Economic Research-Ekonomska Istraživanja

ISSN: 1331-677X (Print) 1848-9664 (Online) Journal homepage: http://www.tandfonline.com/loi/rero20

Air pollution, economic growth and health care expenditure

Soheila Khoshnevis Yazdi & Bahman Khanalizadeh

To cite this article: Soheila Khoshnevis Yazdi & Bahman Khanalizadeh (2017) Air pollution, economic growth and health care expenditure, Economic Research-Ekonomska Istraživanja, 30:1, 1181-1190, DOI: 10.1080/1331677X.2017.1314823

To link to this article: https://doi.org/10.1080/1331677X.2017.1314823

Published online: 06 Jun 2017.

ECONOMIC RESEARCH-EKONOMSKA ISTRAŽIVANJA, 2017
VOL. 30, NO. 1, 1181–1190
https://doi.org/10.1080/1331677X.2017.1314823

Air pollution, economic growth and health care expenditure

Soheila Khoshnevis Yazdi[a] and Bahman Khanalizadeh[b]

[a]Department Economics, College of Economics and Accounting, Islamic Azad University, South Tehran Branch, Tehran, Iran; [b]Department Economics, College of Economics and Accounting, Islamic Azad University, South Tehran Branch, Tehran, Iran

ABSTRACT

In this article, we examine the role of environmental quality and economic growth in the determination of health expenditure in the Middle East and North Africa region (MENA) countries for the period 1995–2014 using Autoregressive Distributed Lag (ARDL) method to explore the estimating the impacts of economic growth and environmental quality on heath expenditure. The results show that health expenditure, income, CO_2 and PM_{10} emissions are a cointegrated panel. While long-run elasticities show that income and CO_2 and PM_{10} emissions have statistically significant positive effects on health expenditure. The results show that the income elasticity is inelastic, that health expenditure is not more sensitive to income and the adjustment to changes in income in MENA countries.

ARTICLE HISTORY
Received 6 October 2015
Accepted 7 March 2016

KEYWORDS
CO_2 emissions; economic growth; health expenditure; panel data; PM_{10}; Middle East and North Africa region (MENA)

JEL CLASSIFICATIONS
Q1; Q5; I0; 115

1. Introduction

During the last decade, epidemiological studies around the world have measured increased mortality and morbidity associated with air pollution. Quantifying the impact of air pollution on public health is increasingly an essential component in the policy debate.

Although impact assessments on health can provide important information for health decisions in regulation and for the public, the results are often subject to misinterpretation, even if the assessment is done rigorously, and multiple uncertainties are carefully presented and explained to policymakers, the press, and the public (Bilthoven, 2000).

About half of the world's population and up to 95% of the population in low-income countries still relies on solid fuels, including firewood and other biomass fuels to meet the energy needs for basics such as cooking and heating. The overall use of biomass for energy production does not decrease, and it is actually increasing in the poorest households (Schmieder & Neidell, 2008).

The costs of health care systems are indisputable, and put more pressure on government budgets, potentially requiring an increase in health care spending argue that the relationship between environmental conditions, public policies of protection of public health and the

CONTACT Soheila Khoshnevis Yazdi soheila_khoshnevis@yahoo.com

ecosystem, and the costs of health care to connect to a broad debate on cost control in the health care system. The main source of environmental cost is air pollution (Gerdtham & Jonsson, 1991; Jerrett, Eyles, Dufournaud, & Birch, 2003).

While air pollution leads to environmental damage which must supported by the company, the air pollution that adversely affects human health has a negative impact on labour productivity. This affects the industrial production and domestic output, thus affecting the growth of businesses and the economy.

This article proposes to extend the work on the determinants of health expenditure in two new ways. This is the first study that attempts to estimate the impact of environmental quality on health spending using a panel cointegration framework.

