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Health Quality and Cost of Living in Asian Cities

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Abstract

Health is now a global concern. However, only a few studies are conducted on how the cost of living affects the quality of healthcare. This study aimed to determine the relationships between the cost of living and quality of healthcare. It is a quantitative method that utilizes data mining technique in the data collection. Numbeo database was used to determine the cost of living and healthcare indices of 36 Asian cities. Statistical treatment was employed using Minitab software version 16 to generate patterns and to determine the relationships of these indices through regression analysis. The scatterplot revealed different patterns of the high cost of living (X) and healthcare index (Y), namely: 1) simple linear model (inverse relation), 2) simple linear model (directly proportional) and 3) elliptical pattern. Findings revealed that there are cities in Asia which allocate more in healthcare spending than other personal needs. In general, people living in Asia do not necessarily avail of healthcare programs and services regardless of their cost of living. Such relationship, therefore, differs from one city to another. Nevertheless, the price of living index and healthcare index relationships infers that there are cities in Asia that tend to increase its healthcare index when the cost of living increases. These people are health conscious and allocate a higher percentage of their expenses to health and wellness. There are also cities that have minimal budget allocation for healthcare from their GDP which requires their people to apportion more personal funds for health.

Keywords: Cost of living, healthcare, healthcare quality, healthcare cost, health expenditure

Introduction

Health is a fundamental human right for the body and mind to function accurately. In fact, World Health Organization (WHO) Constitution envisioned the achievement of health's highest quality. This health right and the similar quality of healthcare are crucial, and reliant upon, the realization of basic human needs as food, clothing, housing, work, education among others. These basic human needs constitute the cost of living (COL) according to Numbeo, the world's leading database of user contributed data about cities and countries. These necessities may also include groceries, restaurants, transportations, and utilities such as healthcare. These (COL) data is in the form of the index shows differences in living costs between cities. The higher COL Index suggests that the city is more expensive to live. Thus, healthcare quality in the Asian cities may be affected by the high or low cost of living. On the other hand, Healthcare Index is an estimation of the overall quality of the healthcare systems, healthcare professionals, equipment, and health professionals, among others. This

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index tracks the movements in the healthcare expenditures, medical expenses, insurance coverage, health industry employment, international comparisons, and healthcare education (Cook, 2015). Studies conducted on healthcare mostly focuses on the correlation between healthcare quality and health care cost. The recent Supreme Court of Canada found out that quality of healthcare combined with government policy affects costs of healthcare (Mitton et al., 2006). Another study by Burke and Ryan (2014), disclosed that the high cost of healthcare poorly ranks on other indicators such as terms of life expectancy. Further, low healthcare value was found mainly attributed to the regional variations in spending patterns and were not cost effective. The paper also summarized that efforts must be made to reduce the unwanted difference in care. In developed Asian cities, healthcare spending that equates to healthcare cost is higher in developing Asian cities. As healthcare expenditure or cost's factors were examined, influence was pointed out to be dependent on the demand, supply, and other factors. There's insignificant relationship between price and healthcare's cost, and positive and a significant connection between Gross Domestic Product (GDP) and health expenditure. The increased health expenditures initiated the urban population density in other countries. Similarly, out-pocket payments have contributed to higher healthcare expenditure. The study summarized that healthcare expenditure or cost that continuously increases is brought about by changes in all factors over the period (Kraipornsak, 2017). The studies cited mostly focus on the cost of healthcare and healthcare quality while the present quantitative data mining study looked into the relationship pattern between the cost of living and healthcare quality among selected Asian cities. The utilized data for cost of living and healthcare quality indices were taken from Numbeo. The present study also examined the healthcare system, healthcare expenditure, insurance coverage both private and government subsidy, health industry employment and healthcare education among the 36 Asian cities. The study was conducted to provide baseline information on the relationship between the cost of living and healthcare quality. Additionally, it offered pattern or model to describe the characteristics of the two indices. Also, this study ensured that the underlying core components of health be guaranteed to all individuals. Moreover, the study will provide policy-makers, both government, and non-government organizations information which serves as the basis for decision-making relative to healthcare in the improvement of its services, infrastructure, facilities, government subsidy on health insurances, availability, the increased accessibility, acceptability, and quality. Lastly, the study will help in all phases of healthcare program: assessment, analysis, planning, implementation, monitoring and evaluation to ensure optimum quality of health and life for all.

