CUDES JOURNAL
CURRENT DEBATES IN SOCIAL SCIENCES

Mojahid, A. A. & Begom, T. & Ahmed, Z. (2020). Public health expenditure and economic growth nexus in Bangladesh, India and Nepal: an econometric analysis. *Journal of Current Debates in Social Sciences*, 3(1), 20-28.

**Research Article**

# Public health expenditure and economic growth nexus in Bangladesh, India and Nepal: an econometric analysis

**Ali Ahsan Md. MOJAHID**
International Islamic University Chittagong, Bangladesh
mujahidiiuc@gmail.com
ORCID: 0000-0002-0529-4170

**Tamanna BEGOM**
Shahjalal University of Science & Technology, Bangladesh
tamanna.syl08@gmail.com
ORCID: 0000-0002-7672-6807

**Zobayer AHMED**
International Islamic University Chittagong, Bangladesh
ecozobayer@gmail.com
ORCID: 0000-0002-3168-6055

**DOI: 10.37154/ijopec.2020.16**

**Article Info**

***Received:*** 05.06.2020
***Accepted:*** 13.06.2020

**Keywords:** Bangladesh, GDP growth, Health expenditure, India, Nepal.

**Abstract**

Public spending in health care ensures productive human capital, less monetary burdens, and supply reliable personnel that successively generates a booming economy. Currently, it is time to diagnose this, notably for developing countries. This paper is conducted on three South Asian developing countries- Bangladesh, India, and Nepal to analyze the future as well as short term relationships between health expenses and economic growth utilizing statistic knowledge (time series data) for the time period of 1995-2014. The connection and relation of the factors scrutinized by the cointegration analysis and causality test take a look through this study. In this study, Granger causality and cointegration analysis have been used for checking long-run relationship and VECM model is for short-run relationship. In short-run, the study obtains a unidirectional relationship running from the growth of gross domestic product to health expenses for Bangladesh and Nepal. However, bidirectional causality for India. However, in the long-run, the paper demonstrates the unidirectional relation running from health expenditure to the growth of gross domestic product for these three countries. In different words, the outcomes indicate that payment in health care is an imperative feature through emerging countries within the growth of the gross domestic product in the long run.

## 1. INTRODUCTION

Theoretical literature acclaims that health and financial gain may well be connected in two ways. The result of the economic process of health is well recognized (Mehrara & Musai, 2011). Payment on health necessarily relies upon income or resources accessible to each private and public segments. Higher-income directs that there is extra money to spend on health. Again, economic growth is decided by several factors. These incorporate inner improvement regulation, political stability, living accommodations capital arrangement, the encroachment of human investment, banking and monetary foundation, export tips, FDI, and foreign resource. It is a proven fact that developing a country's growth is directed by capital accumulation, wherever health reputation and education replicate human capital (Bedir, 2016).

Enormous researches within healthcare economics confirm that changes in the value of per capita health care may well be primarily expounded by differences in the per-head gross domestic product (Gerdtham and Jonsson, 2000). This postulation is additionally keenly related to the endogenous growth theory developed through (Romer, 1990) that work out the importance of investment used for economic growth and human capital accrual (Atilgan, Kilic, & Ertugrul, 2017). Instead, the contrary, causing health outflow to financial gain has a theoretical foundation additionally.

Health could be capital, and therefore investment in health could be an essential supply for the economic growth. The report of the WHO's Commission on political economy and Health (2001), states that "extending the coverage of crucial health services….to the world's poor might save countless lives annually, scale back poorness, spur economic development and promote world security." (World Health Organization, 2001).

From 1790 to 1980, nearly one-third of the gross domestic product of England is that the outcomes of upgrades in well-being, notably sweetening in vitamins, medical aid services, and public health (Fogel, 1994). It is miles best that efforts are taken by researchers to gauge the link between economic growth and health standing (Akram, Ihtsham ul Haq, & Khan, 2008). Although studies regarding the association between health and economic process are thriving recently, also, they are quite rare above all for developing countries. Baltagi and Moscone (2010) reassessed the long economic relationship between health care expenditure and economic growth, employing a panel of twenty OECD countries throughout 1971-2004. As well, they thought of non-stationary and cointegration properties between the expansion of health care payment and earnings. The outcomes showed that health care could be an inevitability, with physical capital abundant slighter than that evaluated in preceding studies.