Our article differs from other studies in this field in several aspects. First, to the best of our knowledge it is the only study that disaggregated health expenditure to study its effects on economic growth, CO_2 emissions and PM_{10}. Second, it is the only study that employs panel data techniques to assess the relative importance of health expenditure, while the overwhelming majority of studies in this field use either cross-section or time series techniques.

This study proposes for the first time a comprehensive panel data analysis of the determinants of health expenditures for a group of 11 countries in the MENA region. The rest of this article is organised as follows. Section 2 consists of a literature review. Section 3 presents the estimation method, definitions of variables and data sources. Section 4 provides the empirical results and discusses the causal relationship between the burden of defence and economic growth. Section 5 provides the conclusion.

2. Literature review

The literature that examines the determinants of health expenditure is increasing. The literature reviewed several determinants of health spending, including income, ageing of the population, the number of practicing physicians, the participation rate in the female labour force, the health expenditure funded the amount of foreign aid, the rate of urbanisation, among other non-economic factors. The main source of pollution is the environmental cost (pollution, noise) of air.

The costs of environmental contamination are indisputable, and put greater pressure on government budgets; potentially requiring an increase in health care expenditure (Gerdtham & Jonsson, 1991). For OECD countries, Hitiris and Posnett (1992) examined the relationship between health expenditure per capita income and per capita of the population aged 65 and over for 20 years during the period 1960 to 1987. Their results revealed that the income of the population aged over 65 had a statistically significant positive effect on health spending. Similarity, Gerdtham, Sogaard, Andersson, and Jonsson (1992) estimated the impact of income per capita, number of physicians, the ratio of participation of the female workforce, the share of the population living in cities, and the population aged over 65 years with several dummy variables for the 19 OECD countries for the year 1987. They found that the income of the population aged over 65 had a statistically significant positive effect on health expenditures per capita; doctors and urbanisation have had a statistically significant negative effect on per capita health expenditures.

In specific studies on a single country, Matteo and Matteo (1998) studied the determinants of health expenditure for Canada at a provincial level. They used a model in which they specified the provincial health expenditure according to the provincial per capita income, population in the province aged over 65 years and provincial federal transfer revenues for the period 1965–1991. They found that while income and age had a statistically significant positive effect, federal transfers have had a statistically significant negative effect on health expenditures. Karatzas (2000) examined the relationship between health expenditure and economic factors, demographic factors and health stock, for the US over the period 1962 to 1989. Its main findings were that the income distribution, the number of doctors, the number of nurses affect health expenditure, while the price index health, the number of hospital beds, and the cities of the US with a population of over one hundred thousand inhabitants had a statistically significant negative effect on performing health expenditures. Oslo, Hansen and Selte (2000) investigated the relationship between air pollution and human health effects. Their focus was to investigate the impact of deteriorating health due to air pollution, which leads to more sick leave and affects labour productivity. They used data from Oslo and employed a logit model. They found that yearly increases in small particulate matter increases the amount of sick leave, which negatively impacts trade and industry. In addition, Tang (2009) investigated the health–income nexus for Malaysia using the cointegration and causality tests. However, the empirical evidence of health care expenditure and real income for Malaysia remains controversial. Tang used the annual data from 1960 to 2007 to assess the relationship between health care expenditure and real income in Malaysia. Unfortunately, the author found that health care expenditure and real income are not cointegrated, the author found evidence of two-way causality.

Concerning health expenditure, available evidence suggests that at low levels of development, public expenditure on health has a stronger effect on mortality rates when compared with private expenditure at high development levels the opposite is shown to be true. Gupta, Verhoeven, and Tiongson (2001) provide evidence from 70 countries that public spending on health is more important for the health of the poor in low-income countries than in the high-income countries, suggesting higher returns on health spending in the former countries compared with the latter group.

