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Original Article

Empirical evidence from a few selected emerging economies on the impact of governance and health spending on health outcomes

Abraham Donkor[1], Revelino Garcia[1], Susan Yaa Aframa Arkah[1], Sabina Ampon-Wireko[2*], James Antwi[1], Emmanuel Kwang[2]

Abstract

Background: Adverse effects of weak governance on health, is a serious policy subject matter for policymakers, health experts, and researchers. Therefore, this study examines the effect of governance and health expenditure on under-five and adult mortality in emerging economies between 2000 and 2016.

Methods: Employing data from World Bank World Development Indicators, the study applied panel procedures namely cross-sectional dependence test, Westerlund cointegration, and cross-section augmented Dickey-Fuller (CADF) panel unit root test that can deal with the effects of cross-sections in the series. The study examined the long-run relationship between governance and health outcomes by using the panel fully modified least squares (FMOLS) and the fixed effects model for a robust check.

Results: The Westerlund cointegration confirmed that the variables are cointegrated. The panel fully modified least squares (FMOLS) and the fixed effects estimation results show that poor governance (corruption) induces adult mortality in most of the panels. However, good governance (political stability) reduces mortality among children under five and adults in all four panels.

Conclusion: The study supports the hypothesis that governance has inordinate consequences on under-five and adult mortality and therefore it has a huge impact on the health outlook of a population. The findings indicate that health expenditure and urbanization affect health outcomes in lower, upper, and high-income countries in changing economies. Different policy implications are therefore offered based on the study outcome.

Keywords: Corruption, Political Stability, Under-Five Mortality, Adult Mortality, Fully Modified Least Squares, Fixed Effect Model, Philippine

Background

The health system and public health signify a gateway to economic growth and development [1]. The concept of the health system shows that every government plays a vital role in ensuring a better quality of life for its citizens. Emerging economies are experiencing epidemiological change. The causes of death are shifting slowly from infectious to chronic diseases such as heart and lung diseases [2]. This transition has led to different viewpoints among scholars on the new challenges regarding the provision of health care services. Among the major factors affecting effective health delivery, is corruption [3, 4, 5]. Corruption is defined by the World Bank as 'the mishandling of public or [6] corporate office for private gain. Corruption has financial, economic, and social costs and has devastating effects on emerging economies. World Health Organization (WHO) assessment for worldwide health expenditures amounted to $5.7 trillion in 2008, of which 7.29% got lost to healthcare fraud through practices ranging from theft of wheelchairs to billing insurance funds for 'ghost' services each year [7]. The solid hierarchical culture within the medical profession may enable behaviors that drive or obscure corrupt conduct [8]. Diversion of resources from health facilities for

*Correspondence: sabina.wireko@cug.edu.gh
[2]Faculty of Health and Allied Science, Catholic University College, Box 363, Ghana
A full list of author information is available at the end of the article

personal gains results in the government paying twice to replace stolen supplies [9]. When corruption is accepted to saturate the health system, its repercussions go beyond the loss of financial resources but negatively decrease society's confidence in the system. The influence of corruption on health has been emphasized recently, yet a comprehensive study regarding the impacts of corruption on health status in emerging economies is readily not accessible. This limitation affects the enactment of appropriate policies that will aid in promoting the population health of emerging economies. This study, therefore, seeks to examine the long-term impact of governance on health outcomes in emerging economies. This study distances itself from the approach taken by previous researchers in many identifiable ways. First, this study is an addition to the existing literature as it focuses on panel data sets instead of time series [10]. This approach was found appropriate because, the large size of the panel groups allows comparisons to be made among regional or income levels an essential embodiment of global health care importantly, to achieve SDG3, countries must know the role of governance on health status since the attainment of this goal depends on ambitious and immediate action emanating from good governance. Methodologically, unlike [10, 11] this study employed econometric techniques capable of eliminating cross-sectional dependence within the data since disregarding the relevance of cross-section estimation in panel analysis can have a detrimental effect on unaccounted residuals leading to estimation inefficiency and provision of invalid results [12]. Hence, the study applied the fully modified ordinary least squares (FMOLS) and fixed effects as a robust check to estimate the long-run impact of corruption on the on-health status of the citizens in emerging countries. Unlike other studies, this study disassembled governance into good (political stability) and bad governance (corruption). The distinctive influence of the effects of political stability and corruption on health outcomes in emerging countries was discussed as well. Finally, this study is of much significance to emerging economies today, as it will go a long way in providing key information necessary for governments and key stakeholders in the attempt to better clarify the uniqueness and need to increase expenses on overall health outcomes.