Objectives of the Study

This study aims to determine the relationships between the cost of living and healthcare index. Specifically, it sought to:

1. Generate a pattern or model to describe the characteristics of the cost of living and healthcare index and;
2. Determine the factors in the increase and decrease of the cost of living to healthcare index;

Conceptual Framework

The framework anchored from the study Begashaw et al. (2015). It shows that the quality of healthcare contained within the cost of living. The concentric circles around the interactions between the four factors, namely:

1. Socio-economic and demographic factors (age, marital status, education, occupation, family size and family income).
2. Individual factors (self-medication or traditional medicine).

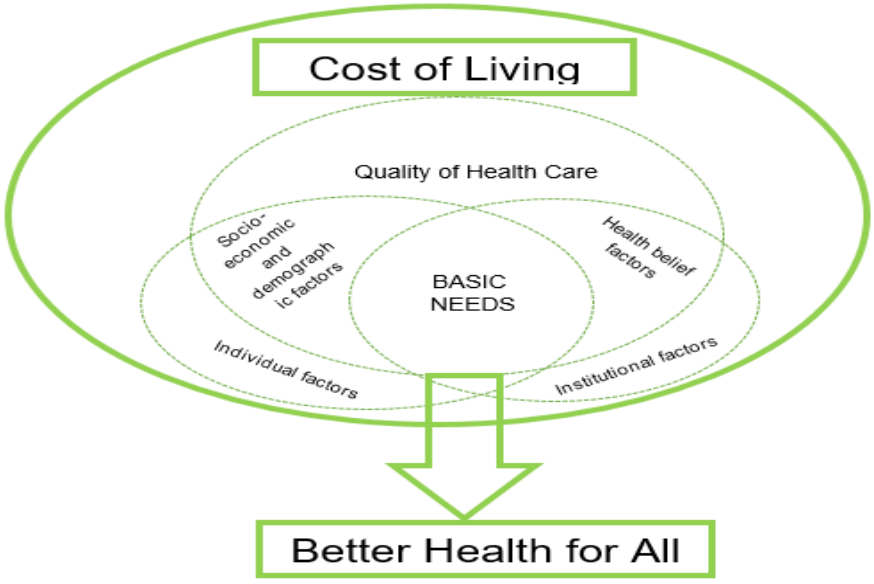


Figure 1. *Conceptual framework of cost of living and the quality of healthcare.*

Table 1. Cost of Living Index versus Healthcare Index among Asian Cities.

Point	City	X Cost of Living Index	Y Healthcare Index
1	Bursa, Turkey	43.79	89.08
2	Mangalore, India	21.99	77.93
3	Riyadh, Saudi Arabia	47.78	70.01
4	Taipei, Taiwan	60.71	84.3
5	Tokyo, Japan	102.05	78.09
6	Abu Dhabi, United Arab Emirates	60.75	54.63
7	Tel Aviv-yafo, Israel	79.19	76.01
8	Dubai, United Arab Emirates	69.12	61.55
9	Pune, India	25.87	63.91
10	Bangalore, India	25.69	66.34
11	Doha, Qatar	67.9	68.29
12	Hyderabad, India	23.54	73.88
13	Ankara, Turkey	45.28	67.69
14	Istanbul, Turkey	49.99	70.03
15	Tbilisi, Georgia	32.77	54.55
16	Amman, Jordan	57.54	70.76
17	Yerevan, Armenia	34.25	52.78
18	Hong Kong, Hong Kong	78.2	75.3
19	Beirut, Lebanon	62.65	67.4
20	Shanghai, China	54.36	57.54
21	Baku, Azerbaijan	31.22	35.88
22	Singapore, Singapore	87.83	70.86
23	Tehran, Iran	41.88	49.71
24	Chennai, India	25.43	74.98
25	Delhi, India	27.63	64.68
26	Beijing, China	51.64	63.64
27	Colombo, Sri Lanka	35.99	80.34
28	Karachi, Pakistan	28.44	55.5
29	Davao, Philippines	32.5	71.9
30	Jakarta, Indonesia	45.42	63.9
31	Bangkok, Thailand	49.83	80.72
32	Kolkata, India	25.22	52.73
33	Mumbai, India	28.14	59.56
34	Manila, Philippines	40.82	68.29
35	Kuala Lumpur, Malaysia	44.51	60.7
36	Ho Chi Minh City, Vietnam	41.74	48.4