Using panel data, Bloom, Canning, and Sevilla (2001) studied the effects of health on economic growth between 1960 and 1990 in different counties with the help of nonlinear regression. In their production, function of physical capital (labour) and human capital (education and health) was used as input. The results showed that health had a positive and significant effect on economic growth. The result also showed that a one year increase in life expectancy of the population leads to a 4% increase in production. In addition, this study identified that the increase in government health spending had a significant and positive impact on labour productivity. For cross-sectional data from 49 counties of Ontario, Canada, Jerrett et al. (2003) examined the relationship between environmental quality (proxied by total pollution emissions and government expenditures devoted to defending environmental quality) and health care expenditure. They found that countries with higher pollution have per capita health expenditures, and countries defending that spend more on environmental quality have lower expenditures on health care. Considering the role of environmental quality in determining per capita health expenditures, Narayan and Narayan (2006) used a panel cointegration approach to explore both short-run and long-run impacts of environmental quality. The empirical analysis is based on eight OECD countries, namely Austria, Denmark, Iceland, Ireland, Norway, Spain, Switzerland and the UK for the period 1980 to 1999. They found that per capita health expenditure, per capita income, carbon monoxide emissions, sulfur oxide emissions and nitrogen oxide emissions are panel cointegrated. Similarity, Wang et al. (2007) applied the method of Granger causality, which is more accurate than the classical correlation analysis method, to determine whether the main air pollutants: Nitrogen oxides (NOx), sulfur dioxide (SO2), carbon monoxide (CO), total suspended particulates (TSP), PM_{10} (particulate matter smaller than 10 microns) and the mortality of respiratory diseases of the residents in Beijing have causal relationship. After ensuring NOx, SO_2 and CO as the responsible substances, they used the time series method to construct the autoregressive integrated moving average model (ARIMA) of the pollutants, so that we could predict the amount of the pollutants from 2005 to 2008. In the end, reducing the amount of pollutants by 10% in the neural network model.

Rao, Jani, and Sanjivee (2008) used annual data from 1981 to 2005 analyse the causal link between spending on health care and real income in five Association of Southeast Asian Nations (ASEAN) countries using Granger causality standard tests. In general, the results are a mixed causality among the five ASEAN countries. Specifically, the study found that there is bilateral causality between health care spending and real income in Indonesia and Thailand, while the only unilateral causality from the real incomes of health care spending has been detected in Malaysia and Singapore. However, the causal link between expenditure and revenue of health care is neutral for the Philippines. For the 15 member countries of the Organisation of Islamic Cooperation (OIC), Peykerjou, Gollu, Gashti, and Shahrivar (2011) studied the relationship between health and economic growth between 2001 and 2009. The aim of this study was to examine the effects of different health indicators on economic growth. The results showed that the increase in economic growth in OIC countries was also due to the increase in life expectancy. It was also observed in this study that there was a negative relationship between fertility and economic growth in the OIC member countries. For low-income countries and sub-Saharan Africa, Tekabe (2012) studied the impact of enrollment rates, the fertility rate (births per woman in total), mortality rate and life expectancy on growth. It found that mortality and fertility rates had influenced economic growth. It also concluded that there was no causal link between income and health per capita while there was a two-way relationship between GDP per capita and mortality. This study also suggested that simultaneity exists between GDP per capita and health.

An analysis was undertaken by Khoshnevis Yazdi, Tahmasebi, and Mastorakis (2014). They examined the relation between environmental quality, income and health expenditure for the period 1967 to 2010 in Iran. They used a cointegration and Autoregressive Distributed Lag (ARDL) approach to explore the possibility of estimating both the short- and long-run effects of environmental quality. We find that health spending, revenues, sulfur oxide emissions and carbon monoxide emissions are cointegrated. Although short and long-run income elasticities show that the emissions of sulfur oxide and carbon monoxide exert a statistically significant positive effect on health spending. Suspended particulate matter (SPM) emissions have a statistically significant positive impact on health expenditure in the short- and long-run.

