Pertanika J. Soc. Sci. & Hum. 26 (2): 717 - 734 (2018)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

Causal Nexus between Health and Economic Development: Evidence among OIC High-Income Economies

Zurina Kefeli[1], Mohd Azlan Shah Zaidi[2] and Abdul Azeez Oluwanisola Abdul Wahab[1]*

[1]Faculty of Economics and Muamalat, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 USIM, Nilai, Negeri Sembilan, Malaysia
[2]Faculty of Economics and Management, Universiti Kebangsaan Malaysia, 43600 UKM, Bangi, Selangor, Malaysia

ABSTRACT

The effects of health on economic development have been discussed in depth in the literature. Most of the findings have shown that the economic performance of a country can be enhanced by improving the health of the citizens. This paper investigates the causal link between health and economic development of high-income economies of selected OIC countries. Since these countries also have high expenditure on health in comparison with other OIC countries, the findings would give some indication of the importance of having high spending in health for the economic wellbeing of a country. The Toda-Yamamoto Granger non-causality model was used on data spanning from 1970 to 2015, and the results showed mixed causal relationships. Specifically, some countries like Bahrain and Kuwait have a health condition that boosts economic development, while Saudi Arabia experiences the opposite effect. However, health and economic development have bidirectional causality in the United Arab Emirates, while Brunei, Oman and Qatar do not show any causal direction between health and economic development. The findings give some evidence of the importance of health on economic prosperity without disregarding the fact that economic development is also important for good health.

Keywords: Economic development, health, high-income economies, OIC JEL Classification: H51, I15, O57

ARTICLE INFO

Article history:
Received: 09 August 2016
Accepted: 22 March 2018

E-mail addresses:
zurina@usim.edu.my (Zurina Kefeli)
azlan@ukm.edu.my (Mohd Azlan Shah Zaidi)
azwah2ks@yahoo.com (Abdul Azeez Oluwanisola Abdul Wahab)
*Corresponding author

ISSN: 0128-7702

INTRODUCTION

As indicated by the World Health Organisation (WHO), health is a condition of complete physical, mental and social prosperity and not only the non-appearance of illness or sickness. According to this definition, wellbeing does not impact only the personal satisfaction of individuals but also the economic development of a country as a whole. According to the health economics theory, health status has a weighty impact on national income. On a macro platform, numerous studies in developed countries have shown that health has a progressive relationship with the economic development of a country (Bloom & Canning, 2000, 2001). In addition, the impact of health efficiency on economic development touches not just human capital but also a nation's economic activities. From this vantage point, health has been identified as a factor that can enhance human capital and, in the long term, energise the economic development of a nation (Wahab & Kefeli, 2016). A study by Bloom, Canning and Sevilla (2001) found that compared with education, health is more significant in contributing to the aggregate national output.

Life expectancy has been used as a significant indicator of the overall health condition of national populations and the quality of healthcare made available to them. Life expectancy is generally considered the expected number of years that a new-born will live if its wellbeing and living conditions at birth remain unchanged. In the broad view, life expectancy is measured by the multiplicity of socio-economic elements such as destitution and malnutrition, right to hygienic water and cleanliness, accessibility to basic healthcare insurance and inoculation facilities (OIC Report, 2013). The more prominent the life expectancy ascribed to a nation, the more healthily its populace (Jen et al., 2010).

Thus, life expectancy is thought to be a suitable indicator for assessing the health condition of a country. Pronounced improvements have been made to life expectancy in some Organisation of Islamic Conference (OIC) nations, especially in the high-income OIC states over the past years (Kefeli & Zaidi, 2014). The occasioned upsurge in life expectancy improvements is the result of the avoidance and regulation of real adolescence communicable diseases and maladies and in food, cleanliness and medical consideration. Improvements in medical innovation, primarily in connection with treatment of coronary illness and stroke, alongside more advantageous ways of life, changes in access to healthcare and improved wide-ranging healthiness prior to age 65 have facilitated enhancements to life expectancy in the second half of the 20th century (Fried, 2000).

A study carried out by Day et al. (2008) compared life expectancy with an array of health scheme signs within and among groups of countries. They identified 12 groups of countries with average life expectancy ranging from 81.5 years (Group 1) to 37.7 years (Group 12). Predictably, the three most highly-rated groups were made up of Western European countries, US, UK,

Canada, Japan and Australia, while the four lowest ranked groups were dominated by African countries. In terms of per capita, global health expenditure was highest among the top three life expectancy groups, who are part of the developed world. Health scheme framework for workers, doctor's facility beds, access to pharmaceuticals as well as vaccination would obviously match the life expectancy indicated for each group (Day et al., 2008).

However, the health status of Organisation of the Islamic Conference (OIC) countries has improved significantly. The average lifespan in the OIC member countries was 59 years in 1990 , but had climbed to 68.5 years in 2011 (OIC Health Report, 2013). In comparison, life expectancy in developed nations improved from 73 years in 1990 to 78 years in 2011. In spite of some change to life expectancy at birth, OIC countries are falling behind the global average by 3.5 years (OIC Health Report, 2013). Moreover, expenditure on health is still low in many OIC countries. In 2011, OIC member countries expended US$279.5 billion on health, signifying on average 4.7% of their GDP compared with US$3706 billion or 8.7% in developed countries (SESRIC, 2012).