Thus, in earlier, some studies performed specializing in panel knowledge and adjusting another variable to look at the connection between health expenditure and economic growth. This paper whole concentrates on statistic knowledge (time series data) and solely two variables, i.e., healthcare spending and economic growth. In an exceedingly developing country, each penny of the budget ought to have some contribution to economic development. So, it is rational to look at the character of the contributions of health disbursement in economic growth for developing countries like Bangladesh, India, and Nepal.

Therefore, this study aims to look at the long and short-run results of health outflow on the growth of gross domestic product for three South Asian developing countries, specifically Bangladesh, India, and Nepal, for the amount 1995 - 2014. The principle reason for considering these three South Asian countries is that there is a likeliness among these countries within the arena of economic development. The different focus of this study would be facilitating policy manufacturers and forthcoming researchers regarding wherever to give stress in the future.

## 2. LITERATURE REVIEW

The theoretical discussion is popping out from a few decades between health payment and economic development. Modish researchers studied this issue in different countries by using different econometrics approaches, ways, and periods to check the relation between health expenses and economic growth.

A lot of labor for analyzing the relationship between health expenditure and growth of the gross domestic product was taken in the place. Some studies of the current literature have used panel and time series knowledge to analyze the connection between health expenditure and growth of gross domestic product for OECD countries. Different studies used time-series data to look at that association for developing countries. However, a majority of the researches targeted developed countries for assessing the link between health and gross domestic product for developed countries, and there are simply a couple of analyses that focused on developing and fewer developed countries (Elmi & Sadeghi, 2012).

Narayan et al. (2010) utilized the DOLS approach to analyze the relationship between health care payment and economic growth. They provided a positive impact of health on per capita financial gain for 5 Asian countries that was additionally statistically vital. The study unravels two notable findings. Firstly, they found cointegration among them. And to boot study, make sure that within the long run, investment, exports, EDRD (the interaction term between education and R&D), and R&D have indicated a positive direction to the economic growth. Health expenditure, education expenditure, and gross domestic product in Bangladesh are investigated via utilizing ECM and located that duplex relation from education expenditure to health expenditure and additionally education expenditure to gross domestic product and solely unidirectional relation from health expenditure to gross domestic product (Rahman, 2011).

Hartwig (2008) reconsidered the question of whether or not health capital construction fuels the GDP in wealthy countries using the panel Granger-causality framework. However, findings did not give support to the sight that health capital formation promotes the long-run economic growth within the OECD vicinity.

Atilgan et al. (2017) utilized the ARDL model to scrutinize the long-run and short-run static relationship between health care payment and economic growth. It is exposed that per-capita gross domestic product will increase by 0.434 % as a result of a 1 % increase in per-capita health expenditure. The Kalman filter model's outcomes bolster these results. In step with Bedir S. (2016), both ways causality is seen for the Czech Republic and the Russian Federation. The empirical fallouts have such as that financial gain is an essential think about clarifying the variance in health expenditures among countries. Consequently, it appears that upturns in financial gain fuel health expenses for a few of the evolving market economies.

Nevertheless, the acknowledgment of the presence of an association between health and economic growth is imperative, notably for developing countries. Therefore, this paper focuses on the existence of the causatives and long run likewise as short-run relationships for three South Asian nations like Bangladesh, India, and Nepal by utilizing the VECM model. In this regard, the contribution of this study close to the present literature is twofold. First, it focuses on precisely three developing countries. Second, it receipts the benefits of the usage of time series methods in phrases of analyzing each short-term and long-term effect.

