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Public Health Expenditure, Governance and Health Outcomes in Malaysia

(Perbelanjaan Awam, Urus Tadbir dan Natijah Kesihatan di Malaysia)

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ABSTRACT

According to the World Health Organization (WHO), government plays a crucial role in providing quality life for its citizens through good health system. There has been less attention given in analysing the relationship between government expenditure, governance and health outcomes particularly in developing countries. This paper aims to study the impact of public health expenditure and governance on health outcomes in Malaysia. An Autoregressive Distributed Lag (ARDL) cointegration framework has been used to analyse data from 1984 to 2009. The results based on the bounds testing procedure show that a stable, long-run relationship exists between health outcomes and their determinants; namely income level, public health expenditure, corruption and government stability. The results also reveal that public health expenditure and corruption affect long- and short run health outcomes in Malaysia. The findings are important to the policy makers in making decisions to improve the citizens' quality of life. We suggest the Ministry of Health of Malaysia to conduct more consultations with other ministries and other stakeholders in health services as to identify the needs and emphasize on the importance of health program to the society. At the same time, attention should be given to reduce or eliminate the corruption rate as it has adverse effects on the country.

Keywords: Governance; corruption; health; public health expenditure

ABSTRAK

Berdasarkan Pertubuhan Kesihatan Sedunia, kerajaan memainkan peranan yang penting bagi meningkatkan kualiti hidup setiap warganegara melalui sistem kesihatan yang baik. Berdasarkan kajian sebelum ini, kajian mengenai kesan perbelanjaan kerajaan dan urus tadbir ke atas hasil kesihatan terutama kajian di negara-negara membangun masih terhad. Kertas kerja ini bertujuan untuk mengkaji kesan perbelanjaan kesihatan awam dan urus tadbir ke atas natijah kesihatan di Malaysia. Rangka kerja Autoregressive Distributed Lag (ARDL) cointegration telah digunakan untuk menganalisis data dari tahun 1984 hingga 2009. Keputusan daripada prosedur ujian sempadan menunjukkan wujud hubungan jangka panjang yang stabil antara natijah kesihatan dan penentu-penentunya iaitu tingkat pendapatan, perbelanjaan kesihatan awam, rasuah dan kestabilan kerajaan. Keputusan juga menunjukkan bahawa perbelanjaan kesihatan awam dan rasuah mempunyai kesan jangka panjang dan jangka pendek ke atas hasil kesihatan di Malaysia. Penemuan ini penting kepada pembuat dasar dalam menentukan peruntukan yang sesuai bagi meningkatkan kualiti hidup orang ramai. Pada masa yang sama, perhatian juga perlu diberikan untuk mengurangkan atau menghapuskan kadar rasuah dalam negara berikutan kesan buruk terhadap negara dan orang ramai.

Kata kunci: Tadbir urus; kesihatan; perbelanjaan kesihatan awam; rasuah

INTRODUCTION

According to the World Health Organization (WHO), a health system in every country comprises all organizations, institutions and resources that are devoted in producing health actions. A health action is defined as any effort, whether in personal health care, public health services or through intersectoral initiatives, in which its primary purpose is to promote, restore, maintain or improve health.[1] The concept of health system as defined by the WHO shows that government in every country plays a vital role in ensuring the country's health system achieves the required standard which includes providing better quality of life for the citizen. The link between public spending and development outcomes (economy or social outcomes) has been debated by many researchers such as Barro (1990), Ram (1986) and Ghali (1998) who discuss the relationship between government expenditure and economic outcome; meanwhile, Filmer and Pritchett (1999), Kim and Lane (2013) and Craigwell et al. (2012) focus on the social outcome. The most important discussion is how public spending may, in practice, be severed when there is no incentive mechanism in the public sector to use available funds for productive purposes. Recently, both economists and researchers have raised their concerns regarding the concept of

governance. Good governance will promote economic growth and greater economic productivity. However, increased public spending may not improve development outcomes as a result of inefficiency in public expenditure and governance. Consequently, public spending leads to crowd out private sector provision in health care. Furthermore, the infrastructure needed to access health care may not exist, rendering the increased health care spending ineffective.

The Malaysian health system has been developed since its independence from the British in 1957, and is heavily influenced by the UK health system. The public sector health services are centrally administered by the Ministry of Health (MOH) through its central, state and district offices. The MOH emphasizes on the promotion of health and the provision of health care that is equitable, effective, efficient and technologically appropriate. In terms of health status, Malaysia has made great gain in life expectancy for its people; an increase between 1970 and 2008 for women from 65.6 to 76.4 years, and men from 61.6 to 71.6 years (Jaafar et al. 2013). Malaysia is also undergoing an epidemiological transition with causes of mortality shifting from communicable to non-communicable diseases such as heart and lungs diseases (Jaafar et al. 2013). It indicates the new challenges facing the government of Malaysia in providing good services and facilities to its people.

Public spending particularly in health sector varies widely among countries. Some governments (particularly in less-developed countries) spend less than 1 percent of their Gross Domestic Product (GDP) on this sector (Rajkumar & Swaroop 2008), while in developed countries such as the United States, the government spends more than 10 percent of GDP on health care services (see Figure 1). Based on the data from the WHO, Malaysia spent a relatively low total health expenditure of 3.47 percent of GDP in 2008. This expenditure increases gradually from year to year such as in year 2013, the total health expenditure was 4.03 percent of GDP. However, this percentage is relatively low if compared to developed countries such as the United States, United Kingdom and Japan. The trend of the total expenditure in Malaysia is quite similar to neighbouring countries such as Thailand and Philippines, while Indonesia's percentage is the lowest. Figure 1 exhibits the total health expenditure in Malaysia and the comparison between several countries (developed and developing countries). On the other hand, the International Country Risk Guide reports that the corruption index in Malaysia is decreasing. For example, in 1990, the corruption index was 4, but in 2009 this index decreased to 2.5. The highest number of points indicates the lowest corruption level and the lowest number (0) indicates the highest corruption level. Corruption distorts the economic and financial environment of a country, and leads to negative impact on social outcome.