At the individual country level, Qatar, Brunei, Albania, Maldives, the UAE, Syria, Bahrain, Libya, Tunisia and Kuwait have the highest life expectancy at birth in 2011. Qatar and Brunei had the highest life expectancy at birth of 78 years old. Meanwhile, the infant mortality proportion in UAE (6 deaths for every 1,000 live births), Qatar, Malaysia, Brunei, Oman, Saudi Arabia, Lebanon, Maldives, Kuwait and Bahrain were the lowest in 2011. Member countries with the highest per capita health expenditure were Qatar, the UAE, Kuwait, Brunei, Saudi Arabia, Oman and Bahrain (OIC Health Report, 2013). These countries are also categorised as high-income economies by the World Bank, as shown in Table 1.

Table 1
Categorisation of OIC countries

S/N	High Income (USD12,736 PCI & above)	Middle Income (Upper, USD4,126-USD12,735 PCI)	Middle Income (Lower USD1,046-USD4,125 PCI)	Low Income (USD1,045 PCI & below)
1	Qatar	Albania	Bangladesh	Afghanistan
2	Oman	Algeria	Cameroun	Benin
3	Brunei Darussalam	Azerbaijan	Ivory Coast	Burkina Faso
4	Bahrain	Gabon	Djibouti	Chad
5	The United Arab Emirates (UAE)	Iran, Islamic Republic	Egypt, Arab Republic	Comoros
6	Kuwait	Iraq	Guyana	Gambia
7	Saudi Arabia	Jordan	Indonesia	Guinea
8		Kazakhstan	Kyrgyzstan	Guinea-Bissau

Table 1 *(continue)*

S/N	High Income (USD12,736 PCI & above)	Middle Income (Upper, USD4,126-USD12,735 PCI)	Middle Income (Lower USD1,046-USD4,125 PCI)	Low Income (USD1,045 PCI & below)
9		Lebanon	Mauritania	Mali
10		Libya	Morocco	Mozambique
11		Malaysia	Nigeria	Niger
12		Maldives	Pakistan	Sierra Leone
13		Suriname	Senegal	Somalia
14		Tunisia	Sudan	Togo
15		Turkey	Syria Arab Republic	Uganda
16		Turkmenistan	Uzbekistan	
17			Palestine	
18			Yemen	
19			Tajikistan	

Source: World Bank (2015)

From the statistics of OIC countries, it is observed that the countries with high per head health expenditure experience high life expectancy at birth and low infant mortality. For this reason, only high-income OIC countries were chosen for this paper. As these countries also experienced high economic development, it seemed that better health condition had a causal linkage with their economic development. Knowing of the existence of this relationship would not only benefit the countries themselves, it would also give some insight to other developing OIC countries on how to improve their health system and economic wellbeing.

Thus, this paper attempted to investigate the causal link between health and economic development of selected high-income OIC countries. Specifically, the study focussed on seven OIC countries that had the highest per capita health expenditure. The countries were Bahrain, Brunei Darussalam, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. The analysis used time-series data from 1970 to 2015. Aggregate data at the country level on life expectancy at birth and GDP per capita were gathered from the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC).

This paper contributes to the literature in two ways. Firstly, past studies on this issue mostly focussed on a panel or cross-sectional data analysis. Thus, the findings on the importance of health are therefore general in nature, concentrating on the status of the countries or on regional locations. This study on the other hand, looked at individual countries and examined whether the effect of health was similar. Secondly, empirical research into the causal effect of health on economic growth in OIC countries

is still lacking, and findings from the analysis would provide some recommendations to policy-makers in those countries.

The remainder of this paper is organised as follows. Section 2 examines the literature on the effects of health on economic development, while Section 3 looks at the healthcare system in high-income OIC countries. Section 4 interprets the data and empirical models used in the estimation and Section 5 discusses the results. Lastly, Section 6 concludes the paper with some remarks on policy.

LITERATURE REVIEW

Labour quality in terms of human capital is always measured by education level. As a result, many studies have identified education as the main factor that contributes significantly to economic development. However, numerous studies have ignored health as an aspect of human capital that can potentially contribute to economic development. In the United Kingdom, the Department of Social Security acknowledged poor health as one of the main issues connected with low income (State of the Nation Report, 2010). Furthermore, on average, individuals in poor nations are considerably less healthy than the citizens of wealthy nations. Weil (2007) studied this phenomenon and attempted to react to the tremendous difference in income between rich and poor nations and its effect on the health status of the people of these nations. Weil (2007) quantitatively assessed the differences in health by clarifying income dissimilarities among rich and poor nations and found that the impact of health on income was economically significant. Besides that, in many developing countries the benefits of better health on productivity have been proven by researchers such as Basta et al. (1979), Spurr (1983), Bhargava (1997) and Strauss and Thomas (1998). Grimm (2011) studied 62 low and middle-income nations from 1985 to 2007 and found a significant and generally vigorous negative impact of health disparity on income levels and income growth after regulating for life expectancy, country and time fixed-effects as well as other factors appeared to be imperative for growth.

