

Article

Analysing the multifaceted determinants of exorbitant medical expenses among senior citizens in Malaysia

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Abstract: This article analyses the complex factors contributing to rising medical expenses, focusing on the senior citizen demographic in Malaysia. With the global aging population, notably in lower and middle-income countries, the study highlights the escalating medical and health insurance costs, driven by age, income source, modern healthcare, and geographical residence. The research draws on an extensive literature review, demographic analysis, and quantitative methods to examine these determinants. It critically analyzes Malaysia's healthcare system, which operates on a dual-tier model, and the financial burden placed on senior citizens. The findings indicate that age, source of income, and geographical residence significantly influence medical expenses, whereas modern healthcare's impact is not statistically significant. The study calls for government intervention, insurance industry adjustments, and private sector support to mitigate the financial strain on senior citizens. Recommendations include tax relief adjustments, National Health Insurance Scheme implementation, and employment sustainability for seniors. This research provides some recommendations to policymaking, the insurance industry, and academia by providing insights into managing the healthcare needs of an aging population sustainably.

Keywords: senior citizens; well-being; human health; sustainable healthcare; medical expenses

1. Introduction

A World Health Organization (WHO) report on Ageing and Health in 2022 reported that the population is living longer globally. The number of senior citizens is increasing in every nation on earth, with low and middle-income countries, including Malaysia, changing the most, where two-thirds of the world's population over 60 are expected to reside by the year 2050. The WHO (2020) report also mentioned that as people get older, they are more prone to encounter various health diseases concurrently termed geriatric syndromes, defined by the appearance of multiple complex health issues simultaneously. Globally, AON Plc's 2023 Global Medical Trend Rates Report has predicted that medical trend rates will increase worldwide in 2023, as shown in **Figure 1**. The anticipated medical trend rate for the entire world in 2023 is 9.2%, up from 7.4% in 2022, the highest level since 2015. There are also significant increases in Europe (9.1%, up from 5.6%), the Middle East and Africa (14.5% from 11.1%), and Asia Pacific (up to 9.2% from 8.2% in 2022).

AON	2022			2023		
	Annual General Inflation Rate	Annual Medical Trend Rates		Annual General Inflation Rate	Annual Medical Trend Rates	
		Gross	Net		Gross	Net
Global	2.4	7.4	5.0	3.6	9.2	5.6
North America	2.3	6.6	4.3	2.8	6.6	3.8
Asia-Pacific (APAC)	2.4	8.2	5.8	3.0	9.2	6.2
Europe	1.8	5.6	3.8	3.8	9.1	5.3
Latin America & Caribbean (LAC)	3.2	10.6	7.4	4.3	11.6	7.3
Middle East & Africa (MEA)	5.0	11.1	6.1	6.4	14.5	8.1

Figure 1. Average medical trend rates—Global (AON, 2023).

Medical expenses refer to all costs incurred for the prevention or treatment of illness or injury, including direct costs for medical treatment such as surgery, hospitalization charges (Mustafa et al., 2019), and out-of-pocket expenses for promotive, preventive, curative, rehabilitative, palliative (or long-term), or laboratory services for the treatment. In Malaysia, the low-income B40 group, which includes senior citizens, is more affected by health issues and out-of-pocket (OOP) health expenses. Sometimes the medical costs are so exorbitant (Koris et al., 2019) that households cannot afford them, which puts them in a financial bind (Said et al., 2020). According to Ismail et al. (2021), the elderly face high medical costs.

Healthcare in Malaysia is operated under a dual-tier system comprising private and public healthcare sectors (Bahrain et al., 2021). Public healthcare costs are heavily subsidized, and as a result, public health services are cheaper. However, the services are often overcrowded and utilized mostly by senior citizens and those with low financial resources or without medical insurance coverage (Sayuti et al., 2022). Private healthcare costs that patients prefer (Baharin et al., 2021) can be prohibitive for vulnerable groups such as senior citizens and low-income earners. The 3.6 million senior citizens in Malaysia (DOSM, 2023) are facing increasing exorbitant medical expenses (Koris et al., 2019). As the aging population ages, they incur more medical expenses as they are more prone to illnesses and require more medical treatment (Ismail et al., 2021). Senior citizens are finding these medical expenses exorbitant and becoming a huge financial burden as they form a big portion of their source of income (Samsudin et al., 2022).

The practical contributions provide a better insight into the relationships between the multifaceted determinants of age, source of income, modern healthcare, geographical residence, and the exorbitant cost of medical expenses among senior citizens in Malaysia. After the data analysis, the relationships identified upon each factor determine the level of influence of the multifaceted determinants to the exorbitant medical expenses. Subsequently, for effective solutions to reduce the exorbitant costs, more emphasis should be placed on mitigating the level of impact from the main determinants. The results from this research can be used further to assist policymakers in implementing more effective and beneficial public policies to reduce senior citizens' financial and social impact. This research will also strengthen the current limited knowledge on the research topic for the benefit of further researchers

who intend to improve the well-being of senior citizens.

Research objectives

RO1: To examine the influence of Age on the exorbitant medical expenses among senior citizens in Malaysia.

RO2: To examine the influence of Source of Income on the exorbitant medical expenses among senior citizens in Malaysia.

RO3: To examine the influence of Modern Healthcare on the exorbitant medical expenses among senior citizens in Malaysia.