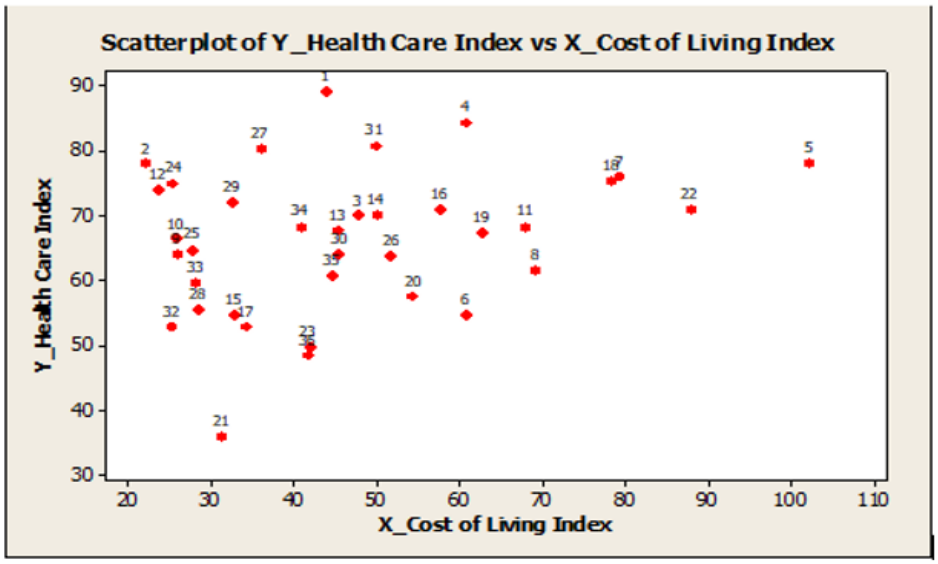


Figure 2. *A plot of Health Care Index versus Cost of Living Index.*

3. Institutional factors (price of health service and distance from health facility).
4) Health belief factors (attitude towards health services) illustrates that the quality of healthcare is vital in the realization of basic human needs.
The arrow shows that the cost of living regardless of the many factors contributes to the broader aim of better health for all. The cost of living comprises the basic human needs as food, clothing, housing, work, education among others. The dashed lines blur the boundaries of the four factors and the quality of healthcare under the cost of living. Within the space of interaction between the different aspects, the framework shows the level of correlative relationship. At the most basic level, better health for all requires professional and educational standards according to the Faculty of Public Health (FPH)

Methodology

This study used a quantitative method utilizing data mining technique in the data collection to develop a model on the relationship of cost of living and healthcare indices among 36 cities in Asia. Statistical treatment was employed to treat data taken from Numbeo in determining the factors of the cost of living to the increase and decrease in healthcare index.

Table 1 shows the thirty-six (36) cities in Asia with the cost of living and healthcare index based on Numbeo 2016 data. These datasets were plotted using the Minitab version 16 version as shown below.

The result was analyzed to identify the relationship between the cost of living and healthcare indices of the 36 cities in Asia. Different patterns were formulated to uncover the relationships between these two factors.

Result and Discussions

Different patterns derived from the scatterplot of the cost of living (X) and healthcare index (Y). Points which are out of the outline considered nuisance were removed. One of the patterns observed was a simple linear model which has an inverse relationship between the cost of living and healthcare index.

The graph shows a Simple Linear Model (Inverse Relation) with one predictor X= Cost of Living Index and a response variable Y= Healthcare Index. A regression analysis was computed using the regression equation Y =