The positive impact of health, in terms of reductions in mortality, on economic growth had earlier been found by Sorkin (1977). In addition, Sorkin found that expansions in the health status of the inhabitants of developed countries will have a slight effect on economic growth, yet the effect could be diverse for developing countries. In view of this, life expectancy as a measure of health indication has been established in past studies. Gürler and Özsoy (2017), for instance, surveyed the relationship between life expectancy at birth and economic growth, by means of cross-sectional data and panel data examination comprising random and fixed effects in the analysis of 55 Islamic Countries for 26 years, using life expectancy at birth as proxy for health. The study established that life expectancy at birth was a contributing factor to the economic growth and development of Islamic countries. The results showed that life expectancy had a significant influence

on economic development, as a rise in life expectancy by a year could promote stable economic development.

Subsequently, by utilising life expectancy as a measurement for health at the individual level, many academic have found that health had a significant effect on economic growth. These works include Barro and Lee (1994), Barro and Sala-I-Martin (1995), Barro (1996), Sachs and Warner (1997), Bloom and Malaney (1998), Bloom and Sachs (1998), Bloom and Williamson (1998), Bloom et al. (1999), Hamoudi and Sachs (1999), Bloom, Canning and Malaney (2000) and Gallup and Sachs (2000). Most of these studies used the ordinary least squares (OLS) and seemingly unrelated regression (SUR) methods. In 2004, Bloom, Canning and Sevilla measured total factor productivity (TFP) by including human capital, which consisted of three elements, average years of schooling, average work experience of the workforce and health. They found that a year expansion in a populace's life expectancy adds to 4% in expansion output and thus, concluded that health, as expressed by life expectancy, affects growth reversions as a real labour productivity effect after controlling for experience of the workforce.

The link between individual income and health has also been seen clearly in Marmot (2010). The study showed that in the UK, persons living in the poorest neighborhoods will, all things considered, decease seven years sooner than individuals living in the wealthiest neighborhoods. Additionally, the data from the Office for National Statistics (2007) showed that for the period of 2002 to 2005, noblemen and women in specialised professions had sophisticated life expectancy compared with people in amateurish labour-intensive occupations. In a systematic evaluation of 98 academic works that studied health inequality, Lynch et al. (2004) inferred that "it is broadly acknowledged that at a discrete level, higher income – and different indicators of socio-economic conditions – are connected with better wellbeing." While numerous studies have taken a glimpse at the relationship between health and income at the individual level using cross-sectional data, there is a limited number of studies looking at this relationship at the macro level using time-series data. Furthermore, policy formulation, especially for reducing poverty among less developed OIC countries, can be strengthened by utilising the findings from this study. Thus, this academic paper was conducted to test the relationship between health and economic development using time-series data from high-income OIC countries.

Healthcare System in High-Income OIC countries

Bahrain is one of the best healthcare providers in the Gulf area through its comprehensive public and private health services. Public health services are delivered to all citizens free of charge, while non-Bahrainis enjoy a subsidised healthcare cost. Most of the services are provided by the Ministry of Health through primary healthcare and secondary healthcare services. Primary

healthcare services involve household and public healthcare methods and incorporate an extensive coverage of precautionary and therapeutic services like motherly and child health, inoculation, dental and oral health and employees' health (Ministry of Health Bahrain, 2015). Bahrain embarked on a national health strategy in the period of 2002-2010, and drafted a framework for long-term development of the health system. In 2006, a health insurance scheme was introduced after broad considerations by all stakeholders. The expediency and coverage of healthcare service are nearly 100%, and the government is the main sponsor of health provision financing. Life expectancy at birth in Bahrain stood at 74 while maternal mortality proportion per 100,000 live births is 11.4% and total government expenditure on health is a fraction of the GDP at 3.9% (WHO, 2013).

On the other hand, Brunei Darussalam paraded one of the best publicly run healthcare systems in Asia and the globe. Citizens of Brunei are eligible for free medical care services, and foreigners who are working in the country are eligible for healthcare services at a subsidised cost. Brunei has admirable hospital facilities in all its four districts. There are general hospitals that are complemented by health clinics located around the country, travelling clinics and flying doctor services. Private hospitals are also available for those who have private medical insurance. As a result of a huge direct investment of oil wealth in healthcare to standardise the system, malaria and diseases like cholera are virtually or totally wiped out. Brunei's public spending on health was 2.3% of its GDP in 2012, which is equivalent to USD1,218 per person. The life expectancy at birth of males and females in 2012 were 76 and 78, respectively (WHO, 2014).

Kuwait too has an excellent healthcare system and its facilities are considered to be on par with those of Western Europe and the United States. Due to the small population of Kuwait, the medical facilities are widely diverse and cover virtually every medical complication. Kuwait has public and private healthcare services. Public healthcare offers quite a number of free services for citizens and other services that are provided at an affordable rate. Also, there are numerous healthcare services that are available to immigrants at a reduced cost. Average life expectancy at birth in Kuwait for both sexes was 78.5 in 2012, and total government expenditure on health as a proportion of GDP was 2.5% , which was equal to USD1,377 per capita in the same year (WHO, 2013).

Oman is also regarded as one of a handful of nations in the world that have revolutionised their health position over a brief timeframe. Oman's present health pointers can be compared with those of various advanced nations. Oman boasts outstanding management of confinement-linked mortality and morbidities, avoidable sicknesses of adolescence and various contagious community sicknesses (Alshishtawy, 2010). Oman has public and private healthcare facilities and all Omanis have free access to complete

healthcare coverage. Healthcare services are provided by Oman's Ministry of Health and are supplemented by other government hospitals and clinics. Presently, the nation's life expectancy that stood at 49.3 years in 1970 has surpassed 76 years for males and females at birth. The total government expenditure on health as a percentage of the GDP was 2.6% in 2012 (WHO, 2013).