RO4: To examine the influence of Geographical Residence on the exorbitant medical expenses among senior citizens in Malaysia.

2. Literature review

2.1. Exorbitant medical expenses

Many people believe that having access to healthcare when necessary is a fundamental human right and expect this to be provided by the Government. Malaysia does not provide free medical care for its citizens but does so on a subsidized basis at Government clinics and hospitals (Baharin et al., 2021). Depending on the nature of the medical problem, these medical expenses may range from minimal to high, and people usually may need financial support for their medical expenses needs (Ismail et al., 2021). As the country progressed through its economic growth, it also brought about modernization and healthcare improvements for its citizens' welfare. Modern healthcare involves heavier expenditures (Yorulmaz and Mohamed, 2019), and Malaysia reported an expenditure of RM 36.1 billion in 2023 for health-related allocations in the Revised Malaysia Budget 2023 (Figure 2). Due to their age and lack of regular sources of income, senior citizens still require modern healthcare (Koris et al., 2019) but still find the medical expenses exorbitant.

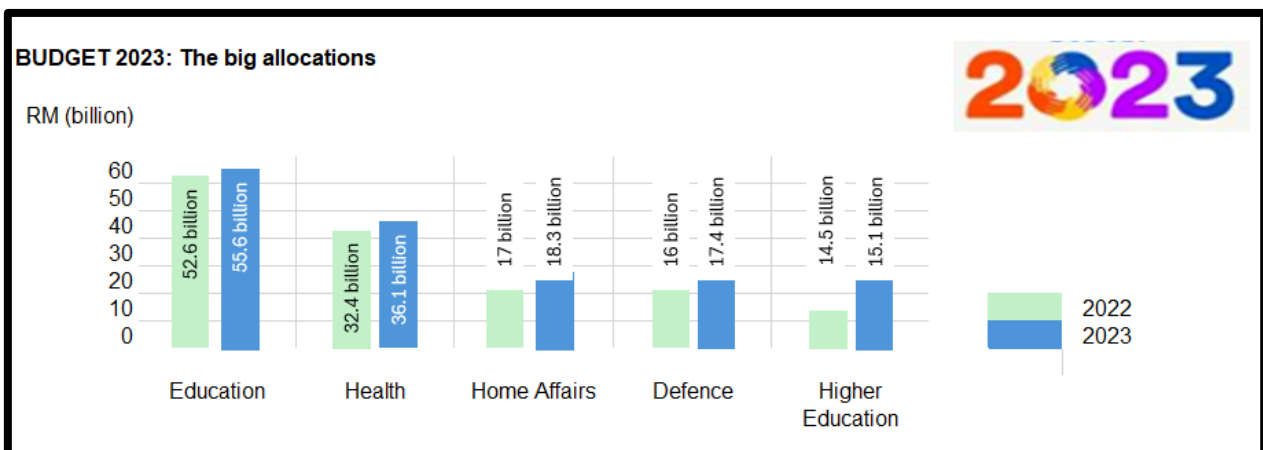


Figure 2. 2023 Revised Budget Health Allocations (MOF, 2023).

2.2. Malaysia perspective

In Malaysia, the Government provides subsidized medical care at Government hospitals (Baharin et al., 2022). The health sector has received a sizable budgetary

allocation of RM 36.1 billion from the Government of Malaysia in the 2023 Revised Budget. In the 2020 National Health and Morbidity Survey of 2019 report by the Ministry of Health Malaysia, the findings revealed that paying for healthcare by households took up 5.1% of their total monthly expenditure. The survey mentioned that 81% used their current income to pay for these services, 36% were financed from savings, and 11% used borrowings. Regarding personal health insurance coverage, only 22% of the population sample had personal insurance coverage. Among the reasons for not having health insurance, an alarming 36% felt they do not need personal health insurance, while an astronomical 43% of respondents could not afford it.

It was also noted that 40% of those who used outpatient services were senior citizens aged 60 and above. The exorbitant cost of medical expenses is eating into the household incomes in Malaysia (Said et al., 2020). Having one or two senior citizens in the household carries a risk of 1.94 times distress financing exposure compared to a 1.59 rate without senior citizens (Mohd Hassan et al., 2022). To offset the cost of medical expenses in Malaysia, the public should take up medical and health insurance (Mustafa et al., 2022). The exorbitant medical expenses burden senior citizens (Samsudin et al., 2022). A big portion of their savings are spent on medical expenses due to the exorbitant costs, according to the National Health and Morbidity Survey 2019.

2.3. Medical and health insurance premiums

In Malaysia, senior citizens subscribe for medical and health insurance coverage to offset their out-of-pocket expenses (Mustafa et al., 2022). However, due to their age being 60 years and above, the insurance coverage are much more exorbitant than those below 60 years. As indicated in **Figure 3**, a compilation of medical insurance premiums taken from a sample of fourteen major insurance companies in Malaysia, six out of the fourteen (43%) insurance companies do not even provide coverage for senior citizens due to the high risk of medical issues. For comparison, medical premiums rise significantly from 55 years gradually until reaching 60 years, with an increased average of 51%. Once a person is deemed a senior citizen (60 years and above), the premiums increase by an average of 35%, where senior citizens pay five times more on average for medical insurance premiums than a person 30 years of age (Mustafa et al., 2022) (see **Table 1**).