## 3. HEALTH EXPENDITURE AND GROWTH: COUNTRY REVIEW

Economic growth or economic process refers to the rise within the capability of an economy to supply additional goods and services compare to last economic period. Economic growth is calculated in nominal or real terms. Conventionally, the mixture economic process is measured in terms of gross domestic product or gross national product.

The ultimate consumption of health care products and services that counts individual health care and communal services, however not as well as payment on investments is measured by health payment. Health care is invested with a mix of funding courses of action counting government finance and obligatory insurance, likewise as voluntary insurance and personal reserves like households' owed installments, NGOs, and personal enterprises.

### 3.1. Economic growth and health expenditure of Bangladesh

According to the market-grounded economy, Bangladesh is the forty-sixth leading economy within the world in nominal terms and thirty third leading by purchasing power parity. As aforementioned by the United Nations agency, the economic growth rate of Bangladesh is 7.1% that is that the second quickest rising major economy of 2016. It is the second-largest monetary sector within the landmass additionally. Since 2004, Bangladesh maintained an associate degree on the average 6.5% of gross domestic product growth. In step with United Nations agency knowledge, per-capita financial gain of Bangladesh was expected as US$3,840 (PPP) and US$1,466 (Nominal) in 2016. The economy faces challenges of structure blockages, scarce power and gas providers, official corruption, political volatility, natural catastrophes, and inadequacy of consummate employees.

It seems that resource allocation in the healthcare sector is a sort of short examination with different areas for Bangladesh. The per capita health expenditure is additionally quite short within the country, compared to different developing economies. The per capita health expenditure had enhanced to $32 in 2017 from $27 in 2012. However, the government's share has declined to twenty-three percent from twenty-seven percent. Peoples pay over sixty-three percent of their total health payment from their fund that is one in every of the highest within the region.

### 3.2. Economic growth and health expenditure of India

India is that the sixth-biggest economy within the world and consequently, the third-largest by purchasing power parity adjusted exchange rates (PPP). On per capita basis, it positions a hundred and fortieth within the world or 129th by the operation. India's per capita financial gain enhanced solely around a 1 % yearly rate within the three epochs when its independence. Within the late 2000s, India's growth grasped 7.5%, which can double the average income in an exceedingly decade. India's gross

domestic product growth throughout the amount of 2015 was at 7.5%, creating it the quickest growing economy. Throughout 2014–15, India's total domestic product growth recovered marginally to 7.3% from 6.9% within the previous fiscal year Indian government has predicted an increase of 8.1–8.5% all over 2015–16.

The target set by the National Health Policy 2017 is a skyrocketing health expenditure that becomes 2.5% of gross domestic product by 2025. United Nations agency knowledge shows that the Republic of India is merely before Pakistan and Bangladesh in health expenditure. As per the report, the Republic of India spends a meager 1.4% of its gross domestic product that could be a few steps before Pakistan and Bangladesh, the neighboring nations that pay 0.9% and 0.8% of their GDPs respectively on the health sector. The sooner health budget accepted throughout the previous NDA regime, within the year 2002, had set the goal of skyrocketing health expenditure by 2%. However, a study conducted by McKinsey and Company shows that in the period 2001 to 2010, India's investment in health somewhat declined as compared to the rise of gross domestic product. Throughout the higher than mentioned amount, India's gross domestic product grew by 14.2% and health expenditure by12.4%. The distinction between the Compound Annual rate of growth of the economy and health spending was -1.7%.

### 3.3. Economic growth and health expenditure of Nepal

Nepal is one in every of the slightest developed countries within the world and perches heavily on foreign aid. The first phase of the economy is farming that utilizes over seventy percent of the population and accounts for thirty-three percent of the total gross domestic product. Nepal is the country blessed with the best mountains within the world. Economic institutions have been unrelentingly developing and can be a significant supply of financial gain for the country. The Asian nation is that the third quickest growing economy within the world in 2017 in step with a report of the World Economic Forum. Asian nation hierarchical third with the projection of the economic process of 7.5 percent. "Nepal's growth has rebounded powerfully following an honest monsoon, reconstruction efforts when the 2015 earthquake and normalization of trade with the Republic of India," the forum says, quoting the World Bank.