Moreover, Qatar has developed a sophisticated general health framework as one of its main objectives alongside its National Vision 2030. At present, the public sector controls healthcare provision, which can differ according to location and the type of care required by the patient. With the introduction of a compulsory Social National Health Insurance scheme, it supports the entire population with first-class health services. Also, there is considerable competition from private healthcare providers, and this complements the public health system. In 2012, government payments on healthcare were valued at 2.2% of the nation's GDP, which is equivalent to USD1,805 per capita. The typical life expectancy at birth was 80.61 years in 2014 for males and females. Qatar has a reduced child death proportion of 7 in 100,000 (WHO, 2014).

In the Kingdom of Saudi Arabia, the Division of Health controls healthcare and hospitals in both the public and private sectors and the scheme provides general healthcare treatment. The Saudi healthcare scheme provides free healthcare for all Saudis, and sophisticated specialised care is available. The healthcare system comprises two networks. The first involves primary healthcare centres and hospitals that offer precautionary, pre-birth, crisis and rudimentary facilities and mobile clinics for distant regions. The second involves clinics and dedicated treatment centres situated in urban regions (Khaliq, 2012). The publicly funded healthcare scheme is mirrored on that of the United Kingdom's National Health Service. However, a healthy private sector has been developed over the years. The 13 geographic regions of the country are divided into 19 health regions for administrative purposes (Al-Yousuf et al., 2002). With the exclusion of employees in the public sector, a massive population of foreign workers and their relatives are estimated to obtain healthcare in the private sector through occupation-based protection, self-paid protection or for a total out-of-pocket cost (Khaliq, 2012). World Health Organisation statistics for 2012 indicated that the average life expectancy for males and females was 76 and the total health payments by Saudi Arabia as a proportion of the GDP was 3.2%, which was equivalent to USD1,004 per capita (WHO, 2014).

The United Arab Emirates (UAE) is ranked number 27 among global health schemes by the World Health Organisation (WHO). The country has numerous public and private sick bays as well as childcare centres and primary healthcare centres to serve her populace. The health division of the United Arab Emirates (UAE) is managed by two establishments; the Division of Health regulates the public health sector, while the Emirates Health Organisation

is in charge of health services at the state level. Healthcare is offered to all citizens and medical coverage is obligatory for foreigners. Aggregate spending on health is 3.3% of the country's GDP. The average life expectancy was 76 years at birth in 2012 for both sexes (WHO, 2014).

METHOD

In this study, the income classification of the OIC member states followed the World Bank categorisation, which is based on the income groups of 214 countries. A country is categorised as a low-income economy if its GNI per capita is USD1,045 or less; lower-middle-income economy if its GNI per capita is from USD1,046 to USD4,125; upper-middle-income economy if its GNI per capita is from USD4,126 to USD12,735; and high-income economy if its GNI per capita is more than USD12,736. Among the 57 OIC member states only seven countries are categorised as high-income economies. Also, these countries have increased their spending on health expenditure as a form of investment in human capital development, and this was one of the reasons for choosing them for this paper. They are Bahrain, Brunei Darussalam, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Life expectancy was used to indicate health status (H), while GDP per capita (GDP) represented the economic development of the OIC countries. All series are transformed into logarithmic form.[1] The period of study is from 1970 to 2015. It was expected that the health status of OIC countries in the high-income economy category would contribute to the countries' economic development.

In order to investigate whether health status led to economic development or vice versa, this study used a two-variable model and employed the Toda-Yamamoto (1995) approach of Granger non-causality. Consider the following VAR model of a country,

$$\begin{bmatrix} GDP_t \\ H_t \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \end{bmatrix} + \begin{bmatrix} \alpha_{11}^{(1)} & \alpha_{12}^{(1)} \\ \alpha_{21}^{(1)} & \alpha_{22}^{(1)} \end{bmatrix} \begin{bmatrix} GDP_{t-1} \\ H_{t-1} \end{bmatrix} + \ldots + \begin{bmatrix} \alpha_{11}^{(k+d)} & \alpha_{12}^{(k+d)} \\ \alpha_{21}^{(k+d)} & \alpha_{22}^{(k+d)} \end{bmatrix} \begin{bmatrix} GDP_{t-(k+d)} \\ H_{t-(k+d)} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$$

where, k is the optimum number of lag in the VAR model, while d is the maximum order of integration in the system. k was initially selected using the Schwarz Criterion (SC) but finally determined using the multivariate Lagrange multiplier (LM) test for VAR residual serial correlation. d was determined from the results of the Augmented Dickey-Fuller (ADF) and Kwiatkowski, Phillips, Schimdt and Shin (KPSS) tests. The Phillips-Perron tests were also employed if the two prior tests provided mixed results.