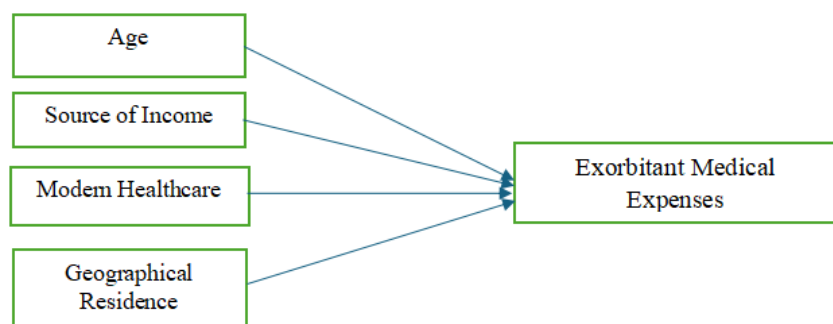


Figure 3. Theoretical framework.

Source: Research compilation (2023).

Table 1. Comparison of Malaysian insurance company's medical insurance premiums for senior citizens (iMoney, 2023).

No.	Insurance company	Limit (RM'000)	Age 30	Age 55	Age 60	Age > 60	% Increase (55 to 60 yrs)	% Increase after 60 yrs)
1	AIA GENERAL	500	702	674	2263	3435	236%	52%
2	AMETLIFE	1750	984	2085	3768	4821	81%	28%
3	FWD TAKAFUL	50	792	2112	2796	NA	32%	Not eligible
4	GENERALI	60	733	3946	5665	NA	44%	Not eligible
5	GREAT EASTERN GENERAL	90	521	1215	1675	NA	38%	Not eligible
6	GREAT EASTERN TAKAFUL	90	1308	2876	3965	5948	38%	50%
7	HONG LEONG	75	663	1704	2087	2744	22%	31%
8	MANULIFE	1000	1074	2681	3480	4113	30%	18%
9	MAYBANK	40	364	955	1233	NA	29%	Not eligible
10	MSIG	150	842	1381	1842	NA	33%	Not eligible
11	PACIFIC	1000	801	2177	3302	4997	52%	51%
12	PRUDENTIAL	NA	1632	4086	5064	6099	24%	20%
13	TOKIO MARINE	40	599	1419	1859	2374	31%	28%
14	ZURICH GENERAL	100	1290	3223	3838	NA	19%	Not eligible
	Average	380.00	879	2181	3060	4316	51%	35%

Source: Mustafa et al. (2022).

2.4. Relational factors with exorbitant medical expenses

Relational factors in this research was found in various research findings. Exorbitant medical expenses (Koris et al., 2019) are determined by four main factors, age (Ismail et al., 2021), source of income (Samsudin et al., 2022), modern healthcare (Koris et al., 2019) and geographical residence (Sayuti et al., 2022). The provision of medical services, whether public or private, finds that it costs more to treat senior citizens as they are more susceptible to illness (Ismail et al., 2021). Exorbitant medical expenses are a worldwide phenomenon that is increasing annually due to the global aging population growth, as reported by the WHO in the Report on Ageing and Health, 2022. As the population grows older, modern healthcare facilities and services are needed to meet the medical treatment demands, leading to increase costs. Among the factors that have led to exorbitant medical expenses are:

(1) Economic growth—A country's economic growth results from increased economic production and indicated by the increase in its Gross Domestic Product (GDP). An increase in the country's productivity leads to an increase in human capital and economic development, resulting in increased demand and higher costs.

(2) Government spending—Government spending on health services and infrastructure allows for the provision of health services and infrastructure for the population (Yorulmaz et. al. 2019). The availability of such services requires more provisioning of medicine and facilities, increasing demand and resulting in higher medical expenses borne by the public.

(3) Availability of Medical and Health insurance—Medical insurance pertains to mainly hospitalization benefits only. In contrast, health insurance pertains to additional benefits such as injuries, maternity care, or health support equipment such

as wheelchairs. Since these services are provided on a commercial basis, the health risks of senior citizens are higher (Mohd Hassan et al., 2022), making it difficult to pay for the high insurance premiums.

2.4.1. Age

As people age, they are more prone to illnesses and require more medical treatments. With this in mind, medical expenses for older people, especially senior citizens, are higher when they grow older (Ismail et al., 2021). This makes age a major determinant of the cost of medical expenses, and this research examines its influence.

As a result, public or private hospitals charges more and passes on the expense back to senior citizens. To cover such exorbitant costs, senior citizens need medical insurance coverage (Mustafa et al., 2022). However, in this instance, the premiums come at exorbitant rates for senior citizens. As illustrated in **Figure 3**, patients less than 60 years old pay a lower premium, while senior citizens who are 60 years and above pay up to five times more on average as associated with the high risk of older people and having to pay more for medical expenses (Koris et al., 2019).

Another aspect that makes age a determinant of the cost of medical expenses is that when a person is younger, they are generally much fitter and are more tolerant to diseases. This research focused on identifying three age ranges of senior citizens, i.e., from 60 to 65 years, 66 to 70 years, and 70 years and above. One reason for doing this is to determine the capability of these age groups of senior citizens, as the 'younger' senior citizens would have just retired with more income and physical ability being 'younger' as compared to the other two age groups.

H1: Age has a positive influence on the exorbitant medical expenses among senior citizens in Malaysia.