3. Data and methodology

3.1. Data

In this article, we try to fill this research gap by examining health care spending in the Middle East and North Africa region (MENA) region includes, Algeria, Djibouti Egypt, Iran, Iraq, Jordan, Lebanon Libya, Morocco, Syrian and Tunisia, Data for the above variables are annual data and are sourced from WDI (2015). CO_2 emissions per capita (metric tonnes), GDP per capita (constant 2005 US$) and health expenditure per capita (constant 2011 international $) is obtained from WDI (2015). PM_{10} emissions (micrograms per cubic metre), (Google Maps) is from World Bank (2015), Development Research Group and Environment Department.

3.2. Methodology

The choice of variables for estimation in this study is in line with the model developed by Evans, Tandon, Murray, and Lauer (2000). They used a production function approach for the estimation of efficiency of health care expenditure.

Our model specification extends the bivariate model, first used by Newhouse (1977) and applied by most of the literature, where per capita health spending is modelled as a function of per capita income and the role of quality environmental, proxy particulate matter (10 microns) emissions and emissions of carbon dioxide. Second, this study undertakes for the first time a comprehensive panel data analysis of the determinants of health expenditures for a group of MENA countries. More specifically, we apply a panel cointegration test suggested by Pedroni (1999) and use panel fixed effect estimators (Gerdtham et al., 1992; Murthy & Ukpolo, 1994). On the other hand, when environmental quality declines, it negatively impacts people's health. A deterioration in health demands more expenditures on health care.

It follows that the PM_{10} and carbon monoxide all deteriorate environmental quality by causing air pollution, thus having a negative impact on human health. This implies that health care demand is expected to increase (Narayan, Narayan, & Mishra, 2010).

Levin et al. proposed a panel unit root test based on an Augmented Dickey–Fuller (ADF) test and assumed the homogeneity in the 'fixed effects' is a source of considerable confusion. As we shall see, the basic idea is very simple. Consider the linear model. The model has the following form:

$$HE_{it} = \beta_0 + \beta_1 CO2_{\text{it}} + \beta_2 \text{PM}_{10\ \text{it}} + \beta_3 \text{GDP}_{\ \text{it}} + \alpha_i + \varepsilon_{ij} \qquad (1)$$

Where i is a country index and t indicates the number of the cross-section regression of the panel, HE is the per capita health expenditures, GDP is the real per capita income (constant price 2005 $), CO_2 and PM_{10} emissions show environmental delegations. The term ε_t is the error term bounded with the classical statistical properties.

The effect of expenditure growth on economic growth is considered availability of data and positive; when health care. We expect an increase in revenues and quality deterioration in environmental through several programmes to positively impact health expenditures. As countries develop, they have more to spend on health care, this is well-known, and empirical studies support autoregression coefficients for all units of the panel with the independence section.

Empirical investigation in this article follows three steps: (1) We test for non-stationarity in the variables of a multivariate cointegration and error-correction GDP and health expenditure. We used the Im, Pesaran and Shin unit root framework; (2) We look for existence of long-run relationship using the ARDL approach. Since the appropriateness of the cointegration analysis depends on all series being integrated in order one, the time series properties of the data must be discovered before any estimation is carried out. There are several statistics that may use to test for a unit root in panel data, but since our panel data set is not too long, we use the Levin, Lin and Chu (2002) test.

4. Econometric results

Table 1 summarises the country statistics for the MENA countries, four variables are considered: Health expenditure, GDP, CO_2 emissions and PM_{10}.

Figure 1 shows the trend of total health expenditures/GDP for the 11 countries: Djibouti, Egypt, Iran, Iraq, Jordan, Lebanon, Libya, Morocco, Syrian Arab, Tunisia and Algeria from 1995 to 2014. There is a general trend of a health expenditure/GDP increase in all nations.