Literature review

Within the healthcare setting, good governance indicates the health sector is functioning effectively with some level of efficiency. The role of governance has been suggested since 1980 as an important issue in health literature [13]. The World Bank defines good governance in relation to six indicators namely: voice and accountability; controlling corruption; political stability; effectiveness plus efficiency; regulatory quality; and rule of law [14]. Nevertheless, in nations with high corruption, governmental resources are misused and not converted into health investments for the benefit of the common good [15]. A lot of research findings are suggestive of the implications of weak governance on health service delivery. Among them is the work of [15] who focused on how corruption influences education and services health care. Their findings proved that government involvement in the healthcare market exposes the healthcare system to other inefficiencies and corruption. On one hand, studied the influence of health care expenses, go and variance together with health outcomes where an Autoregressive Distributed Lag (ARDL) cointegration was employed in analyzing data from 1984 to 2009 in Malaysia and a significantly negative relationship between health outcome and corruption was shown [10]. Azfar and Gurgur [16] on the other hand, utilized eight different surveys to gather data to capture and quantify the various forms of corruption. The study found that corruption remained the single most important factor that influences health outcomes consistently. In 2012, respondents from Uganda acknowledged perceived corruption to be one major factor hindering the provision of better health care [17]. Ukraine also identified corruption as a basis of barriers to accessing medical commodities and health services [18]. Corruption in the health sector has been found to take many forms in various areas, such as in health facility construction; equipment purchasing and supply; pharmaceutical delivery and use, fabrication of medical research, and most importantly the delivery of health care services [5]. Conversely, the effects of corruption on population health may not always be direct, but can however, degrade the system and adversely affect the general public in several ways [19]. For instance, [3] found corruption to ruin vaccination of children, increase patient waiting time, and decrease patient satisfaction. Hanf, and Van-Melle [20] also linked corruption to a negative 1.6 percent of annual deaths in children under 5 globally. Furthermore, the International Monetary Fund (IMF) has estimated that infant and child mortality in countries with high levels of corruption is almost twice as high as that in countries with low levels of corruption [3]. Given this, Hanf, and Van-Melle [20] recommend that governments and donors need to devise indicators at both micro and macro levels as a watchdog in relation to the influence of corruption on health efficiently as an integral element in overcoming these linkages. Urbanization represents the increasing number of individuals living in urban areas. The implications of urbanization on health are two-edges. On the one hand, various schools of thought provide evidence of a positive significant impact of urbanization on health status while others report the opposite. While urbanization offers opportunities for people, on the other hand, it also poses physical, chemical, and biological hazards, which can result in injury and illness in urban residents [21]. De Grande et al. [22] examined the tendencies of young adult mortality in urban and rural areas in Belgium. The disintegration analysis found that young adult mortality decreased considerably over time, mostly in large urban areas. The results of Welander et al. [23] proved that urbanization reduces infant mortality besides, a high level of political stability in a country usually enhances child health status. Economic growth can positively affect health by enhancing the provision of health resources like nutritive food, insurance, transportation, housing, and health care [24]. On the contrary, Berkey and Scannapieco [25] highlighted that higher income also correlates with unhealthy habits, predominantly consumption of less healthy meals, alcohol, and tobacco, that deteriorate the immune system. For example, South Africa's life expectancy reduced drastically between 62-51 years from 1992 – to 2005, even though the GDP per capita increased about sevenfold in the same period. Similarly, Gonzalez and Quast [26] reported that income upsurge was connected with a longer life span in Sweden in the 1800s, however, the association changed in the 1900s, with the growth of the economy being associated with death. This is because people could spend more

time at the workplace leading to overwork-related stress and other work hazards as people also turn to drink more, causing accidents and health problems. Preston [27] measured the life expectancy rate against per capita GDP countries covering the period 1900, 1930, including 1960. He evinces an increasing, concave association and shifting upward over the period. Though the correlation is stable over time, the estimation from Preston's study is attributed to between 10-25% of progression of the life expectancy rate ranging from the year 1930 to1960. Mackenbach and Looman [28] conducted a study in Europe on the nexus between health status and national income for the years 1900-2008 and employed regression parameters to estimate the data. The study found that a surge in income has a negative impact on infectious and cardiovascular diseases. Expenses on health care by the government are essential for the betterment of individuals' health within the population. Similar to any other development project, a crucial decision every government faces is health expenditure involving the deployment of resources for disease prevention, general medical care services, and the promotion of health for its citizens.