2.4.2. Source of income

Medical expenses are paid out of household income, and the main source of income is through regular employment. Without a regular income, it is a financial burden to them (Samsudin et al., 2022). Hence, they find medical expenses exorbitant as income greatly influences the choice of healthcare (Koris et al., 2019). The second research objective was thus defined as:

Without medical protection, senior citizens had to seek cheaper public healthcare (Baharin et al., 2021). Senior citizens who have retired, rely mainly on their pensions or savings, and any medical expenses for high treatment costs will be a financial burden on them (Samsudin et al., 2022). In the recent 2023 revised Malaysia Budget, the Government raised the amount of medical expense relief from RM8000 to RM10,000 to help offset the cost of medical expenses.

H2: Source of Income has a positive influence on the Exorbitant Medical Expenses among senior citizens in Malaysia.

2.4.3. Modern healthcare

Malaysia's government provides public health care to its citizens at subsidized rates much cheaper than private health care (Mohd Hassan et al., 2022). The services at Government health facilities are often crowded, and medical attention is delayed (Said et al., 2020). The third research objective examined the influence of Modern Healthcare.

The government has a commitment to protect the livelihood of the rakyat by enhancing a caring and compassionate society. It has promised to address the high cost of living to further strengthen the social safety net by having the second highest budget expenditure allocation of RM 36.1 billion for the Health Ministry under the 2023 Revised Budget (MOF). This included the Bantuan Keluarga Malaysia (BKM) to alleviate the financial burden of the low-income B40 group, which will include 1.2 million senior citizens. As the population grows older, there is an increase in the consumption of modern healthcare services (Koris et al., 2019).

H3: Modern Healthcare has positive influences the Exorbitant Medical Expenses among senior citizens in Malaysia.

2.4.4. Geographical residence

The geographical residence refers to where the population resides. A study by Sayuti et al. (2022) indicated that out-of-pocket health expenditures were higher in urban households than in rural households due to the increased usage of public health services in rural areas or the disparity in income and purchasing power between urban and rural populations which formed the basis of the fourth research objective:

A higher concentration of private healthcare institutions in urban areas also increased out-of-pocket medical expenses among urban residents due to the strong demand for such services. Urban areas' health facilities are more accessible (Baharin et al., 2021) than non-urban areas. As such, the concentration of residents in urban areas has better and quicker access to health services, saving time for visits and reducing stress. The older age population is growing each year, with an expectation that senior citizens will comprise 16% of Malaysia's total population by 2030 (Loke et al., 2021).

H4: Geographical residence has a positive influence on the exorbitant medical expenses among senior citizens in Malaysia.

2.5. Theoretical justification

2.5.1. Theory of price

Medical expenses are associated with costs or prices. The theory of price in microeconomics refers to the relationship between supply and demand (Smith, 2018). Price will increase if demand exceeds supply, and when supply exceeds demand, the price will decrease. This theory relates to the relationship between the medical needs of senior citizens and the price or cost of medical expenses. Senior citizens' demand for medical services increases as they grow older (Koris et al., 2019). However, few medical service providers, i.e., private hospitals, are willing to supply them due to the high costs involved unless they are covered by medical insurance (Mustafa et al., 2022).

2.5.2. Theory of planned behaviour

The second adopted theory was the theory of planned behavior (Ajzen, 1991). It relates that a person's intention influences human behavior and that attitude towards the behavior, subjective norms, and perceived behavioral control determines human intentions. For example, people still intend to go to public healthcare services, although it takes longer time for treatment (Mohd Hassan et al., 2022). According to the Theory of Planned Behaviour, people behave rationally by their attitudes, arbitrary

standards, and perceived behavioral control. Although not often actively or consciously considered, these elements serve as the framework for making decisions. The individual's purpose in carrying out a specific behavior is a key component in planned behavior. The motivational variables that drive behavior are thought to be captured by intentions, indicating how much effort a person is prepared to put forth to carry out the behavior.

3. Methodology

This research was a quantitative research-based descriptive study using a survey to determine the factors influencing the exorbitant medical expenses among senior citizens in Malaysia. According to the Department of Statistics, Malaysia (DOSM, 2022), there are 3.6 million senior citizens in Malaysia. The respondents selected were focused on three age groups, i.e., 60–65 years, 66–70 years, and 70 years and above. This was to analyze their affordability and physical health conditions as those who had just retired had fresh funds from their savings and were fitter than the older senior citizens. The study adopted a non-probability convenient sampling method. Based on Krejcie and Morgan (1970), the minimum sample required for this study was 384 responses. The research survey was conducted online using Google Forms over a three-month period from May 2023 to July 2024, obtaining 396 out of 400 responses and giving a response rate of 99%. An introduction at the beginning of the survey form that the research complied with the Ethics protocols of the University, allowed respondents to provide their consent to the survey, and no personal data were requested from respondents. The instrument for exorbitant medical expenses (DV) was adapted from Koris et al. (2019) and Tan et al. (2007). Whereas independent variables, Age adapted from Ismail et al. (2021) and Selvaratnam et al. (2012); Source of Income adapted from Samsudin et al. (2022) and Tan et al. (2007); Modern Healthcare adapted from Koris et al. (2019) and Tumin et al. (2016); Geographical Residence adapted from Sayuti et al. (2022) and Tumin et al. (2016). All statistical data analyses were kept within the control of the researcher. The primary data was analyzed using Smart PIs version 4.0. A Pilot Study was conducted on the initial results, which met the Kaiser-Meyer-Olkin (KMO) sampling adequacy target of >0.6 ; Cronbach Alpha values of >0.6 for data reliability and Pearson's Correlation Coefficient validity levels showing positive correlation levels and being statistically significant.