Based on this fact, this paper examines the efficacy of government and the quality of institutions on the health outcomes in Malaysia. Besides, the motivation of this study is also derived from the lack of studies that focus on social outcome side. Most of the studies had concentrated on economics outcomes particularly on economic growth in developed countries. This paper examines the importance of government expenditure particularly health expenditure on health outcomes in Malaysia as one of developing countries. Interestingly, this study also takes into account the role of governance in affecting the health status of this country. Specifically, this paper analyses the long term relationships between public expenditure, institutions and health status in Malaysia. In addition, the paper aims to identify the short term relationship among variables.

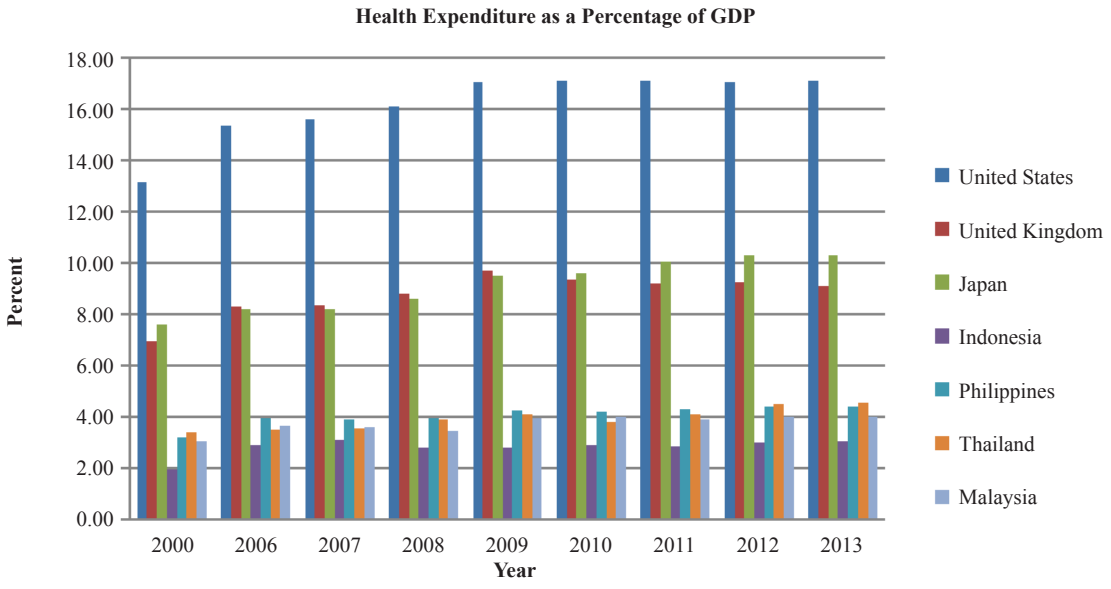


FIGURE 1. Health Expenditure among Selected Countries

This paper contributes to the existing work in this area particularly in Malaysia. Previous studies such as Filmer and Pritchet (1999), Kneller et al. (1999) and Rajkumar and Swaroop (2008) had focused on either developed countries or using cross sectional data approach. There are limited studies that examine the relationship between health spending, governance and health status in developing countries, particularly Malaysia. Some of the studies have examined the impact of government expenditure on economic growth of Malaysia (e.g., Sinha 1998; Samudram et al. 2009; Tang 2009). Thus, this paper contributes to the existing literature in two ways. First, this study will extend the existing literature by focusing on the issue of public health expenditure and health outcomes in Malaysia. This paper also analyses the issue of governance namely corruption and government stability. This paper differs from previous studies as time series data instead of cross sectional approach is used. Second, this paper uses an econometric technique namely the Autoregressive Distributed Lagged (ARDL) testing procedure proposed by Pesaran et al. (2001). The method is sufficient in dealing with a short sample size and it allows a mixture of time series variables of I(0) and I(1) to be collectively estimated. This study will shed some light on the importance of public health expenditure and institutions in affecting health status for a small developing country.

The remainder of this paper is organized as follows: in Section 2 provides a brief review of the previous studies in this topic. Section 3 discusses the methodology, while Sections 4 and 5 discuss the findings and offer concluding remarks, respectively.

LITERATURE REVIEW

There are substantial studies on the issue of government spending and its outcomes. The most important studies are those which examine the relationship between government spending and economic outcome such as economic growth. Previous studies such as Barro (1990), Dar and AmirKhalkhali (2002), Ghali (1998), Guseh (1997), Kneller et al. (1999), Levine and Renelt (1992) and Ram (1986) had focused on this issue. Some of these studies reported that government spending has a positive relationship with economic growth and some studies offered contradictory findings. Interestingly, some researchers have argued that there is a non-linear relationship between government expenditure and economic growth.