[1]The first three letters of a country name that are written in subscript in a particular series represent the series for that countries. For example H_{BAH} represents the health series for Bahrain, while GDP_{BAH} represents the GDP per capita series for Bahrain. Similar representation is used for all series pertaining to the other countries

To test whether health resulted in wealth, parameter restriction of the following was tested using the modified Wald (MWALD) test.

$$H_0 = \alpha_{12}^{(1)} = ... = \alpha_{12}^{(k)} = 0$$

In the integrated and co-integrated system, Toda and Yamamoto (1995) proved that the Wald test for linear restrictions on the parameters of VAR (k) had an asymptotic χ^2 distribution when VAR($k+d$) was estimated. Rejection of the null implies that health does Granger cause wealth. Similarly to test whether wealth Granger cause health, the following null was tested.

$$H_0 = \alpha_{21}^{(1)} = ... = \alpha_{21}^{(k)} = 0$$

According to Toda and Yamamoto (1995) and Dolado and Lutkepohl (1996), with the modified Wald (MWALD) test statistics, the technique can be applied regardless of the level of integration of the time series in the model or whether they are co-integrated or not. Thus, pre-testing of the co-integrating properties of the system is not necessary.

FINDINGS AND DISCUSSION

Table 2 provides a summary of initial key results. The results proved the outcomes of the unit root tests of the time series and the maximum number of integration in the system. The full results can be seen in Table 4 and Table 5 in the appendix.

As shown, each GDP variable for each country was I(1). The finding was straightforward as the ADF and KPSS revealed almost similar results. Nevertheless, some health variables were I(0), while others were I(2). Most of the time, the ADF and KPSS tests were not sufficiently informative. Consequently, PP was employed to help in making a decision. From the results, the maximum number of integration in the system (d) for each country could be determined, and this is shown in the last column of Table 2.

Table 2
Summary of Key results

Order of Integration of Time Series				Maximum Order of Integration (d) in the System
GDP_{BAH}	I(1)	H_{BAH}	I(0)	1
GDP_{BRU}	I(1)	H_{BRU}	I(2)	2
GDP_{KUW}	I(1)	H_{KUW}	I(0)	1
GDP_{OMA}	I(1)	H_{OMA}	I(2)	2
GDP_{QAT}	I(1)	H_{QAT}	I(0)	1
GDP_{SAU}	I(1)	H_{SAU}	I(0)	1
GDP_{UAE}	I(1)	H_{UAE}	I(0)	1

Once d was determined, unrestricted VAR was modelled for each country. The number of lags used in each model was $k+d$. For testing Granger non-causality, only k lags were taken into account. Each estimated VAR model was stable (stationary) with regard to its roots, which had a modulus less than one and lay inside a unit circle. These figures are not presented to save space.

Table 3 shows the results of the Toda-Yamamoto Granger non-causality test. As indicated, health condition did Granger cause economic development in Bahrain

and Kuwait. The opposite causal direction, however, was evident for Saudi Arabia. The United Arab Emirates showed bidirectional causality between the variables, while Brunei, Oman and Qatar did not show any causal direction between the variables.

Table 3
Results of Toda-Yamamoto Granger non-causality tests

Null Hypothesis	df	Chi-sq	Probability	Causal Nexus
H_{BAH} does not Granger cause GDP_{BAH}	5	23.27***	0.00	Health causes economic development
GDP_{BAH} does not Granger causes H_{BAH}	5	5.98	0.31	
H_{BRU} does not Granger cause GDP_{BRU}	5	3.04	0.69	No causality
GDP_{BRU} does not Granger cause H_{BRU}	5	4.54	0.48	
H_{KUW} does not Granger cause GDP_{KUW}	4	8.82*	0.07	Health causes economic development
GDP_{KUW} does not Granger cause H_{KUW}	4	1.26	0.87	
H_{OMA} does not Granger cause GDP_{OMA}	5	5.93	0.31	No causality
GDP_{OMA} does not Granger cause H_{OMA}	5	3.59	0.61	
H_{QAT} does not Granger cause GDP_{QAT}	4	1.73	0.78	No causality
GDP_{QAT} does not Granger cause H_{QAT}	4	1.74	0.78	
H_{SAU} does not Granger cause GDP_{SAU}	4	2.92	0.57	Economic development causes health
GDP_{SAU} does not Granger cause H_{SAU}	4	8.43*	0.08	
H_{UAE} does not Granger cause GDP_{UAE}	8	48.36***	0.00	Bidirectional causality
GDP_{UAE} does not Granger cause H_{UAE}	8	16.35**	0.04	

Note: *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level, df means degree of freedom

The results in Table 3 above showed that the positive health conditions that led to economic development in Bahrain and Kuwait were the result of a massive national health plan and government projection for long-term development of the health system. However, it is of note that economic development triggered health conditions in Saudi Arabia. This was the result of total health commitments of about 3.2% as a percentage of GDP to health, and assisted in rapid development of a sophisticated health sector for the kingdom. The United Arab Emirates showed bidirectional causality between the health condition and economic development due to its urbane health scheme for citizens and a mandatory health insurance policy as well as a budget allocation of 3.3% for the health sector.

On the other hand, the non-causal direction between health condition and economic development of Brunei, Oman and Qatar can be attributed to the health policy implementation of those countries that might need improvement. Nevertheless, the three countries are revolutionising their health sector through the introduction of national health insurance coverage and considerable first-class health service delivery.