3.1. Ethical approval

The researchers involved human participants and hence obtained ethical approval for this study. All data were collected according to INTI International University's Faculty Research & Ethics Panel guidelines, and the approval number is INTI/UEC/2024/006. This committee is transparent in its functioning, independent of the researcher, and its members are duly qualified. After the end of the study, the researcher submitted the final report to the committee containing a summary of the study's findings and conclusions. The researchers have taken measures to protect the privacy of research updates and the confidentiality of the personal information of the targeted respondents.

3.2. Informed consent

The researchers informed the purpose of the study and received consent from target respondents, who were all interested and gave information voluntarily to be considered as target respondents. The researchers have received verbal approval from target respondents for the study.

4. Result

4.1. Demographic profile

A target was set to obtain 400 responses for the research analysis, with a minimum of 384 responses to ensure a buffer for invalid responses. 396 responses were received, indicated by a high response rate of 99%. Among the 396 participants surveyed, 58.8% identified as male and 41.2% as female. The predominant age group was ‘60 to 65 years,’ encompassing 61.9% of respondents. Meanwhile, 24.7% fell within the ‘66 to 70 years’ category, and 13.4% were ‘70 years and above.’ Ethnically, the cohort was primarily Chinese, accounting for 64.4% of participants, followed by Malays (16.9%), Indians (15.7%), and others (3%). Notably, the Malay-to-Chinese respondents’ ratio was inversely related to the senior population’s ethnic distribution in Malaysia, which stands at 7:2 (Department of Statistics Malaysia, 2022). In terms of employment status, 48.7% of respondents were employed, while 51.3% were retired or no longer working. Most % of these employed respondents, 82.8%, were in the private sector, with the remaining 17.2% in the public sector. Geographically, 87.1% of respondents resided in urban areas, compared to 12.9% in non-urban locales (refer to **Figure 4** and **Table 1**).

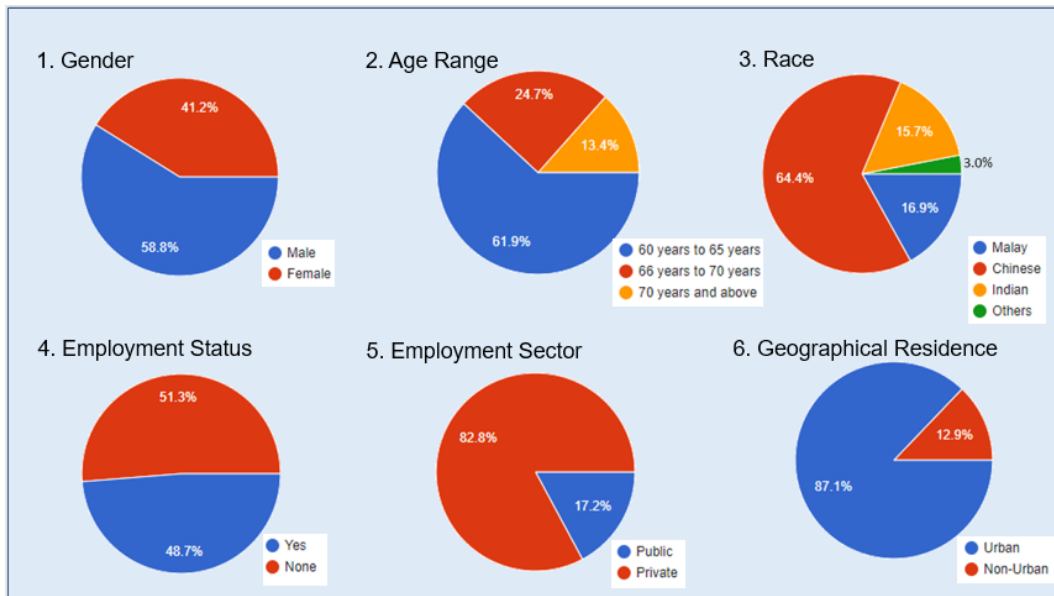


Figure 4. Demographic results summary.

Source: Research survey (2023).

4.2. Construct reliability and validity

Several essential metrics were utilized to evaluate our study’s construct reliability and validity, including Cronbach’s Alpha, Average Variance Extracted (AVE), and

Composite Reliability (rho_a and rho_c). The internal consistency of item sets was assessed using Cronbach’s Alpha, which revealed varying degrees of coherence amongst constructs. With alphas of 0.634 and 0.463, AG and GR showed less consistency than desired, indicating the need to reassess these constructs. On the other hand, ME and MH showed good internal consistency, even though MH’s alpha was 0.944, suggesting that some items were redundant. In some circumstances, the rather subpar alpha for SI (0.696) might be considered acceptable.