The ratio of health expenditure/GDP in the MENA countries in different periods is compared the health expenditure/GDP increased in most countries in 2008 except Morocco, Tunisia and Egypt. This study shows two conclusions. First, the cross-sectional analysis of certain periods, health care expenditure in the different countries is quite different; between countries in the MENA countries with similar levels of economic development, the difference is still significant. Second, the long-run development, regardless of medical levels, expenditure on health care in the different countries are increasing. In addition, the growing rate of spending on health care is more important than the national income. Growth in health care expenditure has a positive effect on GDP.

Table 1. Descriptive statistics for 11 MENA countries.

Variables	HE	CO_2	GDP	PM_{10}
Mean	450.1891	3.433076	2,697.753	72.16256
Median	340.6033	3.186530	2,042.877	65.30375
Maximum	1,414.500	10.54270	9,153.107	305.3185
Minimum	16.01967	0.444583	694.3548	23.05120
Std. Dev.	336.8111	2.366932	2,048.317	44.11715
Skewness	0.845758	1.021550	1.441446	1.848837
Kurtosis	2.647983	3.492702	4.165675	8.189926
Jarque-Bera	25.99560	38.46484	84.20837	353.6290
Probability	0.000002	0.000000	0.000000	0.000000
Observations	209	209	209	209

Source: World Health Organisation National Health Account database 1995-2014, WDI, 2015.

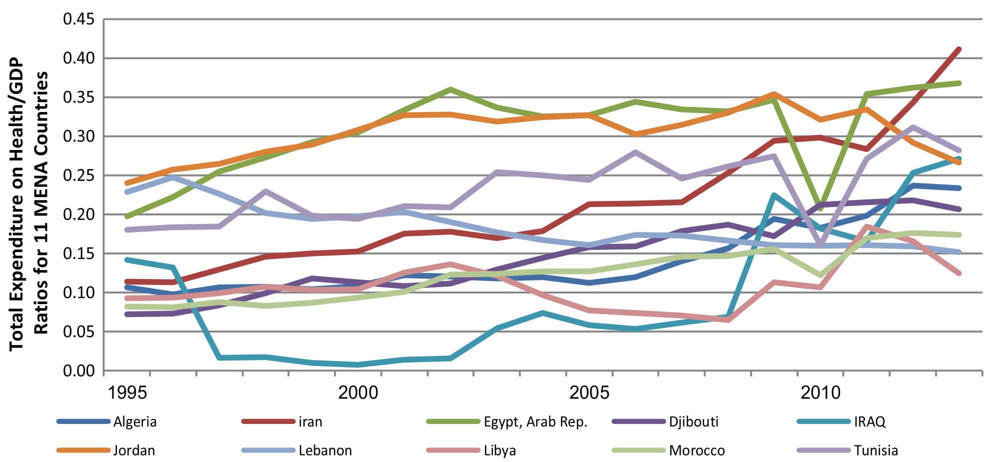

Figure 1. Total expenditure on health/GDP ratios for 11 MENA countries. Source: WDI, 2015.

4.1. Panel unit root tests

The first step is to determine whether the variables are stationary. If the variables contain a unit root, the next step is to check if there is a cointegration relationship between variables. Table 2 shows the results of the unit root tests. All variables are not stationary at the significant level of 5% according to the test results. They are static when the first differences are taken into I (1).

4.2. Panel cointegration

When the variables are static in their first differences, it is possible to apply cointegration analysis on the variables. The Pedroni Johansen cointegration Fisher test was performed and the results are shown in Table 3.

Regarding the results of Pedroni panel cointegration tests, the null hypothesis suggests that there is a cointegration between the variables in terms of statistics panel and group. In other words, there is a long-run relationship between health expenditures, GDP, CO_2 emissions and PM_{10} emissions. Similarly, the null hypothesis, which suggests that there is no cointegration between the variables, is also rejected and it concluded that the variables are cointegrated according to test results panel cointegration.

4.3. Estimation of the long-run equilibrium

Our final step is the estimation of the long-run relationships between health expenditures and income, CO_2 emissions and PM_{10} emissions. We chose the econometric technique best

Table 2. Panel unit root test.