On the other hand, there are studies that focus on the effects of government spending and social outcomes; education and health (Baldacci 2003; Filmer and Pritchett 1999; Kim and Lane 2013; Craigwell et al. 2012). According to Filmer and Pritchett (1999), in 1995 over nine million children, under five years, in developing countries died of avoidable deaths.2 It shows the vital role of the government in providing and maintaining good health in the country. Kim and Lane (2013) empirically analysed the relationship between public health expenditure and national health outcomes among developed countries. The result shows that there is a negative relationship between government health expenditure and infant mortality rate, and a positive relationship between government health expenditure and life expectancy at birth. Craigwell et al. (2012) assessed the efficacy of public spending on health care and education in 19 Caribbean countries and revealed that health expenditure has a significant positive effect on health status. Filmer and Pritchett (1999) found weak link between public spending and social outcome. However, it is difficult to draw policy conclusion from cross country data due to policy recommendations that are dependent upon a country's specific situation. In addition, Kefeli and Zaidi (2014) studied the causal relationship between health and economic development for selected OIC countries (high income countries).

The link between public expenditure and health status has been described by researchers. For example, Rajkumar and Swaroop (2008) argued that there are two concepts to explain the low or negligible impact of public spending on development outcomes. First, it is argued that the link between public spending and development outcomes could be severed because an increase in public provision could lead to the substitution of private sector provision. Second, the ineffectiveness of public expenditure includes poor targeting and/or institutional inefficiencies such as leakage in public spending and weak institutional capacity also affects development outcomes negatively. In addition, Filmer and Pritchett (1999) explained that the three components of public health expenditure, namely health production function, net public sector impact, and public sector efficacy are important in achieving better health status. The main focus in health production function is the cost effectiveness of public spending. A second component is the net impact of public sector supply. In this component, it emphasizes on the role of government to supplement, not replacing the market with low cost services. The third component focuses on public sector efficacy and emphasizes on improving the operational performance of public sector health care providers. These three components are depicted in Figure 2 which shows the government's vital role in supporting the provision for better health.

Recent studies have begun to examine the importance of governance and institutional quality on development outcomes such as economic growth, foreign direct investment, public investment and social infrastructure. Rajkumar and Swaroop (2008) discussed the relationship between a variety of governance indicators and development outcomes from previous studies. According to the World Bank, good governance is characterized by predictable, open, and enlightened policy making (that

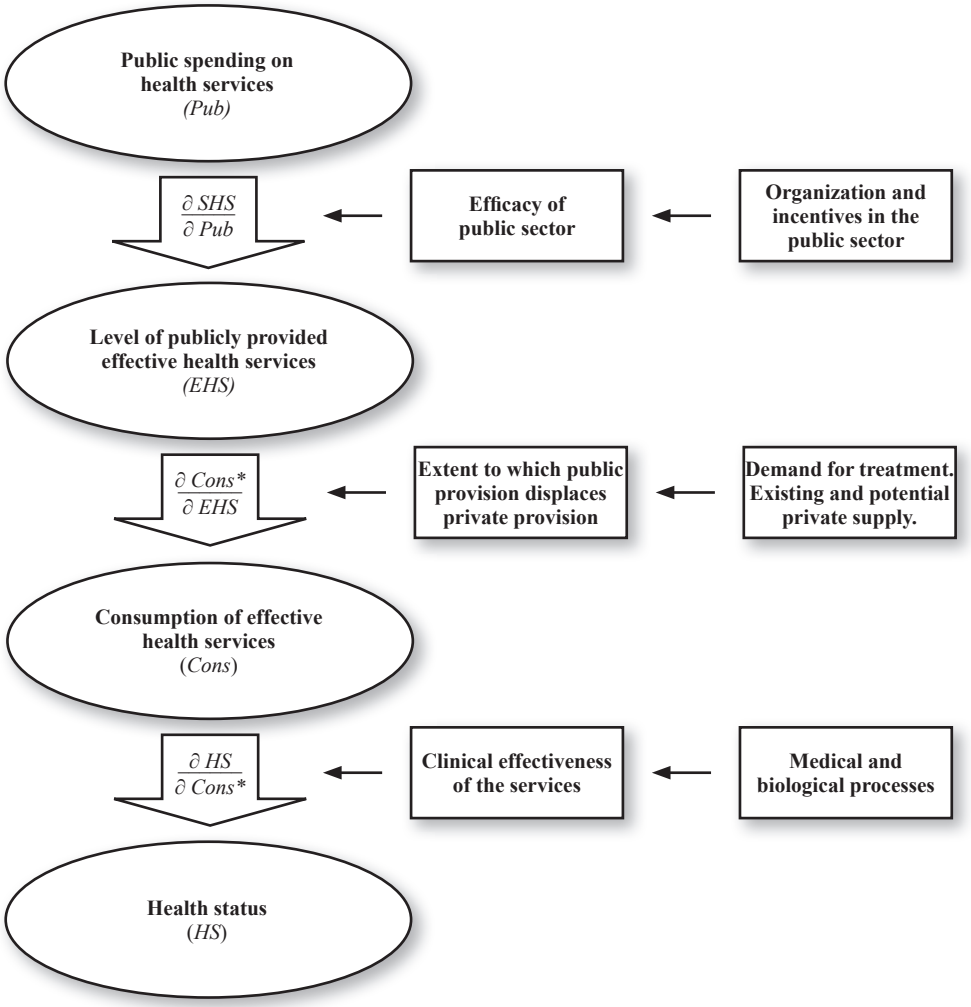


FIGURE 2. Public Spending for Better Health (Filmer and Pritchett (1999))