We also examined construct reliability using Composite Reliability measures (rho_a and rho_c), which consider varying item loadings on constructs in contrast to Cronbach’s Alpha. Every construct exhibited CR values higher than the threshold of 0.7, signifying strong internal consistency. The differences between Cronbach’s Alpha and CR measures for particular constructs could indicate unequal item contributions or constraints in the underlying assumptions of Cronbach’s Alpha. The AVE metric, examining the variance a concept extracts from its indicators relative to measurement error, showed all constructs with values over 0.5, emphasizing satisfactory convergent validity. Thus, despite minor concerns with internal consistency as demonstrated by Cronbach’s Alpha, the overall construct reliability and validity are validated by CR and AVE measurements. However, the low alpha values for AG and notably GR, coupled with the probable redundancy in MH, call for a careful evaluation and maybe more data collection to develop the measurement model, ensuring each construct accurately embodies the desired theoretical concept (refer to **Table 2**).

Table 2. Demographic profile.

Demographic	Category	Frequency	Percent %
Gender	Male	233	58.8
	Female	163	41.2
Age Range	60 yrs to 65 yrs	245	61.9
	66 yrs to 70 yrs	98	24.7
	70 and above	53	13.4
Race	Malay	67	16.9
	Chinese	255	64.4
	Indian	62	15.7
Employment Status	Others	12	3.0
	Yes	193	48.7
Employment Sector	None	203	51.3
	Public	68	17.2
Geographical Residence	Private	328	82.8
	Urban	345	87.1
	Non-Urban	51	12.9

Source: Author’s compilation.

4.3. Discriminant validity

We evaluated discriminant validity using the Heterotrait-Monotrait ratio (HTMT) criterion based on **Table 3**. The degree to which constructs in a particular model are expected to be different and distinct is evaluated by discriminant validity. The ratio of

within-trait correlations to between-trait correlations, or HTMT values, provides information on how distinct each construct is from the others. Per the established rules, discriminant validity is deemed good when the HTMT value is less than 0.85, indicating a sufficiently distinct set of notions. All HTMT ratios, including those between AG and GR (0.094), AG and ME (0.548), and even across constructs with larger correlations, such as SI and MH (0.429), are considerably below the 0.85 threshold, according to our findings, indicating good discriminant validity within our model. These low ratios between various constructions indicate that each construct captures a unique dimension, confirming the constructs’ distinctness and theoretical separation. This strong discriminant validity indicates a clearly defined conceptual structure where constructs do not considerably overlap in what they measure, which supports the validity of our study’s theoretical framework and the reliability of our construct assessments.

Table 3. Construct reliability and validity.

	Cronbach’s alpha	Composite reliability (rho a)	Composite reliability (rho_c)	Average variance extracted (AVE)
AG (Age)	0.634	0.679	0.842	0.728
GR (Geographical Residence)	0.463	0.464	0.788	0.651
ME (Medical Expenses)	0.782	0.792	0.858	0.603
MH (Modern Healthcare)	0.944	0.962	0.973	0.946
SI (Source of Income)	0.696	0.705	0.828	0.617

Source: Compiled from SmartPLS Analysis.

Our study’s use of the Fornell-Larcker criterion offers a rigorous test for discriminant validity. It compares the correlations between the constructs and the square root of the Average Variance Extracted (AVE) for every construct. In order to ensure that constructions have a stronger relationship with their indicators than with other constructs, the square root of the AVE for each construct must be bigger than its highest correlation with any other construct in order to have sufficient discriminant validity. According to our analysis, each of the constructs—AG (0.853), GR (0.807), ME (0.776), MH (0.973), and SI (0.785)—has diagonal elements (the square root of AVEs) that are bigger than their off-diagonal elements, which indicate correlations with other constructs. This is shown in **Table 4**. This meets the Fornell-Larcker requirement for discriminant validity across our constructs. The MH construct is unique, as evidenced by the negative correlations it has been found to have with other constructs (e.g., -0.121 with AG and -0.334 with SI). These correlations may indicate that the MH and other constructs have different conceptual underpinnings or measurement domains.

Though the Fornell-Larcker criterion is met, showing strong discriminant validity, critical reflection indicates that negative correlations (e.g., MH with AG, GR, ME, and SI) need more investigation. These negative values may indicate inverse correlations or the complexity of the constructs that the model cannot reflect fully, raising concerns about the constructs’ theoretical underpinnings and conceptual distinctiveness. These realizations highlight how crucial it is to have a thorough theoretical framework and a sophisticated operationalization of the constructs to

appropriately capture the complex nature of the constructs and their relationships (see **Table 4**).

Table 4. Discriminant validity—Heterotrait-monotrait ratio (HTMT)—Matrix.

	AG	GR	ME	MH	SI
AG					
GR	0.094				
ME	0.548	0.235			
MH	0.144	0.071	0.156		
SI	0.208	0.142	0.342	0.429	

Source: Compiled from SmartPls Analysis.

4.4. Path coefficients—Mean, STDEV, T values, p values

Our study’s examination of path coefficients in **Table 5** provides informative assessments of the connections between the constructs, highlighting the direction, strength, and statistical significance. Originally, sample path coefficients, their means, standard deviations (STDEV), *T* statistics, and accompanying *p*-values are displayed in **Table 6**, which thoroughly evaluates the paths our structural model suggests. A critical evaluation of the results reveals a strong, positive, and statistically significant association between AG and ME, with a path coefficient of 0.353, a *T* statistic of 5.865, and a *p*-value of 0.000, indicating a considerable influence of AG on ME. Similarly, with *T* statistics of 3.860 and 4.745, respectively, the routes from GR → ME (0.155) and SI → ME (0.207) are also positive and statistically significant, suggesting that GR and SI have significant, albeit differentiable, effects on ME.