Unit root test	HE	GDP	CO_2	PM_{10}
Level				
Levin, Lin& Chut*	−0.93433	−0.38516	−1.82673**	−0.80761
Im, Pesaran and Shin W-stat	0.43094	1.74085	−0.98225	2.46020
ADF - Fisher Chi-square	23.4321	13.0051	26.2868	6.68933
PP - Fisher Chi-square	30.5753	16.5144	34.6106**	8.79719
Level 1				
Levin, Lin& Chu t*	−5.87307**	−1.91513**	−8.09770**	−3.20706**
Im, Pesaran and Shin W-stat	−7.05276**	−2.86651**	−7.21059**	−4.50711**
ADF - Fisher Chi-square	92.1813**	42.4735**	91.7003**	60.5051**
PP - Fisher Chi-square	228.039**	131.451**	177.900**	124.945**

Notes: All unit root tests are performed with individual intercept for each series. The optimal lag length was selected automatically using the Schwarz information criteria. The null hypothesis is a unit root for all the tests (**) denotes statistical significance at the (5%).
Source: Authors' calculations.

Table 3. Pedroni cointegration test results.

	t statistic	p value	Weighted t statistic	p value
Panel v-Statistic	−0.710811	[0.7614]	1.359810***	[0.0869]
Panel rho-Statistic	2.061895	[0.9804]	0.468223	[0.6802]
Panel PP-Statistic	−0.979938	0.1636]	−4.674433**	[0.0000]
Panel ADF-Statistic	−1.238059**	[0.1078]	−4.993444**	[0.0000]
Group rho-Statistic	2.092507**	[0.9818]		
Group PP- Statistic	−4.990008**	[0.0000]		
Group ADF-Statistic	−4.892404**	[0.0000]		

Notes: Critical value is at the 5%, 10% significance level denoted by (**), (***).
Source: Authors' calculations.

Table 4. Panel ARDL long-run estimations.

	Variable					
	LGDP		LCO_2		LPM_{10}	
Country	Coefficient	Prob.*	Coefficient	Prob.	Coefficient	Prob
Panel	0.66**	[0.0000]	0.27**	[0.0042]	0.23**	[0.0000]
Algeria	−0.28***	[0.0734]	0.25***	[0.0974]	0.08	[0.6824]
Djibouti	1.05***	[0.06426]	1.14**	[0.0176]	0.45**	[0.0031]
Egypt	−0.01***	[0.0739]	2.43**	[0.0370]	0.94	[0.0886]
Iran	0.72**	[0.0001]	1.34**	[0.0002]	0.39**	[0.0032]
Iraq	0.36	[0.1352]	0.22***	[0.0955]	0.57	[0.1867]
Jordan	0.60**	[0.0003]	1.53**	[0.0001]	0.001	[0.9657]
Lebanon	0.67**	[0.0121]	0.14**	[0.0002]	0.58**	[0.0277]
Libya	0.02	[0.2399]	0.20**	[0.0003]	0.08**	[0.0413]
Morocco	−0.83**	[0.0077]	0.30**	[0.0001]	0.26	[0.3560]
Syrian Arab	−0.50***	[0.0561]	0.01	[0.8702]	0.89**	[0.0304]
Tunisia	−0.31**	[0.0000]	0.08**	[0.0193]	0.13***	[0.0807]

**denotes rejection of the hypothesis at the 0.05 level.
*** denotes rejection of the hypothesis at the 0.01 level.
Source: Author's calculation using Eviews 9.

suited to our panel data characteristics. Therefore, we proceed to estimate our panel data in ARDL model. The results are shown in Table 4.