In 2002, government funding for health matters was around US$2.30 per individual. Owed contributions to total health expenditures were nearly 70 percent. The government distributed regarding 5.8 percent of the overall allow health care in 2009. In 2012, the Nepalese government launched a trial program in 5 districts of the country on universal insurance. In step with WHO, the Asian nation spent a meager 2.34% of its gross domestic product throughout 2015-2016.

## 4. DATA AND METHODOLOGY

### 4.1. Data

To find the causality amongst economic growth and healthcare expenses for three South Asian countries is the focal intention of this study. For this, this study targets to test whether there is causality amongst economic growth and healthcare payments intended for three South Asian countries. The data are occupied from the World Bank's database that are yearly clarifications of per capita gross domestic product and per capita health expenses from 1995 to 2014. Where panel data strategies ignore the complexity of country precise properties of statistics and behave as if all nations are homogenous. Consequently, time series methods may be greater appropriate to study the connection between health expenditure and GDP growth over the current years(Tang & Ch'ng, 2011)

### 4.2. Model

The capital accumulation may be a fundamental element of development, especially for emerging nations; consequently, a generous portion of the event is decided through health standing that replicates society's human capital accretion. Based on existing literature related to the causality between economic growth and health expenditures, the model is depicted as follow:

$$Economic\ growth = f\ (Health\ Expenditure)$$

Here, per capita gross domestic product (log GDP) has been used as a pointer of economic growth and per capita health spending (logHEX) as a pointer of health expenditure. For both variables, we take natural logarithms.

### 4.3. Econometrical process

Econometric analysis is provided through this study to examine the association between health expenditure and GDP growth for the three South Asian countries. The appropriate approaches have been used to scrutinize the dynamic association of the factors in this study. At first, we employ the unit root of our variables via a well-known ADF test (Augmented Dickey-Fuller). Then, we have used the Johansen Co-integration test to investigate the long-run cointegration between these two variables. Finally, we have used the VECM model to defend the direction of causality.

## 5. RESULTS AND FINDINGS

### 5.1. Augmented Dickey-Fuller (ADF) Unit-Root Test

To confirm the robust result of the time series data, at first, we have tested Unit Root for each three-country to see whether data are stationary or non-stationary. We have used the Augmented Dickey-Fuller (ADF) method. Here,

The null hypothesis is Ho=variable has a unit root, and

An alternative hypothesis is HA= variable has no unit root.

| Country | Bangladesh | | | | India | | | | Nepal | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | At level | | At 1st difference | | At level | | At 1st difference | | At level | | At 1st difference | |
| Values | t-statistics | t-value | t-statistics | t-value | t-statistics | t-value | t-statistics | t-value | t-statistics | t-value | t-statistics | t-value |
| log GDP | .542 | .99 | -3.25 | .03 | -.2396 | .9678 | -3.500 | .0205 | .479 | .9985 | -3.525 | .0195 |
| logHEX | .297 | .99 | -3.25 | .03 | -.521 | .9828 | -4.021 | .0072 | 0.813 | .7921 | -4.537 | .0025 |

**Table 1:** ADF unit root test for each country

Here, in table-1, ADF unit root test results indicate that GDP and Health Expenditure data of Bangladesh, India, and Nepal are non-stationary at level. Still, they are all stationary at first difference I(1), which is statistically significant at 5% level of significance.

### 5.2. Result of Cointegration test

Here, the Johansen Cointegration test applied to check the existence of long-run relationships between these two variables.