is, transparent processes); a bureaucracy imbued with a professional attitude; an executive arm of government accountable for its actions; and a strong civil society participating in public affairs; and all behaving under the rule of law. Good quality of governance and institutions will contribute to greater productivity in the economy and affect social outcomes as well. For example, Acemoglu et al. (2005), Acemoglu and Robinson (2010) and Mo (2001) explained the importance of institutions in promoting long run economic growth. Besides, Kaufmann et al. (1999) showed that governance indicators have a strong direct negative impact on infant mortality. Azfar and Gurgur (2005) examined the effect of corruption on outcomes in the Philippines and discovered that corruption negatively impact health outcomes. Interestingly, studies have been done by focusing on the integrated issue of public spending, governance and outcomes either in economic growth or social outcomes. Rajkumar and Swaroop (2008) examined the links between public spending, governance, and outcomes for 91 developed and developing countries. The result indicates that public spending on health care alone does not guarantee improved social outcomes; instead, quality governance tools such as well-functioning budget formulation, execution and monitoring are essential in producing a better health position.

In Malaysia, the study on the issue of health system is growing steadily. Kefeli and Jones (2012) examined moral hazard and the impact of private health insurance on the utilisation of health care. In addition, Kefeli and Zaidi (2013) examined the differences in the utilisation of health services among the elderly. Yu et al. (2008) comprehensively assessed the equity of health care financing. Five financing sources were studied and they are: direct taxes, indirect taxes, contributions to Employee Provident Fund and Social Security Organization, private insurance and out-of-pocket payments. These three studies use household surveys data to achieve their objectives. At macro level, Sinha (1998) studied the impact of government expenditure on economic outcome (economic growth) instead of social outcomes. Based on the above discussion, this paper contributes to the existing literature particularly in the case of Malaysia by using aggregate data. Interestingly, this paper focuses on the

issue of governance quality and its impact on health status in developing countries. While many studies have looked at the relationships between government expenditure, governance and health outcome using cross sectional data, there are limited number of studies that examine these relationships at the macro level using time series data especially in developing countries. Furthermore, policy formulation especially in increasing standard of living in developing countries can be strengthened by utilizing the findings from this study. Thus, this study is conducted to test the relationship between government spending, governance and health outcomes using time series data.

METHODOLOGY

DATA

Due to the issue of data unavailability (governance data), this paper uses the dataset that has been collected annually starting from 1984 to 2009. There are two data sources. First, the data for national income (GDP), public health expenditure, total population, life expectancy, infant mortality, under-five mortality were collected from the Department of Statistics of Malaysia. Second, the data for corruption and government stability were collected from the International Country Risk Guide (ICRG). The corruption data are scaled from zero to six, while government stability data are scaled from zero to twelve; whereby higher values show better quality, and vice versa. Based on the ICRG, government stability has three subcomponents; namely government unity, legislative strength and popular support. The risk rating assigned is the sum of these three components, each with a maximum score of four points, and a minimum score of 0 point. However, the ICRG does not give specific method to calculate the indices in assessing the quality of these subcomponents of institutions. Health outcomes, on the other hand, will be measured using three indicators namely life expectancy, infant mortality and under-five mortality.

The inclusion of income in the model estimation will indicate the importance of income in improving health status through a variety of indirect channels, for instance providing better housing, sanitation and nutrition to the people in the country. In other words, higher income countries have the capability to invest more in health care services, and educate their people to live in healthy environment. As a result, health status and the quality of life can be improved. Thus, in this paper, it is expected that income level will improve national health status. As mentioned earlier, health outcomes will be measured by three indicators; therefore, there is a positive relationship between income level and life expectancy, a negative relationship between income level and infant mortality as well as under-five mortality. Besides, government spending (specifically public health expenditure) has a positive relationship with life expectancy, and a negative relationship with infant mortality and under-five mortality. The relationship between government spending and infant mortality is negative which reflects the efficacy of public spending in improving health status. This relationship has been confirmed by previous studies such as in Filmer and Pritchett (1999) and Rajkumar and Swaroop (2008). Corruption, on the other hand, is expected to have a negative relationship with life expectancy and a positive relationship with infant mortality and under-five mortality. Government stability is expected to have a positive effect on life expectancy and a negative effect on infant mortality and under-five mortality.

ESTIMATION PROCEDURE

This study has employed the ARDL bounds test proposed by Pesaran and Shin (1995) and Pesaran et al. (2001) to investigate the relationships between health status, government spending and governance in Malaysia. The most important advantage of the bound test procedure is that it is applicable irrespective of whether the model's regressors are purely I(0), purely I(1) or cointegrated. In other words, it does not require the pre-testing of the variables included in the model for unit roots, unlike other techniques such as the Johansen and Juselius' (1990) approach. Another important advantage of the bound test procedure is that estimation is possible even when the explanatory variables are endogenous.

There are two steps in estimating the model. First, we did the estimation by using the bound test procedure to test for the existence of a long run relationship in levels among the variables. Next, we estimate the parameters of the long run relationship and the associated short run dynamic error correction model using the autoregressive distributed lag (ARDL) approach as proposed by Pesaran and Shin (1995) and Pesaran et al. (2001).