CONCLUSION

Studies have shown that health has become one of the imperative features of the economic development of a country. Nevertheless, having better economic development could also lead to better health for citizens. Knowing which causes the other is crucial for policy implementation, especially if a higher proportion of income is contributed to improving health. This paper examined the causal relationship between health and economic development in selected high-income economies of Organisation of Islamic Conference (OIC) nations. Since the selected countries also have high expenditure on health in comparison with other OIC countries, the study could give some indications of the importance of high spending on health and economic wellbeing of a country.

This study employed the Toda-Yamamoto Granger non-causality model on data spanning from 1970 to 2015, and obtained results that showed mixed causal directions. In particular, Bahrain and Kuwait seemed to have a health condition that causes higher economic development, while Saudi Arabia experienced the opposite. The United Arab Emirates showed bidirectional causality in the variables while Brunei, Oman and Qatar showed no causal direction between health and economic development.

The results imply that spending high on health does not always stimulate better economic wellbeing even though it can lead to better health condition. Bahrain and Kuwait showed that health condition can stimulate economic development, sending a signal to other high-income OIC countries to improve their policy implementation. Likewise, better economic development could also lead to better health condition. Future research can look into factors that cause a particular causal linkage in some countries but not in others.

Lastly, this study is limited by its use of a two-variable model as the only measure of health and economic development, so future studies could make the attempt to expand the variables by including other variables of health in the model for a more robust outcome.

ACKNOWLEDGEMENT

The authors wish to thank the Ministry of Education, Malaysia for supporting this research under the Fundamental Research Grant Scheme (FRGS). Research Code: FRGS/1/2013/SS07/USIM/02/2 and USIM/FRGS/FEM/32/51013.

REFERENCES

Al-Yousuf, M., Akerele, T. M., & Al-Mazrou, Y. Y. (2002). Organization of the Saudi Health System. *Eastern Mediterranean Health Journal, 8*(4&5), 645–653.

Alshishtawy, M. M. (2010). Four decades of progress: Evolution of the health system in Oman. *Sultan Qaboos University Medical Journal, 10*(1), 12–22.

Barro, R. (1996). *Health and economic growth.* Mimeo. Cambridge, MA: Harvard University.

Barro, R., & Lee, J. (1994). Sources of economic growth. *Carnegie-Rochester Conference Series on Public Policy, 40*, 1–46.

Barro, R., & Sala-I-Martin, X. (1995). *Economic growth.* New York: McGraw-Hill.

Basta, S. S., Soekirman, M. S., Karyadi, D., & Scrimshaw, N. S. (1979). Iron deficiency anaemia and the productivity of adult males in Indonesia. *American Journal of Clinical Nutrition, 32*(4), 916–925.

Bhargava, A. (1997). Nutritional status and the allocation of time in Rwandese households. *Journal of Econometrics, 77*(1), 277–295.

Bloom, D. E., & Canning, D. (2000). The health and wealth of nations. *Science, 287*(5456), 1207–1208.

Bloom, D. E., & Canning, D. (2001). Demographic change and economic growth: The role of cumulative causality. In N. Birdsall, A. C. Kelley, & S. W. Sinding (Eds.), *Population matters: Demographic change, economic growth and poverty in the developing world* (pp. 165–197). New York: Oxford University Press.

Bloom, D. E., & Malaney, P. (1998). Macroeconomic consequences of the Russian mortality crisis. *World Development, 26*(11), 2073–2085.

Bloom, D. E., & Sachs, J. (1998). Geography, demography, and economic growth in Africa. *Brookings Papers on Economic Activity, 1998*(2), 207–273.

Bloom, D. E., & Williamson, J. G. (1998). Demographic transitions and economic miracles in emerging Asia. *World Bank Economic Review, 12*(3), 419–455.

Bloom, D. E., Canning, D., & Malaney, P. N. (2000). Demographic change and economic growth in Asia. *Population and Development Review, 26*(supp.), 257–290.

Bloom, D. E., Canning, D., & Sevilla, J. (2001). The effect of health on economic growth: Theory and evidence. *NBER Working Paper No. 8587*.

Bloom, D. E., Canning, D., & Sevilla, J. (2004). The effect of health on economic growth: A production function approach. *World Development, 32*(1), 1–13.

Bloom, D. E., Canning, D., Evans, D., Graham, B., Lynch, P., & Murphy, E. (1999). Population change and human development in Latin America. *Paper prepared for the Inter-American Development Bank*.

Day, P., Pearce, J., & Dorling, D. (2008). Twelve Worlds: A geo-demographic comparison of global inequalities in mortality. *Journal of Epidemiology Community Health, 62*(11), 1002–1010.

Dolado, J. D., & Lutkepohl, H. (1996). Making Wald tests work for cointegrated VAR systems. *Econometric Review, 15*(4), 369–386.

Fried, L. P. (2000). Epidemiology of aging. *Epidemiologic Reviews, 22*(1), 95–106.

Gallup, J., & Sachs, J. (2000). The economic burden of malaria. *Working Paper No. 52*. Center for International Development, Harvard University, Cambridge, MA.

Grimm, M. (2011). Does inequality in health impede economic growth? *Oxford Economic Papers, 63*(3), 448–474.

Gürler, M., & Özsoy, Ö. (2017). The relationship between life expectancy at birth and economic growth in Islamic countries. *The International Congress of Islamic Economy, Finance and Ethics (ISEFE 2017)*. Istanbul, Turkey.