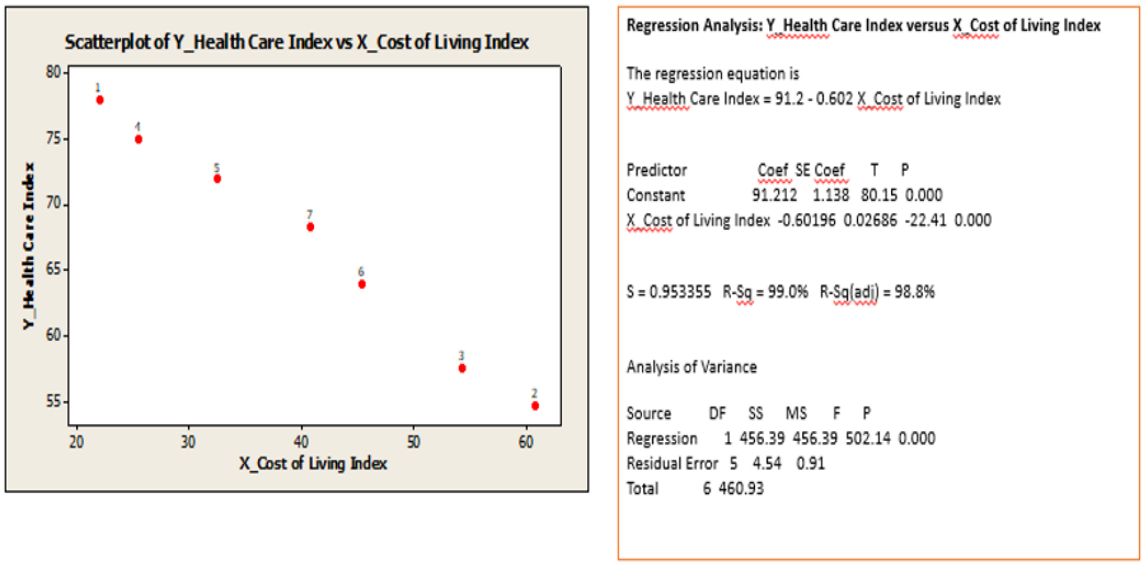


Figure 3. *Simple linear model (inverse relation) with regression analysis of Health Care Index versus Cost of Living Index.*

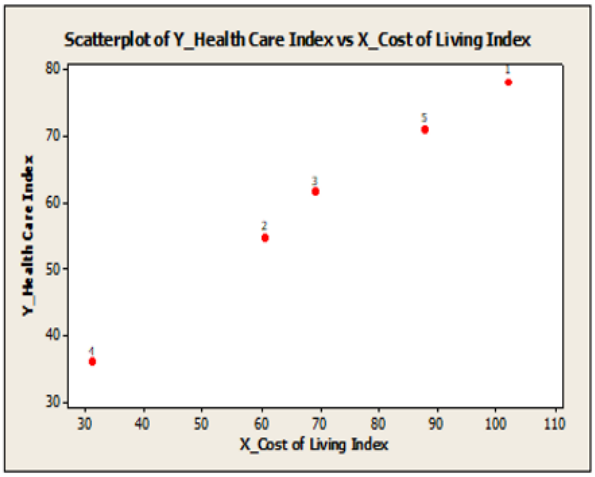
Table 2. Indices of Cost of Living and Healthcare among Asian Countries in a Simple Linear Model.

City	Gross Domestic Product	Tax rate
Mangalore, India	2288.72	34.61
Abu Dhabi, United Arab Emirates	325.135	55
Shanghai, China	11383.312	25
Chennai, India	11383.312	34.61
Davao, Philippines	310.312	30
Jakarta, Indonesia	936.955	25
Manila, Philippines	310.312	30

1 + 1.5 X – 2.5X$\hat{2}$ with R-Sq (adj) = 98.8%. In Asian cities, the relationship between the cost of living and healthcare index varies from one city to another. Around 19% of these cities where the people have a high cost of living and can only avail of few healthcare's services. These cities were Mangalore, Abu Dhabi, Shanghai, Chennai, Davao, Jakarta, and Manila as shown in the table.

Cities such as Chennia, Mangalore, Davao, Manila, and Jakarta have a high quality of healthcare system with more than 60% while cities such as Abu Dhabi, Shanghai and Jakarta have a high cost of living with more than 40%. In countries where the quality of healthcare system is high, people did not rely on government healthcare programs and services. They tend to allocate a great amount of their income for healthcare. In countries like UAE and China, the cost of living is high, and the government health expenditure budget is also high. Therefore, people are not particular of the quality of healthcare. They are just dependent on the health services offered by the government. Another pattern was a simple linear model which is directly proportional to the cost of living and healthcare index.

The graph shows a Simple Linear Model



Regression Analysis: Y_Health Care Index versus X_Cost of Living Index

The regression equation is
Y_Health Care Index = 18.2 + 0.599 X_Cost of Living Index

Predictor	Coef	SE Coef	T	P
Constant	18.186	1.996	9.11	0.003
X_Cost of Living Index	0.59857	0.02687	22.27	0.000

S = 1.45598 R-Sq = 99.4% R-Sq(adj) = 99.2%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1051.6	1051.6	496.08	0.000
Residual Error	3	6.4	2.1		
Total	4	1058.0			

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Figure 4. . *Simple linear model (directly proportional) with regression analysis of healthcare index versus cost of living index.*

Table 3. Indices of Cost Of Living and Healthcare among Asian Countries in a Simple Linear Model.