The Hypothesis Johansen Cointegration

H0: No Cointegration

HA: At least most cointegration Exist

| Country | Bangladesh | | | India | | | Nepal | | |
|---|---|---|---|---|---|---|---|---|---|
| Hypothesized No of CE | Trace Statistics | Critical Value | Probability | Trace Statistics | Critical Value | Probability | Trace Statistics | Critical Value | Probability |
| None* | 16.453 | 15.494 | 0.0358 | 15.265 | 15.494 | 0.0541 | 17.697 | 15.494 | 0.0229 |
| At most 1* | 7.413 | 3.841 | 0.0065 | 0.1450 | 3.841 | 0.7033 | 1.234 | 3.841 | 0.2666 |
| Hypothesized No of CE | Max-Eigen Statistics | Critical Value | Probability | Max-Eigen Statistics | Critical Value | Probability | Max-Eigen Statistics | Critical Value | Probability |
| None | 9.039 | 14.264 | 0.0282 | 15.120 | 14.264 | 0.0365 | 16.463 | 14.264 | 0.0221 |
| At most 1* | 7.413 | 3.841 | 0.0065 | 0.1450 | 3.841 | 0.7033 | 1.234 | 3.841 | 0.2666 |

**Table 2:** Cointegration tests of Bangladesh, India and Nepal

According to the result shown in Table-2 at a 5% level of significance, we can discard the null hypothesis in the Trace test for Bangladesh. It also signposts that there is 2 co-integrated equation at a 5% level of significance. So we can pledge that there are long-run relationships between variables. Where, in the case of India at 5% level of significance, we can make castoff null hypothesis in the Max-Eigen value test. It also designates that there is 1 co-integrated equation at a 5% level of significance. And it spectacles long course relationship between variables for India too. Once more, for Nepal, at a 5% level of significance, we can scrap the null hypothesis in the Trace test and Maximum-Eigen value test. Equally, the analysis also indicates that there is 1 co-integrated equation at a 5% level of significance. Accordingly, here, also we acquire a long-run relationship between variables for Nepal.

### 5.3. Causality test Under VECM

The equation of VECM for Bangladesh

$$\text{Equation (1)}\ldots\ldots \Delta LGDP_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta LGDP_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta LHEX_{t-i} + \delta ECT + U_t$$

$$\text{Equation (2)}\ldots\ldots \Delta LHEX_t = \alpha + \sum_{i=1}^{q} \lambda \Delta LHEX_{t-1} + \sum_{i=1}^{s} x_i \Delta LGDP_{t-i} + \varphi ECT + U_t$$

In equations, LGDP stands for log GDP, and LHEX stands for log Health Expenditure. The equation (1) tests the causality from health payments to GDP. The equation (2) tests the causality from GDP to health expenses for Bangladesh.

The equation of VECM for India

$$\text{Equation (3)}\ldots\ldots \Delta LGDP_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta LGDP_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta LHEX_{t-i} + \delta ECT + U_t$$

$$\text{Equation 4)}\ldots\ldots \Delta LHEX_t = \alpha + \sum_{i=1}^{q} \lambda \Delta LHEX_{t-1} + \sum_{i=1}^{s} x_i \Delta LGDP_{t-i} + \varphi ECT + U_t$$

In equations, LGDP stands for log GDP and LHEX stands for log Health Expenditure. The equation (3) tests the causality from health expenditure to GDP. The equation (4) tests the causality from GDP to health expenses for India.

The equation of VECM for Nepal

$$\text{Equation (5)}\ldots\ldots \Delta LGDP_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta LGDP_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta LHEX_{t-i} + \delta ECT + U_t$$

$$\text{Equation (6)}\ldots\ldots \Delta LHEX_t = \alpha + \sum_{i=1}^{q} \lambda \Delta LHEX_{t-1} + \sum_{i=1}^{s} x_i \Delta LGDP_{t-i} + \varphi ECT + U_t$$

In equations, LGDP stands for log GDP and LHEX stands for log Health Expenditure. The equation (5) tests the causality from healthcare disbursement to GDP. The equation (6) tests the causality from GDP to health expenditure for India