Based on Rajkumar and Swaroop's (2008) model specification, the ARDL model in this study can be written as follows:

$$\begin{aligned}\Delta HO_t = {} & a_0 + \beta_1 HO_{t-1} + \beta_2 GDPC_{t-1} + \beta_3 PHE \\ & + \beta_4 CRP_{t-1} + \beta_5 GST_{t-1} + \sum_{i=1}^{p} \delta_1 \Delta HO_{t-i} \\ & + \sum_{i=0}^{q} \delta_2 \Delta GDPC_{t-i} + \sum_{i=0}^{r} \delta_3 \Delta PHE_{t-i} \\ & + \sum_{i=0}^{s} \delta_4 \Delta CRP_{t-i} + \sum_{i=1}^{t} 0 \Delta GST_{t-i} + \varepsilon_t \quad (1)\end{aligned}$$

In equation (1), HO indicates health outcomes. In this study, three indicators will be used to measure the health outcomes in Malaysia; namely infant mortality (IM), under-five mortality (UFM) and life expectancy (LFE). GDPC is Gross Domestic Product (GDP) per capita and it has been used to measure aggregate income level of a country. PHE is public health expenditure that has been measured by the share of public health to GDP, CRP represents index of corruption, while GST refers to government stability index. All variables are in natural

logarithm except the CRP and GST. There are two models that will be estimated in this paper. The first model will exclude the variable GST, while the second will estimate the model specification as shown in equation (1).

The null hypothesis of the non-existence of a long-run relationship is H_0:$\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ against H_1:$\beta_1 \neq 0, \beta_2 \neq 0, \beta_3 \neq 0, \beta_4 \neq 0, \beta_5 \neq 0$.The critical value bounds of the F-statistics are sensitive to the number of regressors (k), and are tabulated in Pesaran et al. (2001). Besides, Narayan (2005) also provides the critical values that account for small sample sizes. In this paper, we use the table provided by Pesaran et al. (2001). Two sets of critical values are provided. The upper bound assumes that all the variables in the ARDL model are I(1), while the lower bound assumes all variables to be I(0).The null hypothesis of no cointegration among variables can be rejected if the computed F-statistics is higher than the upper bound of the critical values. In contrast, if the computed F-statistics falls below the lower bound, then the null hypothesis cannot be rejected and there is no long run relationship among variables. Nevertheless, if the F-statistic falls within the critical value band, a unit root test of stationarity is needed to authenticate the order of integration of respective variables.

Once a cointegrating relationship is established, the cointegrating vector can be estimated using the ARDL model. The conditional $ARDL(p, q, r, s, t)$ long-run model of the determinants of the HS_t can be estimated as below:

$$HO_t = a_0 + \sum_{i=1}^{p}\beta_1 HO_{t-i} + \sum_{i=1}^{q}\beta_2 GDPC_{t-i} + \sum_{i=0}^{r}\beta_3 PHE_{t-i} + \sum_{i=0}^{s}\beta_4 CRP_{t-i} + \sum_{i=0}^{t}\beta_5 GST_{t-i} + \varepsilon_t \quad (2)$$

Finally, we estimate the short-run dynamic parameters by estimating an error correction model (ECM) associated with the long run estimates. The specification is shown as follows:

$$\Delta HO_t = \vartheta_0 + \gamma_3 ECM_{t-1} + \sum_{i=1}^{p}\text{Ø}_1\Delta HO_{t-i} + \sum_{i=0}^{q}\text{Ø}_2\Delta GDPC_{t-i} + \sum_{i=0}^{r}\text{Ø}_3\Delta PHE_{t-i} + \sum_{i=0}^{s}\text{Ø}_4\Delta CRP_{t-i} + \sum_{i=0}^{t}\Delta_5 GST_{t-i} + \varepsilon_t \quad (3)$$

Where, Ø_1, Ø_2, Ø_3, Ø_4, and Ø_5 are the short-run dynamic coefficients of the model's convergence to equilibrium, and γ is the speed of adjustment. The focus of this study is on the relationship between public health expenditure, corruption and health status in Malaysia.

FINDINGS AND DISCUSSIONS

In this section, we report the results that have been estimated empirically using the ARDL model. The method is adequate and sufficient to deal with a short sample size, and allows a mixture of time series variables of I(0) and I(1) to be collectively estimated. In other words, the ARDL model does not require pre-testing for unit roots. For this reason, we proceed to report the results for the long run relationship among variables as discussed in detailed below.

Table 1 presents the results of testing the existence of long run relationship between health status and public health and governance in Malaysia. There are two models that have been estimated for bound cointegration test. The optimum lag length two has been chosen based on Aikaike Information Criteria (AIC). The first model has three explanatory variables namely GDPC, PHE and CRP, while in the second model, we added an additional explanatory variable namely GST. Three indicators for health status have been used namely under-5 mortality, infant mortality and life expectancy. Based on the results, it can be seen that the null hypothesis of no relationship among variables is rejected at 5 percent significance level for model 1 when the LFE has been used as dependent variable. However, the null hypothesis is not rejected when the dependent variables are infant mortality and under-5 mortality. Similar results are obtained in model 2. The null hypothesis is only rejected when the dependent variable is life expectancy at 1 percent significance level. The computed F-statistics of 5.4578 and 11.0281 are greater than the upper bound value of 5.018 and 7.063 for both models, respectively. This indicates that there is a long-run relationship among variables. Next, we proceed to estimate the long run model of the determinants of

TABLE 1. ARDL Cointegration Tests Results

Dependent variable	Independent variable	Lag	F-statistic
Under 5 mortality	(Model 1) GDPC, PHE, CRP	2	1.9224
Infant Mortality			1.6077
Life Expectancy			5.4578**
Under 5 mortality	(Model 2) GDPC, PHE, CRP, GST	2	1.0862
Infant Mortality			0.6567
Life Expectancy			11.0281*

Note: Lower and Upper Bound Critical Values

10%	5%	1%
[3.008 4.150]	[3.710 5.018]	[5.333 7.063]

(*) and (**) indicate significant at 1% and 5% significance level respectively.