Hamoudi, A., & Sachs, J. (1999). Economic consequences of health status: A review of the evidence. *Working Paper No. 30*. Harvard Center for International Development, Cambridge, MA.

Jen, M. H., Johnston, R., Jones, K., Harris, R., & Gandy, A. (2010). International variations in life expectancy: A spatio-temporal analysis. *Journal for Economic and Social Geography, 101*(1), 73-90.

Kefeli, Z., & Zaidi, M. A. S. (2014). Effect of health on economic development: Evidence among OIC high-income economies. In *Prosiding Persidangan Kebangsaan Ekonomi Malaysia (PERKEM ke-9)*, Kuala Terengganu, Terengganu, Malaysia.

Khaliq, A. A. (2012). The Saudi healthcare system: A view from the minaret. *World Health and Population, 13*(3), 52–64.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992) Testing the null hypothesis of stationarity against the alternative of a unit root. *Journal of Econometrics, 54*(1-3), 159–178.

Lynch, J., Davey Smith, G., Harper, S., Hillemeier, M., Ross, N., Kaplan, G., & Wolfson, M. (2004). Is income inequality a determinant of population health? Part 1: A systematic review. *Millbank Quarterly, 82*(1), 5–99.

MacKinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics, 11*, 601–618.

Marmot, M. (2010). Fair society, healthy lives. *The Marmot Review.* Retrieved October 17, 2013 from http://www.instituteofhealthequity.org/projects/fair-society-healthy-lives-the-marmot-review.

MHKB. (2015). *I-SEHA, informed health care*. Ministry of Health Kingdom of Bahrain. Retrieved March 14, 2015 from http://www.moh.gov.bh/en/aboutMOH/ministry.aspx.

OIC. (2013). *OIC health report 2013*. Statistical Economic and Social Research and Training Centre for Islamic Countries (SESRIC). Organisation of Islamic Cooperation.

ONS. (2007). *Trends in life expectancy by social class 1972–2005. London: Office for National Statistics.* Office for National Statistics. Retrieved October 17, 2013 from http://www.ons.gov.uk/ons/rel/health-ineq/health-inequalities/trends-in-life-expectancy-by-social-class-1972-2005/trends-in-ons-longitudinal-study-estimates-of-life-expectancy-1972-2005.pdf.

Sachs, J., & Warner, A. (1997). Sources of slow growth in African economies. *Journal of African Economics, 6*, 335–337.

SESRIC. (2012). *Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC).* Turkey.

SNP. (2010). *Poverty, worklessness and welfare dependency in UK*. State of the Nation Report. Retrieved March 17, 2015 from http://www.bristol.ac.uk/poverty/downloads/keyofficialdocuments/CONDEM%20-poverty-report.pdf.

Sorkin, A. L. (1977). *Health economics in developing countries.* Lexington, MA: Lexington Books.

Spurr, G. B. (1983). Nutritional status and physical work capacity. *Yearbook of Physical Anthropology, 26*(S1), 1–35.

Strauss, J., & Thomas, D. (1998). Health, nutrition and economic development. *Journal of Economic Literature, 36*(2), 766–917.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics, 66*(1-2), 225–250.

Wahab, A. A. O. A., & Kefeli, Z. (2016). Projecting a long term expenditure growth in healthcare service: A literature review. *Procedia Economics and Finance, 37*, 152–157.

Weil, D. N. (2007). Accounting for the effect of health on economic growth. *The Quarterly Journal of Economics, 122*(3), 1265–1306.

World Bank. (2015). *World development indicators.* Retrieved March 20, 2015, from https://blogs.worldbank.org/opendata/new-country-classifications

WHO. (2013). *Regional health observatory.* World Health Organization. Retrieved 13 March, 2015 from http://www.who.int/countries/en/.

WHO. (2014). *Global health observatory.* World Health Organization. Retrieved 13 March, 2015 from http://apps.who.int/gho/data/node.cco.