### 5.4. Result for short-run causality test under VECM

| **Country** | **Bangladesh** | | **India** | | **Nepal** | |
|---|---|---|---|---|---|---|
| Excluded | Chi-sq | Probability | Chi-sq | Probability | Chi-sq | Probability |

| | | | | | | |
|---|---|---|---|---|---|---|
| Dependent variable: GDP growth | | | | | | |
| D(logHEX) | 0.076 | 0.781 | 3.800 | 0.0512 | 6.376 | 0.0412 |
| Dependent variable: Health Expenditure | | | | | | |
| D(logGDP) | 5.522 | 0.018 | 3.136 | 0.076 | 1.197 | 0.5496 |

**Table 3**: Result for short-run causality test under VECM for Bangladesh, India and Nepal

The table-3 shows that there is no short-run causality running from health expenditure to GDP growth for Bangladesh at 5% level of significance. But there is short-run causality from GDP growth to health expenditure for Bangladesh at 5% level of significance. However, for India, there is short run causality running from healthcare outflow to Gross Domestic Product (GDP) growth at 10% level of significance. Additionally, there is also short-run causality from GDP growth to health expenditure for India at 10% level of significance. And the case of Nepal, short-run causality running from health expenditure to GDP growth is seen at a 5% level of significance though there is no short-run causality from GDP growth to health expenditure for Nepal at a 5% level of significance.

| Country | Bangladesh | | India | | Nepal | |
|---|---|---|---|---|---|---|
| Direction | Coefficient | Probability | Coefficient | Probability | Coefficient | Probability |
| logHEX to logGDP | -0.0828 | 0.0670 | -1.513 | 0.075 | -0.4255 | 0.0096 |
| logGDP to logHEX | -0.0921 | 0.5476 | -0.013 | 0.982 | -0.7375 | 0.1176 |

**Table: 4** Result for Long Run causality for Bangladesh, India and Nepal

The table-4 demonstrates that there is long-run causality running from healthcare costs to the growth of gross domestic product for Bangladesh and India at a 10% level of significance. But there is no long-run causality outing from GDP growth to health expenditure for them at the same level of significance. And there is a long-run causality outing from health expenditure to GDP growth for Nepal at a 5% level of significance. But then again, there is no long run causality running from GDP growth to health expenditure for Nepal at the same level of significance.

**Diagnostics test result**

We have tested Autocorrelation and Jarque-Bera test of Normality as a means of the diagnostic test of the GDP growth and health expenditure data, and we passed both tests significantly.

## 6. DISCUSSION

The study investigated both the long-run and short-run relationship between health expenses and economic growth for three South Asian countries, namely, Bangladesh, India and Nepal, in the cointegration and Granger causality framework. Finally, some remarkable results have been found for the countries.

The study confirms short-run unidirectional causality running from GDP growth to healthcare expenditure for Bangladesh. But in the long-run result appears as opposite direction, i.e., long-run unifacial causality running from health expenditure to GDP growth. However, Rahman (2011) found unidirectional causality in the case of the long-run from health expenditure to GDP for Bangladesh. But they did not find any short-run causality stuck between these variables.

For India, we obtained short-run bidirectional causality and long-run unidirectional causality running from health payments to GDP growth. In the case of Nepal, both in the short-run and long-run, there is unifacial causality outing from health expenses to GDP growth. Another study by Akram et al. (2008) also found short-run and long-run unidirectional causality for Pakistan.

Therefore, it is noteworthy that the study found long-run unidirectional causality outing from healthcare expenditure to GDP growth for each of these three countries. And it is seen that Narayan et

al. (2010) also obtained long-run unidirectional causality from health expenditure to GDP for 5 South Asian countries employing panel data run.

## 7. CONCLUSION

Cointegration, coupled with an error correction technique, has been used in this research to test the long run and short-run relationship between health spending and economic growth. The positive direction between variables confirms that outlay on health care plays a vital role in shaping the long run and short-run economic growth for Bangladesh, India and Nepal. As well, the study defends the importance of government involvement by executing the policies to boost health expenditure, which is undeniable to construct a healthier and productive society to carry on economic growth as well as development in developing countries. Moreover, there is a dreadful requisite of study, which analyses the changing aspects of healthy demand in these South Asian countries, as such research is deficient for several years.