TABLE 2. Estimation of Long-Run Coefficient

Dependent variable: Life Expectancy	Model 1 (1,2,2,0)	Model 2 (1,2,1,0,1)
GDPC	0.012 (0.003)***	0.010 (0.007)
PHE	0.024 (0.004)***	0.022 (0.005)***
CRP	-0.002 (0.946)**	-0.002 (0.001)**
GST	-	0.46 (0.165)
Constant	1.862 (0.021)	1.869 (0.038)

Note: The selection of optimal lags is based on the Aikaike Information Criterion

(*), (**) and (***) indicate significant at 1%, 5% and 10% significance level respectively. Numbers in parentheses are standard errors

TABLE 3. Results of Short Run ARDL Model

Dependent variable: Life Expectancy	Model 1 (1,2,2,0)	Model 2 (1,2,1,0,1)
d(GDPC)	0.017** (0.006)	0.018** (0.007)
d(GDPC)t-1	0.022*** (0.006)	0.022*** (0.006)
d(PHE)	0.431 (0.002)	-0.103 (0.417)
d(PHE)t-1	-0.004 (0.003)	-
d(CRP)	-0.001** (0.434)	-0.001*** (0.417)
d(GST)	-	-0.842 (0.750)
d(Constant)	1.009** (0.1696)	0.876*** (0.163)
ECT_{t-1}	-0.541*** (0.093)	-0.468*** (0.093)

Note: The selection of optimal lags is based on the Aikaike Information Criterion

(*), (**) and (***) indicate significant at 1%, 5% and 10% significance level respectively. Numbers in parentheses are standard errors

health status in Malaysia by using life expectancy as a dependent variable in both models. The estimation results are reported in Table 2.

Next, Table 2 reports the results for the level long run parameter estimates of the model. The ARDL model (1,2,2,0) and model (1,2,1,0,1) as selected by the AIC and their asymptotic standard errors are shown in Table 2. For model 1, the results depict that all the coefficients are statistically significant at least at 5 percent significance level; while for model 2, the PHE and CRP are statistically significant in explaining health status in Malaysia at 5 percent significance level. However, the GST is not significant at affecting life expectancy in Malaysia. The coefficient values for the PHE and CRP are small for both models. This is not surprising as previous studies such as Rajkumar and Swaroop (2008) and Filmer and Pritchett (1999) had also found similar results. Moreover, Filmer and Pritchett (1999) explained the possibility of why public spending on health does not have a strong effect on improving health status.

Public health expenditure affects the life expectancy positively, while corruption has a negative effect on life expectancy. These results are consistent with the hypothesis explained earlier in the methodology section. A positive relationship between public health expenditure and life expectancy in the long run indicates the need for an effective government expenditure to improve the health status in Malaysia. On the other hand, as expected corruption affects life expectancy negatively. It indicates that high rate of corruption (bad governance) prevents the improvement of health status in the long run.

Table 3 reports the estimation results of the short-run model using ARDL (1,2,2,0) and ARDL(1,2,1,0,1). In model 1, it can be seen that income level and corruption are significant at affecting health status at least at 10 percent significant level. The error correction term which explains the speed of the adjustment is also significant at 1 percent significance level for both models. This indicates that there is long run causality from the explanatory variables; GDPC, PHE, CRP and GST to life expectancy. In the short run, corruption also affects health status in Malaysia (a negative effect on life expectancy), similar to long run. However, public health expenditure is not significant in explaining life expectancy in Malaysia. It depicts that the government efforts in terms of expending money to improve health status such as investment or cost. In the short run, there is no 'profit' from the investment, but it is only can be obtained in the long run.

The robustness of the model is confirmed by several diagnostic tests such as Breusch-Godfrey serial correlation LM test, ARCH test, Jacque-Bera normality test, and Ramsey RESET specification test and this is shown in Table 4. All the tests reveal that the model has the desired econometric properties, in which it has the correct functional form and the model's residuals are serially uncorrelated, normally distributed and homoscedastic. Therefore, the results reported are valid for reliable interpretation.

Next, we assessed the stability of the long-run relationship between health status and its determinants. We relied upon the CUSUM and CUSUM-squared tests proposed by Brown et al. (1975) to test for constancy of long-run parameters. We applied the tests to the residuals of the model. The CUSUM test is based on the cumulative sum of recursive residuals based on the first set of n observations. It is updated recursively and plotted against the break points. If the plot of the CUSUM statistics stays within the 5% significance level, then the estimates are stable. The same applies to the CUSUM-squared statistics, which are based on the squared recursive residuals.

TABLE 4. Diagnostic Tests

Test Statistics	LM Version	F Version	LM Version	F Version
	Model 1 (1,2,2,0)		Model 2 (1,2,1,0,1)	
[a]Serial Correlation	0.141 (0.707)	0.055 (0.819)	4.201 (0.040)	1.341 (0.291)
[b]Functional Form	1.049 (0.306)	0.43 (0.528)	0.013 (0.909)	0.003 (0.956)
[c]Normality	1.526 (0.466)	-	3.225 (0.199)	-
[d]Heteroscedasticity	1.732 (0.188)	1.710 (0.205)	2.325 (0.127)	2.362 (0.139)