Rank	City	X_Cost of Living Index	Y_Healthcare Index
5	Tokyo, Japan	102.05	87.07
6	Abu Dhabi, United Arab Emirates	60.75	57.71
8	Dubai, United Arab Emirates	69.12	61.55
21	Baku, Azerbaijan	31.22	35.88
22	Singapore, Singapore	87.83	69.98

(Directly Proportional) with one predictor X= Cost of Living and a response Variable Y= Healthcare Index. A regression analysis was computed using the regression Y= 1 + 1.5 X – 2.5 X$\hat{2}$ with R-Sq (adj) = 99.2%. In Asian cities, the relationship between the cost of living and healthcare index differ from one city to another. Around 14% of Asian cities where people with the low cost of living still avail of healthcare services.

Cities such as Tokyo, Japan, and Singapore have the highest cost of living with more than 80% while cities such as Dubai, and Abu Dhabi follows with more than 60%. Among the five cities mentioned, Baku has the lowest cost of living which is less than 40%. In a highly developed country like Japan where the quality of healthcare delivery system is high, the government is paying 70% of all healthcare delivery system, and the patient is paying only 30%. Also, all residents are required by the government to have health insurance coverage. Abu Dhabi and Dubai, both cities from the United Arab Emirates, the cost of living are also high, but they have highly developed health services. That is why health insurance of these countries are not compulsory. The people of Baku, Azerbaijan are not particular with healthcare delivery system.

An elliptical pattern observed as shown in figure 4 which depicts the relationship

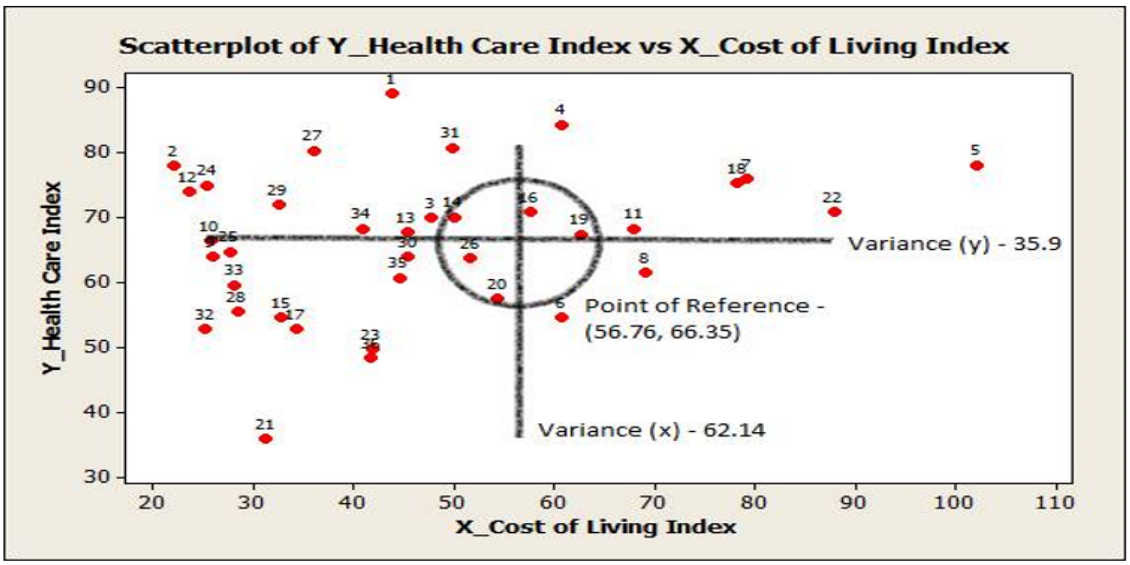

Figure 5. . *An elliptical pattern of the Cost of Living Index versus Health Care Index.*