The coefficients of GDP are significant at 5% and 1% levels. GDP has a positive long-run effect on health expenditure in MENA countries. The implication is that increases in real GDP tend to increase health expenditure in the long-run. GDP explains around 0.65% of the increase in health expenditure. One interpretation of this result is that if after an economic boom, which generates more income for people, health expenditure increases, then it may take a recession for per capita health expenditures to fall. This also confirms the findings of Hitiris (1999), Kiymaz, Akbulut and Demir (2006), and Zheng, Yu, Zhang and Zhang (2010) that increases in national income has a positive long run effect on public health spending. The implication is that increases in real GDP tend to raise public expenditure in the long-run. Similar to Hitiris and Posnett (1992), we claimed that the extent to which GDP has a positive effect on health care expenditure. We find evidence between national income and health expenditure, and that health expenditure is a necessity, not a luxury good. In Djibouti it is a luxury good and health expenditure is an inferior good for Algeria, Egypt, Morocco, Syrian Arab and Tunisia. As a necessity, much effort must be made by government to make it available to all, regardless location, age, gender, religion or tribe, social or economic status of the individual.

The CO_2 emissions coefficient is significant within the period under study at a 5% level. In our sample, the CO_2 emissions explain around 0.27% of the increase in health expenditures and are consistent with Toor and Butt's (2005) findings that pollution has the potential to spur public health spending. The implication is that air pollution increases public health spending, but at small levels. The PM_{10} emissions explain around 0.23% of the increase in health expenditures.

5. Conclusion

The purpose of this study was to contribute to the literature of ecological economics and health that modelled the determinants of health expenditures. We have extended this work by introducing quality variables of the environment. In other words, we proposed a model that examined the relationship between health expenditure, income, CO_2 emissions and PM_{10} emissions. We used the framework of cointegration on panel data, and in so doing we felt long-run elasticities of the determinants of health expenditure. Our empirical analysis is based on a panel of countries in the MENA countries for the period 1995–2014 using ARDL methods to estimate elasticities.

We found that the four variables in our proposed panel regression model are integrated of order one. With the assistance of the panel Pedroni cointegration, we found overwhelming evidence between the panel cointegration between health expenditures and its determinants. Economic growth has statistically significant and positive effects on health expenditure. Health care is a necessity, and not a luxury good, in the MENA countries. The result that health care is a 'need' and a normal good, at the mean data points, confirms the a priori notion that health care behaviour changes with the level of economic development. With economic growth in the MENA countries, the consumption of crude oil, gasoline, kerosene, diesel and fuel oil will increase. Our results imply that economic growth will come at the cost of environmental degradation, which increases the risk of pollution induced health diseases, including mortality.

Finally, our results suggest that health policy should include environmental quality issues, for failure to do so is likely to see an increase in health care expenditures. As pointed out earlier, health care expenditures in GDP in the MENA countries is increasing, which is potentially at the expense of: (1) expenditures on maintaining environmental quality to a certain standard; and (2) expenditures on other sectors, such as education. This implies that if the proportion of health expenditure goes to caring for those affected from deterioration in environmental quality, then there are fewer funds available to cater for upgrading environmental quality and if this process continues, it is likely to lead to more pressure on government budgets. The policies that aim to raise real GDP in the MENA countries economy would be very beneficial to government investment in the health sector.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Bilthoven. (2000). *Quantification of the health effects of exposure to air pollution report of a WHO working group*. Netherlands: European Centre for Environment and Health.

Bloom, D. E., Canning, D., & Sevilla, J. (2001). The effect of health on economic growth: Theory and evidence (Working Paper No. 8587). Cambridge: National Bureau of Economic Research.

Evans, D. B., Tandon, A., Murray, C. M., & Lauer, J. A. (2000). The comparative efficiency of national health systems in producing health: An analysis of 191 countries. GPE Discussion Paper Series No. 29.

Gerdtham, U. G., & Jonsson, B. (1991). Conversion factor instability in international comparisons of health care expenditure. *Journal of Health Economics, 10*, 227–234.

Gerdtham, U. G., Sogaard, J., Andersson, F., & Jonsson, B. (1992). An econometric analysis of health care expenditure: A cross-section study of the OECD countries. *Journal of Health Economics, 11*, 63–84.