Table 5. Discriminant validity—Fornell-Larcker criterion.

	AG	GR	ME	MH	SI
AG00	0.853				
GR00	0.045	0.807			
ME00	0.400	0.150	0.776		
MH00	-0.121	-0.011	-0.136	0.973	
SI00	0.144	-0.058	0.262	-0.334	0.785

Source: Compiled from SmartPls Analysis.

Table 6. Path coefficients—Mean, STDEV, T values, p values.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
AG → ME	0.353	0.353	0.060	5.865	0.000
GR → ME	0.155	0.157	0.040	3.860	0.000
MH → ME	-0.064	-0.069	0.045	1.426	0.154
SI → ME	0.207	0.212	0.044	4.745	0.000

Source: Compiled from SmartPls Analysis.

On the other hand, a lower *T* statistic (1.426) indicates that the path from MH → ME is negative (-0.064) and not statistically significant (*p*-value of 0.154), indicating that MH has no statistically significant impact on ME. This lack of relevance raises

concerns about the theoretical foundations of the anticipated association between MH and ME, suggesting that either the complexity of the relationship is not sufficiently captured by the current model design or there may have been a mistake in the theoretical framework of the model. The range of path strengths and their significant levels highlight the complex interactions between these constructs, indicating that although AG, GR, and SI are important factors affecting ME, the expected effect of MH on ME is not supported by the current model parameters. This finding demands a critical reevaluation of the theoretical presumptions that connect MH and ME. It may also call for a more thorough qualitative investigation or the investigation of mediating/moderating variables to better clarify their relationship's nature.

4.5. Hypothesis interpretation

H1: Age has a positive influence on the exorbitant medical expenses among senior citizens in Malaysia.

The hypothesis testing on Age in **Table 6** showed the Beta Coefficient and Significance (Sig.) values of 0.353 and 0.000, respectively. Since the Sig. a value of 0.000 was less than the p -value of 0.05. Hence, the H1 hypothesis was accepted, and it was concluded that age had a positive significant influence on exorbitant medical expenses among senior citizens in Malaysia. Interestingly, previous research also supported the findings that Age influences the cost of health care among the older population (Ismail et al., 2021) as the older the person, the more the person will be prone to illness, leading to more allocation for medical expenses.

H2: Source of Income has a positive influence on the Exorbitant Medical Expenses among senior citizens in Malaysia.

The hypothesis testing on the Source of Income in **Table 6** showed the Beta Coefficient and Significance (Sig.) values of 0.207 and 0.000, respectively. Since the Sig. value of 0.000 was less than the p -value of 0.05. Hence, the H2 hypothesis was accepted, and it was concluded that the Source of Income has an influence on Exorbitant Medical Expenses among senior citizens in Malaysia. Previous research supported the findings that the Source of Income influences exorbitant medical expenses where spending on medical expenses depends on the source of income (Samsudin et al., 2022).

H3: Modern Healthcare has positive influences on the Exorbitant Medical Expenses among senior citizens in Malaysia.

The hypothesis testing on Modern Healthcare in **Table 6** showed the Beta Coefficient and Significance (Sig.) values of -0.064 and -0.069 , respectively. Since the Sig. value of 0.154 was greater than the p -value of 0.05. Hence, the H3 hypothesis was rejected and concluded that Modern Healthcare do not influence Exorbitant Medical Expenses among senior citizens in Malaysia. Previous research has supported findings that Modern Healthcare does have an influence on exorbitant medical expenses where the prevalence of diseases increases with age and leads to a higher demand for modern healthcare services thus increasing the cost of medical expenses (Koris et. al. 2019).

H4: Geographical residence has a positive influence on the exorbitant medical expenses among senior citizens in Malaysia.

The hypothesis testing on Geographical Residence in **Table 6** showed the Beta Coefficient and Significance (Sig.) values 0.155 and 0.004, respectively. Since the Sig. 0.004 was less than the p -value of 0.05. Hence, the H4 hypothesis was accepted, and it was concluded that geographical residence has an influence on exorbitant medical expenses among senior citizens in Malaysia. Previous research has supported findings that geographical residence influences exorbitant medical expenses, and the location of residence is one of the determinants of catastrophic health expenditures (CHE) (Sayuti et al., 2022).

5. Discussion

The research's major findings and trends on the astronomical medical costs faced by Malaysia's older citizens are highlighted in the discussion of this study. Except for race, where Chinese respondents predominated—possibly due to the survey's urban focus—the demographic analysis showed a high response rate of 99% and respondents' characteristics that were broadly in line with those of the Malaysian populace. The majority of respondents (93%) agreed, according to the analysis of answer patterns, that medical costs are excessive. Significant opinions were found to link medical expenses to age (74%), source of income (59%), modern healthcare (53%), and geographic domicile (80%). Despite a high opinion rate, the theory relating age to excessive medical expenses being rejected was an unexpected outcome. Research gaps were identified, highlighting the necessity for more thorough investigations to comprehend and address the issues causing high medical costs for older adults in Malaysia.

6. Recommendations

From the research data analysis and discussions of the research findings, the following recommendations are targeted at three main stakeholders: the Government, the Insurance industry, and the general public.