## REFERENCES

Akram, N., Ihtsham ul Haq, P., & Khan, M. (2008). The Long Term Impact of Health on Economic Growth in Pakistan. *The Pakistan Development Review, 47*(4), 487-500.

Atilgan, E., Kilic, D., & Ertugrul, H. M. (2017). The dynamic relationship between health expenditure and economic growth: is the health-led growth hypothesis valid for Turkey? *The European Journal of Health Economics, 18*(5), 567-574. doi:10.1007/s10198-016-0810-5

Bedir, S. (2016). Healthcare expenditure and economic growth in developing countries. *Advances in Economics and Business, 4*(2), 76-86. doi:10.13189/aeb.2016.040202.

Devlin, N., & Hansen, P. (2001). Health care spending and economic output: Granger causality. *Applied Economics Letters, 8*(8), 561-564. doi:10.1080/13504850010017357

Elmi, Z. M., & Sadeghi, S. (2012). Health care expenditures and economic growth in developing countries: panel cointegration and causality. *Middle-East Journal of Scientific Research, 12*(1), 88-91.

Fogel, R. W. (1994). *Economic growth, population theory, and physiology: the bearing of long-term processes on the making of economic policy*. Retrieved from

Gerdtham, U. G., & Löthgren, M. (2002). New panel results on cointegration of international health expenditure and GDP. *Applied Economics, 34*(13), 1679-1686. doi:10.1080/00036840110116397

Hartwig, J. (2008). "What drives health care expenditure?—Baumol's model of 'unbalanced growth'revisited." Journal of Health Economics 27(3): 603-623.

Hitiris, T., & Posnett, J. (1992). The determinants and effects of health expenditure in developed countries. *Journal of health economics, 11*(2), 173-181. doi:http://dx.doi.org/10.1016/0167-6296(92)90033-W

MacDonald, G., & Hopkins, S. (2002). Unit root properties of OECD health care expenditure and GDP data. *Health Economics, 11*(4), 371-376. doi:10.1002/hec.657

McCoskey, S. K., & Selden, T. M. (1998). Health care expenditures and GDP: panel data unit root test results. *Journal of health economics, 17*(3), 369-376. doi:http://dx.doi.org/10.1016/S0167-6296(97)00040-4

Mehrara, M., & Musai, M. (2011). The causality between health expenditure and economic growth in Iran. *Int. J. Eco. Res, 2*(4), 13-19.

Narayan, S., Narayan, P. K., & Mishra, S. (2010). Investigating the relationship between health and economic growth: Empirical evidence from a panel of 5 Asian countries. *Journal of Asian Economics, 21*(4), 404-411. doi:https://doi.org/10.1016/j.asieco.2010.03.006

Neelankavil, J. P., Stevans, L. K., & Roman, F. L. (2012). Correlates of economic growth in developing countries: a panel cointegration approach. *International Review of Applied Economics, 26*(1), 83-96. doi:10.1080/02692171.2011.557048

O'Connell, J. M. (1996). The relationship between health expenditures and the age structure of the population in OECD countries. *Health Economics, 5*(6), 573-578. doi:10.1002/(SICI)1099-1050(199611)5

Rahman, M. M. (2011). Causal relationship among education expenditure, health expenditure and GDP: A case study for Bangladesh. *International Journal of Economics and Finance, 3*(3), 149.

Rivera, B., & Currais, L. (1999). Economic growth and health: direct impact or reverse causation? *Applied Economics Letters, 6*(11), 761-764. doi:10.1080/135048599352367

Romer, P. M. (1990). Endogenous Technological Change. *Journal of Political Economy, 98*(5, Part 2), S71-S102. doi:10.1086/261725

Tang, C. F., & Ch'ng, K. S. (2011). The Granger causality between health expenditure and income in Southeast Asia economies. *African Journal of Business Management, 5*(16), 6814.