Gupta, S., Verhoeven, M., & Tiongson, E. (2001). Public Spending on Health Care and the Poor IMF Working Paper. Fiscal Affairs Department.

Hansen, A. C., & Selte, H. K. (2000). Air pollution and sick-leaves: A case study using air pollution data from Oslo. *Environmental and Resource Economics, 16*, 31–50.
Hitiris, T. (1999). Health care expenditure and cost containment in the G7 countries Discussion Papers in Economics, No. 1999/15. University of York.
Hitiris, T., & Posnett, J. (1992). The determinants and effects of health expenditure in developed countries". *Journal of Health Economics, 11*, 173–181.
Jerrett, M., Eyles, J., Dufournaud, C., & Birch, S. (2003). Environmental influences on health care expenditures: An exploratory analysis from Ontario. *Canada, Journal of Epidemiology and Community Health, 57*, 334–338.
Karatzas, G. (2000). On the determination of the USA aggregate health care expenditure. *Applied Economics, 32*, 1085–1099.
Khoshnevis Yazdi, S., Tahmasebi, Z., & Mastorakis, N. (2014). Public Healthcare Expenditure and Environmental quality in Iran. No. 233. *Recent Advances in Applied Economics*.
Kiymaz, H., Akbulut, Y., & Demir, A. (2006). *Tests of stationarity and cointegration of health care expenditure and gross domestic product*. The European Journal: An application to Turkey.
Matteo, L. D., & Matteo, R. D. (1998). Evidence on the determinants of Canadian provincial government health expenditures. *Journal of Health Economics, 17*, 211–228.
Murthy, N. R. V., & Ukpolo, V. (1994). Aggregate health expenditure in the United States. *Applied Economics, 26*, 797–802.
Narayan, P. K. (2006). Examining structural breaks and growth rates in international health expenditures. *Journal of Health Economics, 25*, 877–890.
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*, 404–411.
Newhouse, J. P. (1977). Medical care expenditure: A cross-national survey. *Journal of Human Resources, 12*, 5.
Pedroni, P. (1999). Critical values for cointegration tests in heterogenous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics, 61*, 653–670.
Peykerjou, K., Gollu, R. B., Gashti, H. P., & Shahrivar, R. B. (2011). Studying the relationship between health and economic growth in OIC Interdisciplinary. *Journals of contemporary research in business, 3*(8), 1041–1054.
Rao, R. R., Jani, R., & Sanjivee, P. (2008). Health, quality of life and GDP: An ASEAN experience. *Asian Social Science, 4*, 70–76.
Schmieder, J., & Neidell, M. (2008). Air pollution and infant health: Lessons from New Jersey, National Bureau of Economic Research (Nber Working Paper, No. 14196).
Tang, C. F. (2009). An examination of the government spending and economic growth nexus for Malaysia using the leveraged bootstrap simulation approach. *Global Economic Review, 38*, 215–227.
Tekabe, L. F. (2012). Health and long run economic growth in selected low income countries of Africa South of the Sahara: Cross country panel data analysis (Master's thesis). Sodertorns university press.
Toor, I. A., & Butt, M. S. (2005). Determinants of health care expenditure in Pakistan. *Pakistan Economic and Social Review, 43*, (Summer 2005), 133–150.
Wang, Y. (2007). *A randomized community intervention to improve complementary feeding practices of children aged 6 to 24 months in rural China*. China: Peking University Health Science Center.
World Bank. (2015). World development indicators. Retrieved from http://www.worldbank.org/data/onlinedatabases/onlinedatabases.html.
Zheng X., Yu Y., Zhang L., & Zhang Y. (2010). Does pollution drive up public health expenditure? A Panel Unit Root and Cointegration Analysis. Retrieved from http://www.hanqing.ruc.edu.cn/admin/uploadfile/201005/20100520103320946.pdf