6.1. Recommendations to policy adoption

In Malaysia, public servants are still entitled to free medical facilities even after retirement. 83% of senior citizens are facing a burden and are looking to the government to reduce their burden on exorbitant medical expenses (from 96% of respondents in the survey). With such requests in mind, the following are the proposals:

(1) Currently, individuals can claim tax relief on medical expenses for themselves up to RM 8000 and for their parents up to RM 16,000, with medical insurance relief up to another RM 3000 (LDHN, 2023). It is proposed that the Malaysian Government consider providing additional tax relief on health and well-being to offset medical expenses.

(2) It is proposed that the Government implement the 2023 Health with Paper strategies to provide a more resilient, sustainable, and high-quality healthcare system to address the issue of exorbitant medical expenses.

(3) It is proposed that the National Health Insurance Scheme be implemented to address the cost concerns of the public and enable all to be treated at all government

and participating private hospitals. This proposal had been raised earlier by a former Health Minister, who remarked, “For a modern “New Malaysia,” the country must therefore adopt strategies for a rejuvenated and overhauled national healthcare system that are consistent with its efforts to become a “fully developed” country (Ahmad, 2019).”

6.2. Recommendations to the insurance industry

The insurance industry in Malaysia is a lucrative business with an annual income of RM40.68 billion (Statista, 2023).

(1) In comparison to Malaysian insurance companies’ medical insurance premiums for senior citizens, the average annual medical premium is RM4316, and the income of the B40 group is <RM 4850 per month (DOSM, 2023). This works out to about 9% of their annual income. It is recommended that the insurance industry consider lowering their premiums to help this despondent and underserved group.

(2) On average, senior citizens have to pay 35% more for medical insurance coverage after 60 years old, as shown in **Figure 3**. It is recommended that the insurance industry offer discounts, as requested by 96% of the survey respondents and remove the age barrier of above 60 for eligibility for medical insurance.

(3) It is recommended that incentives be provided to loyal customers through tiered discounts or redemption points and use the incentives to offset the premium costs.

(4) The phrase “Silver Economy” refers to a wide variety of ideas and topics with an emphasis on the opportunities and problems where the aging population brings more business to the insurance industry (Rogelj and Bogataj, 2019). It is recommended that new products such as community living be offered at affordable rates to senior citizens.

6.3. Recommendations to the general public

(1) It is recommended that the private sector allows flexibility and encourage employees to work beyond the minimum retirement age of 60 (Minimum Retirement Age Act, 2012) to create employment sustainability for employees to get continued entitlement to corporate medical insurance coverage to cover their cost of healthcare (Mustafa et. al., 2022).

(2) It is recommended that the general public participate in more activities to prevent or reduce illnesses at an early stage among senior citizens by maintaining a healthy lifestyle to avoid medical expenses.

(3) It is recommended to adopt technology by using health gadgets such as Fitbands, Blood Pressure Monitors. This acts as a form of early detection of preventive measures to avoid illnesses, leading to higher medical expenses (Mohd Hassan et al., 2022).

7. Limitations of this research

There were a few limitations identified in the course of this research and could be improved for future research and enhanced the research by allowing a longer duration for the survey to attract more respondents. Malaysia’s senior citizen

population comprises of various ethnicities where certain groups are not conversant with the use of English in conducting the survey. The inability to post in Bahasa Malaysia, Mandarin or Tamil restricted access to the sample population. Furthermore, the survey was restricted to senior citizens above 60 years. Opening up to other age groups, e.g., those above 21 years, would have allowed the opportunity to get more opinions from the younger generation on how they perceive medical expenses are affecting senior citizens in Malaysia.

8. Future research focus

Future research that can tolerate the patience of time and allows for the inclusion of other variables, such as income groups, disability expenses spending, economic burdens, health problems, living arrangements, education levels, medical history, health status and size of household can help to generate more comprehensive research findings that will reap greater benefits in addressing the exorbitant medical expenses for senior citizens in Malaysia.

9. Conclusion

The study yielded distinct results derived from information gathered from elderly individuals in Malaysia. Other researchers looking into medical costs in three important areas—academics, policymakers, and the insurance industry—can benefit from our findings. Policy makers, including the Malaysian Government and Bank Negara Malaysia, can benefit from the research, emphasizing the financial burden of medical bills on senior individuals, particularly those in the B40 group. In light of their prior economic contributions, incentives must be in place to promote their health and well-being. This study is relevant because it was completed on 15 June 2023, the same day the Health White Paper was approved. It may also help with pressing health service improvements. The government already recognizes that older citizens should have rights, such as travel discounts and other benefits; similarly, medical expense reductions should be considered. Enforcing regulations to compel the insurance industry to offer senior persons sustainable financing packages is another way that Bank Negara Malaysia could assist. According to the research, the insurance sector has a chance to serve the aging population. People are living longer, with the majority expected to live into their 60s and beyond, according to the World Health Organization's (WHO) report on Ageing and Health in 2022. This 'Silver Economy' presents an opportunity for the insurance sector to provide elderly citizens with reasonably priced health and medical insurance, contributing to Malaysia's Sustainable Development Goal 3.8 on Universal Healthcare Coverage (UHC). The results offer academics a foundation for a more in-depth investigation into medical costs for senior individuals, a field in which few previous studies were conducted in Malaysia. The low correlation values and unexpected statistical values on ethnicity point to the necessity for more variables or more items in the questionnaire design to achieve higher satisfaction correlation levels.

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