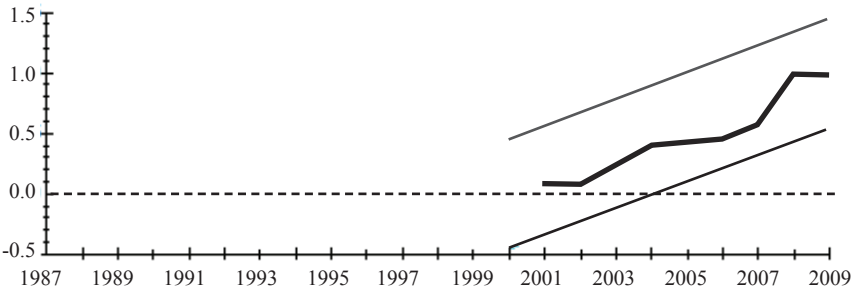
Note: ARDL (1,2,2,0) and (1,2,1,0,1) lag for each variable is selected based on AIC.
[a]Lagrange multiplier test of residual serial correlation;
[b]Ramsey's RESET test using the square of the fitted values;
[c]Based on a test of skewness and kurtosis of residuals;
[d]Based on the regression of squared residuals on squared fitted values.

As can be seen in Figures 1 and 2, the plot of the CUSUM and CUSUM-squared statistics stay within the critical bounds indicating (represented by a pair of straight lines) the stability of the health status. They do not show any evidence of statistically significant breaks as indicated by the two statistics.

FURTHER ANALYSIS

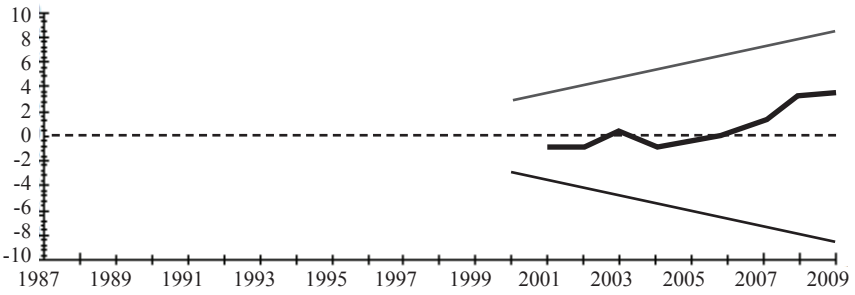
In this section, we further the analysis by replacing the variable public health expenditure (PHE) with general public expenditure (PE). We would like to test what are the effects of PE on health outcomes in Malaysia. Will it be consistent with the results above? Thus, in this study we also tested the impact of PE on health status. The results are reported from Table 5 to Table 8 as well as Figure 3 and Figure 4 respectively. From Table 5, it can be seen that there is only one cointegrating relationship among variables for model 1 and infant mortality as a dependent variable at least at 10 percent significance level. For model 2, there is no cointegrating relationship among variables. Thus, we proceed by using model 1 for the next results.

Table 6 indicates the results for model (2,2,1,1) using public expenditure instead of public health expenditure. In the long run, it can be seen that



The straight lines represent critical bounds at 5% significance level

FIGURE 1. Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

FIGURE 2. Cumulative Sum of Recursive Residuals

TABLE 5. ARDL Cointegration Tests Results Using General Public Expenditure

Dependent variable	Independent variable	Lag	F-statistic
Under 5 mortality	(Model 1) GDPC, PHE, CRP	2	2.8032
Infant Mortality			4.2546***
Life Expectancy			3.2689
Under 5 mortality	(Model 2) GDPC, PHE, CRP, GST	2	2.7878
Infant Mortality			2.8714
Life Expectancy			4.1366

Note: Lower and Upper Bound Critical Values

10%	5%	1%
[3.008 4.150]	[3.710 5.018]	[5.333 7.063]

(*), (**) and (***) indicate significant at 1%, 5% and 10% significance level respectively.

TABLE 6. ARDL Results Using General Public Expenditure

Estimation of Long-Run Coefficients		
Dependent variable:	Model 1	
Infant Mortality	(2,2,1,1)	
GDPC	1.076 (0.214)*	
PE	0.232 (0.155)	
CRP	0.102 (0.022)*	
GST	-	
Constant	4.138 (-0.311)*	
Short Run ARDL Model		
d(LIM)t-1	0.755 (0.129)*	
d(GDPC)	0.055 (0.059)	
d(GDPC)t-1	0.114 (0.063)**	
d(PE)	-0.006 (0.029)	
d(CRP)	0.012 (0.006)**	
d(Constant)	0.887 (0.332)*	
ECT_{t-1}	-0.214 (0.084)**	
Diagnostic Tests		
	LM Version	F Version
[a]Serial Correlation	0.131 [0.909]	0.005 [0.944]
[b]Functional Form	2.365 [0.124]	1.031 [0.336]
[c]Normality	0.477 [0.787]	-
[d]Heteroscedasticity	0.504 [0.982]	0.460 [0.983]

Note: The selection of optimal lags is based on the Aikaike Information Criterion

(*), (**) and (***) indicate significant at 1%, 5% and 10% significance level respectively. Numbers in ( ) are estandard errors and [ ] are probability values.

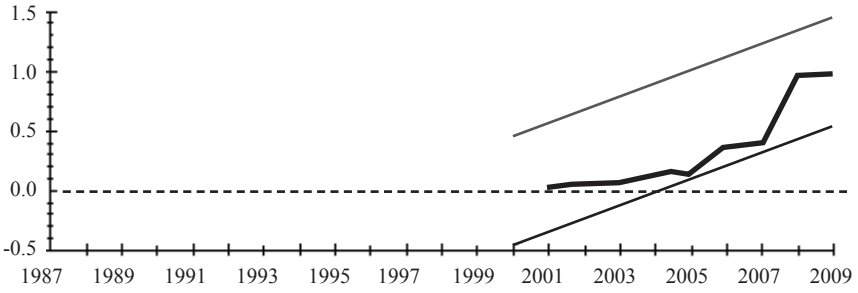
Note: ARDL (1 2, 2,0) and ARDL (1,2,1,0,1) lag for each variable is selected based on AIC.

