure for the elderly using local and current data based on good underlying sources together with an appropriate methodology can contribute and provide policymakers and society with valuable information. In the meantime, hopefully, all of the missions for the provision of government policy for the elderly in Malaysia will be achieved. There are a few relevant policies namely the National Elderly Policy, National Action Plans for the Elderly and National Health Policy for Older Persons. Generally, each of these policies has emphasised the commitment by the Government to create self-sufficiency among the elderly, healthy ageing, active ageing and productive ageing to achieve rising living standards with increased quality of life and productivity in accordance with the 4th National Key Results Areas (NKRA) and Vision 2020, as well as the most important the cost of health care, would be reduced. Therefore, these findings highlight the importance of further research aimed at decreasing the prevalence and severity of diseases among the elderly in the community-dwelling at may reduce healthcare costs.

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NOTES

[1] Refer to the Malaysia Treasury Circular Letter, WP 1.4/2013 for class C where vehicle cylinder capacity (cc) is lower than 1,000cc.

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