APPENDIX

Table 4
Results of unit root tests: GDP

Augmented Dickey Fuller						
H_0: The variable has a unit root						
	Level Form		First Difference		2nd Difference	
Time Series	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
GDP_{BAH}	-2.02 (0)	-2.18 (0)	-6.55 (0)***	-6.48(0)***	-7.82(2)***	-7.87(2)***
GDP_{BRU}	-0.91 (2)	-3.79 (5)**	-4.47 (1)***	-4.47 (1)***	-6.34 (3)***	-6.25 (3)***
GDP_{KUW}	-2.69 (1)*	-2.52 (1)	-4.90 (0)***	-5.01 (0)***	-8.00 (1)***	-7.90 (1)***
GDP_{OMA}	-2.91 (1)*	-1.24 (1)	-5.16 (0)***	-6.08 (0)***	-10.07 (0)***	-9.94 (0)***
GDP_{QAT}	-1.85 (2)	-0.86 (0)	-2.64 (1)*	-5.11 (0)***	-12.04 (0)***	-11.90 (0)***
GDP_{SAU}	-2.19 (2)	-1.41 (0)	-4.88 (0)***	-4.84 (0)***	-11.16 (0)***	-11.11 (0)***
GDP_{UAE}	-1.30 (1)	-2.49 (1)	-5.12 (0)***	-5.08 (0)***	-8.98 (0)***	-8.88 (0)***
KPSS						
H_0: The variable is stationary						
	Level Form		First Difference		2nd Difference	
Time Series	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
GDP_{BAH}	0.22	0.09	0.07	0.07	0.25	0.25
GDP_{BRU}	0.60**	0.08	0.17	0.12	0.02	0.01
GDP_{KUW}	0.20	0.18**	0.31	0.10	0.14	0.14*
GDP_{OMA}	0.71**	0.21**	0.49**	0.04	0.09	0.11
GDP_{QAT}	0.20	0.20**	0.34	0.10	0.11	0.11
GDP_{SAU}	0.45*	0.14*	0.11	0.11	0.22	0.19**
GDP_{UAE}	0.78***	0.09	0.07	0.06	0.20	0.18**
Phillips-Perron						
H_0: The variable has a unit root						
	Level Form		First Difference		2nd Difference	
Time Series	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
GDP_{BAH}	-2.04	-2.22	-6.55***	-6.48***	-33.57***	-36.67***
GDP_{BRU}	-1.00	-2.63	-5.21***	-5.22***	-16.46***	-16.74***
GDP_{KUW}	-2.32	-2.07	-4.84***	-4.91***	-16.18***	-15.94***
GDP_{OMA}	-2.61	-0.73	-5.20***	-6.28***	-17.57***	-18.75***
GDP_{QAT}	-1.42	-1.13	-4.94***	-5.24***	-16.36***	-16.17***
GDP_{SAU}	-1.54	-2.02	-4.85***	-4.76***	-13.67***	-14.42***
GDP_{UAE}	-1.17	-2.17	-5.12***	-5.08***	-22.16***	-21.86***

Note:
- Number in parenthesis is the optimum number of lags determined by SC
- *** significant at 1% level; ** significant at 5% level; * significant at 10% level
- For ADF and PP, the critical values are from MacKinnon (1996), while for KPSS, the critical values are from Kwiatkowski-Phillips-Schmidt-Shin (1992)

APPENDIX

Table 5
Results of unit root tests: Health

Augmented Dickey Fuller						
H_0: The variable has a unit root						
	Level Form		First Difference		2nd Difference	
Time Series	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
H_{BAH}	-1.39 (4)	-5.02 (5)***	-4.03 (6)***	-1.96 (3)	-3.01 (2)**	-1.84 (2)
H_{BRU}	-3.49 (4)**	-3.15 (4)	-1.88 (1)	-3.08 (2)	-2.72 (0)*	-5.05 (5)***
H_{KUW}	-4.29 (5)***	-3.06 (2)	-1.31 (3)	-1.60 (3)	-2.49 (1)	-2.52 (1)
H_{OMA}	-10.72 (1)***	-12.65 (1)***	0.12 (0)	-1.64 (0)	-3.73 (2)***	-4.43 (2)***
H_{QAT}	-1.00 (3)	-4.22 (4)***	-2.37 (2)	-2.36 (2)	-2.50 (1)	-1.53 (1)
H_{SAU}	-2.44 (4)	-2.36 (4)	-2.53 (4)	-1.23 (4)	-2.24 (3)	-3.01 (3)
H_{UAE}	-1.34 (4)	-4.42 (8)***	-2.19 (3)	-2.18 (3)	-2.48 (2)	-2.00 (2)
KPSS						
H_0: The variable is stationary						
	Level Form		First Difference		2nd Difference	
Time Series	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
H_{BAH}	0.84***	0.21**	0.70**	0.20**	0.68**	0.19**
H_{BRU}	0.88***	0.20**	0.53**	0.18**	0.16	0.06
H_{KUW}	0.82***	0.22***	0.75***	0.20**	0.52**	0.09
H_{OMA}	0.84***	0.23***	0.80***	0.15**	0.13	0.13*
H_{QAT}	0.85***	0.21**	0.66**	0.22***	0.63**	0.13*
H_{SAU}	0.80***	0.22***	0.78***	0.21**	0.53**	0.09
H_{UAE}	0.85***	0.22**	0.78***	0.21**	0.71**	0.19**
Phillips-Perron						
H_0: The variable has a unit root						
	Level Form		First Difference		2nd Difference	
Time Series	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
H_{BAH}	-10.90***	-15.59***	-10.00***	-4.93***	-2.69*	-3.37*
H_{BRU}	-3.17**	-3.27*	-2.02	-1.85	-2.90*	-2.78
H_{KUW}	-9.98***	-3.68**	-2.78*	-0.45	-5.50***	-6.82***
H_{OMA}	-14.26***	-2.29	-0.34	-2.38	-3.01*	-2.97
H_{QAT}	-6.96***	-8.60***	-6.64***	-3.56*	-2.34	-3.39*
H_{SAU}	-27.34***	-9.72***	-3.01*	0.25	-2.04	-4.19***
H_{UAE}	-16.05***	-15.38***	-10.74***	-4.96***	-3.93***	-6.85***

Note:
- Number in parenthesis is the optimum number of lags determined by SC
- *** significant at 1% level; ** significant at 5% level; * significant at 10% level
- For ADF and PP, the critical values are from MacKinnon (1996), while for KPSS, the critical values are from Kwiatkowski-Phillips-Schmidt-Shin (1992)