[a]Lagrange multiplier test of residual serial correlation;

[b]Ramsey's RESET test using the square of the fitted values;

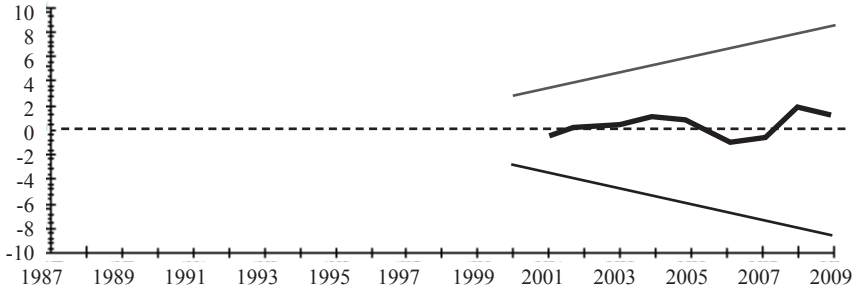
[c]Based on a test of skewness and kurtosis of residuals;

[d]Based on the regression of squared residuals on squared fitted values.



The straight lines represent critical bounds at 5% significance level

FIGURE 3. Cumulative Sum of Squares of Recursive Residuals Using General Public Expenditure



The straight lines represent critical bounds at 5% significance level

FIGURE 4. Cumulative Sum of Recursive Residuals Using General Public Expenditure

corruption has a positive impact on infant mortality and it is significant at 1 percent significance level. It means that poor governance will lead to an increased mortality rate among babies. However, public expenditure is not significant at affecting infant mortality even though the sign is still positive, and the same result holds for income level. Thus, it can be said that good governance plays an important role to enhance health status. In the dynamics short run model, income level and corruption have a positive effect on infant mortality, while public health is not significant at affecting infant mortality. The error correction term is also significant at 5 percent significance level.

CONCLUSION

Although the study on the issue of government spending and governance has been examined extensively in the previous studies, less attention has been given in examining the impact of government expenditure and corruption on health outcomes and specifically through the utilization of time series data. Thus, this study has been done to extend the existing literature by providing new empirical evidence for the impact of government health expenditure and corruption on health outcomes. Specifically, it has been done in Malaysia. In this paper, the ARDL model or bound testing procedure has been used after considering the short annual sample size. The objective of this paper is to examine the long run relationship and the causality direction (long run and short run) among the variables of interest.

In this study, health status or outcome is measured by three indicators, namely infant mortality, under-five mortality and life expectancy. There are two models that have been estimated using the ARDL model. The first model is consisted of three explanatory variables (GDPC, PHE and CRP), while in the second model we added another explanatory variable namely government stability (GST). The main findings from this paper can be summarized as follows. First, there is a cointegration or long run relationship among variables both in model 1 and model 2 when the health status is measured by life expectancy. However, there is no cointegration among variables when the health status is measured by infant mortality and under-five mortality. Second, in the long and short run, both public health expenditure and corruption are statistically significant at affecting health status in Malaysia with the expected sign (positive).

The findings would be of concern to Malaysian leaders and policy makers. Currently, the government has invested to provide an extensive health infrastructure and improve the health care system in the country. Besides, the Ministry of Health of Malaysia (MOH) has collaborated with the WHO to engage in various

international consultations including technical advice and updates in the development of health care financing strategies. However, new challenges have emerged including the changing in the disease patterns and population profiles as well as an increasing need for high-cost medical technology. As a result, the government has to be prepared to face new challenges in the health sector. It is important to ensure that Malaysians receive better quality of life in the long run. It includes conducting more consultations with other ministries and other stakeholders in health services in the formulation of new policies and implementation of certain projects. For instance, the cooperation between the MOH and Ministry of Women, Family and Community Development should be organized to identify the problems among children, women and elderly people. By doing so, the MOH could obtain precise information to enhance their projects and programmes as well as to identify the type of health problems. Besides, the centralisation of health administration could be improved by providing more avenues for the public both in the states and districts to voice out their opinions. This will help the MOH to receive feedback and information in improving their efficacy.

In addition, the government of Malaysia should consider being more transparent to the public in terms of the publication of health performance indicators (in detail). It is very important to ensure that the public obtain more information and raise the awareness to enhance the provision of health in the country. However, increasing public expenditure on health is unlikely to lead to better outcomes if countries have poor governance. For this reason, the government must reduce or even eliminate the level of corruption as significant level of corruption has been proven to deter health status.

This study is not without its limitations. First, there are other socioeconomic data that explain the health status such as female education, degree of urbanization, and access to safe water. We do not control these variables because if too many parameters are used in the model, it will result in the loss of degree of freedom. Therefore, further study should consider testing other variables that influence the health status in Malaysia. Moreover, other studies could be conducted to measure the impact of these socioeconomic variables on other social outcomes such as in the educational sector.

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NOTES

1. The World Health Report (2000), Health System: improving performance.
2 Avoidable deaths are simply defined as the excess of the average death rate for the 0 to 5 years age group in the low-and middle-income countries 88 per 1000 vs. the level in the high-income countries, 9 per 1000 (Filmer and Pritchett (1999)).

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