between the cost of living and healthcare indices among the 36 cities in Asia. Nuisance Points 1, 2, 32, 21, and 5 were taken from the dataset. An elliptical pattern was observed with the center point at (56.76, 66.35) and with the variance of (62.14, 35.9) along the cost of living index(x) and healthcare index(y). Cities that surrounds the point of reference are Bursa Turkey, Beijing China, Amman Jordan, Shanghai China, and Beirut Lebanon. The living expenses in these Asian cities is significantly higher in comparison to other cities. The cost of housing, food, and energy largely account for the high cost of living. In Amman Jordan, high cost of living problem is not related to the increased outlays of commodities, however, salaries are not high enough to be able to afford them. The quality of healthcare, on the other hand, varies from cities to cities. In Bursa Turkey, healthcare is cheaper, and there are many private and public hospitals across the country that people have access to good quality private hospitals with experienced doctors and medical staff that most of whom can speak English. Healthcare in China, Lebanon and Jordan is a significant point of contention. The Chinese healthcare system is hospital-centered that most of them take out private health insurance and seek treatment at private facilities. Jordanians are also accustomed to receiving a high standard of medical care with the expertise of Jordanian doctors. In Beirut Lebanon, there is a wide range of both private and public healthcare with a high standard of medical and dental care. From the variance of the cost of living (x)= 62.14, Abu Dhabi is one of the cities that is highly variable regarding the cost of living. An individual's cost of living also is very much unpredictable. With regards to their healthcare system, both public and private healthcare services are available. Since their healthcare accompanies with high prices, their health insurance is not compulsory. On the other hand, they are being encouraged to get health insurance which covers most of the costs. Abu Dhabi has a high cost of living where few people can avail of their healthcare services. On the other hand, Taipei Taiwan has a much lower cost of living. As to their healthcare delivery system, they have unbelievably low-priced health insurance or Medicare. Majority of the citizens make use of the government funded health-care through their National Health Insurance. It enables the members to access medical benefits like emergency care, doctors and dentists consultations,

maternity care and even access to Traditional Chinese Medicine. Through National Health Insurance, the citizens can easily access all medical benefits. Since the living expenses are low and the healthcare delivery system is very affordable, there is a possibility that many residents will invest more for their health. The variance of healthcare index(y)= 35.9 indicates that cities such as Bangalore India and Singapore has a similar cost of living but the healthcare varies. India considered as one of the cheapest cities in the world. Two cities in India, Bangalore, and Chennai, both reflect the structurally low prices enjoyed on the subcontinent. Although India is prospected for future growth, much of this is driven by its large population and the untapped potential within the economy. Income inequality means that low wages multiply, driving down household spending and creating many tiers of pricing that keep spending per head low. Thus, shared with a low-cost and abundant supply of commodities into cities from rural producers with short supply chains, as well as government subsidies on some products, has kept prices down (WCOL, 2015). The cost of living is practically low in India. The standard of living in India shows large disparity from state to state. On the other hand, Singapore is one of the best countries to live. Its healthcare deems to be of high standard. Amidst the soaring cost of living in Singapore, the healthcare index is high since the government put in place a planned, built, developed and maintained public healthcare system. The public and private system are administered by the Ministry of Health which takes full responsibility for assessing health needs and for planning and delivering services through network s of health and hospital facilities, day care centers, and nursing homes. Universal healthcare coverage is afforded by Singaporean government to all citizens with well-developed financing system. Funds for the Healthcare System emanated from general revenue and used for subsidies, campaigns for health practices promotion, development, training, and infrastructure expenses. Private insurance supplement the provision afforded by the government. Moreover, the employers may offer private insurance to their employees as a staff benefit. Typically, employer-sponsored insurance covers the primary care and other outpatient visits, in addition to hospitalizations (Ministry of Health, 2013).

Conclusions and Recommendations

This study aimed at determining the relationships between the cost of living and healthcare indices. Firstly, it was designed to generate a pattern or model to describe the characteristics of the cost of living and healthcare index. There were three patterns observed from the scatterplot, namely 1) simple linear model (inverse relation), 2) simple linear model (directly proportional) and 3) elliptical pattern. In general, people living in Asia does not necessarily avail of healthcare programs and services regardless of their cost of living. Such relationship, therefore, differs from one country to another. Nevertheless, living index and healthcare index relationships infers. Secondly, this study aimed to determine the factors in the increase and decrease of the cost of living to healthcare index. In summary, there are cities in Asia that tend to increase its healthcare index when the cost of living increases. This people are health conscious and allocate a higher percentage of their expenses to health and wellness. These cities have minimal budget allocation for Healthcare from their GDP which requires their people to apportion more personal funds for health. Thus, to solve the increased cost of living, the budget allocation for healthcare becomes dynamic. Some cities in Asia decrease its healthcare index when the cost of living increases. Despite higher budget allocation for healthcare by the government from their GDP, the cost of living is relatively higher by which more of their expenses appropriated on

other personal needs than health services. Therefore, government budget for healthcare remains static despite the increased cost of living among its people. For future studies, the researchers recommend on quality improvement which undertakes on the overuse, underuse or misuse of healthcare services, to include the following:

• Identify factors which encourage quality and various payment facility scheme, financial incentives, and government factors which affect the behavior of healthcare organizations.

• Design and implement new healthcare policies, processes and unifying framework to provide safer, high-quality care.

• Mainstream human rights, gender equality, and equity into healthcare programs.

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