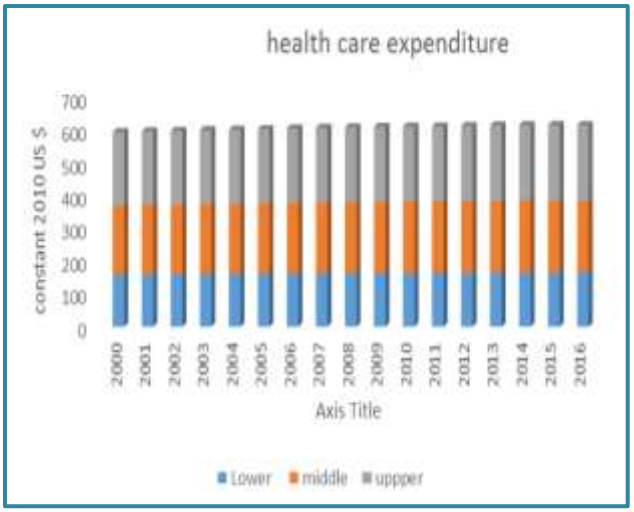

Figure 1: Public health care expenditure WDI, 2019; Source: Authors Construction 2023.

Concerning the proportion of government spending, as mirrored in Figure 1, the lower-income countries in the emerging countries spend noticeably less on health than the middle- and high-income countries.

Methods

Study design and setting

The study used a panel dataset covering the period from 2000 to 2016 based on data availability. The panel comprises twenty-six countries within the emerging economies following the World Health Organization's report [29]. These countries were categorized into four sub-panels. Low-income countries are nations that have a per capita gross national income of less than $1,0261. A middle-income country is a country that has a gross national income per capita between $1,036 and $12,535. A high-income country is a country with a gross national income per capita exceeding $12,376 according to the World Bank report 2021. Due to the availability of data, the lower-income countries include (Egypt, Indonesia, India, Nigeria, Pakistan, Philippines, and Bangladesh), whereas upper-income countries (Argentina, Brazil, Columbia, Malaysia, Peru, Thailand, China, Venezuela, and South Africa) and high-income countries are made up of (Chile, Czech Republic, Greece, Qatar, Russia, Poland, Ukraine and Bulgaria) and the main panel. According to the standardization of the World Bank: the sub-panels are categorized based on data on per capita GDP at a constant 2010 US$; a proxy for economic growth, public health expenditure, under-five mortality (deaths of under 5-year-olds per 1,000 live births), and adult mortality (ADMR) is the probability that those who have reached age 15 will die before reaching age 60 per 1,000 persons, and Urbanization. These were extracted from the World Bank World Development Indicators, while the data for government stability and corruption was sourced from the International Country Risk Guide (ICRG) based on the availability of data and following the study by Ahmad and Hasan [10]. The dependent variables include adult mortality rate and under-five mortality rate whilst the independent variables include health care expenditure, economic growth, political stability, and corruption. The relationships between the variables are confirmed by [10, 30, 31].

Table 1: Name and definition of variables

Abbreviation	Variable name	Unit	Source
ADMR	Adult mortality	The probability that those who have reached age 15 will die before reaching age 60 per 1,000 persons	World Development Indicator (2019)
U5MR	Under-five mortality	Children who die before reaching 5 years per 1,000 live births)	World Development Indicator (2019)
U URB	Urbanization	Total number of people living in the urban areas	World Development Indicator (2019)
GDP	Gross Domestic Product per capita%	Current US $	World Development Indicator (2019)
POL	Political Stability	Ranges from 1 to 12 of which countries with the lowest score represent higher corruption levels and vice versa	International Country Risk Guide (ICRG), 2019
PHCE	Public health expenditure	Current US $	WDI, 2019
CRP	Corruption	1-low to 6 is high	International Country Risk Guide (ICRG), 2019.

Estimation Procedure

Panel data usually suffer the problem of cross-sectional dependence and heterogeneity. Given this, the study employed a recent econometric technique to test if such problems exist in the data set. This study used the panel fully modified ordinary least squares (FMOLS) proposed by Pedroni [33] to examine the interplay between governance, health outcomes, and economic growth in emerging countries.

Following Ahmad and Hasan [10], the study proposed the following model:

(1) U5MR=f (CRP, POL, PHCE, PGDPC, URB)
(2) ADMR= f (CRP, PHCE, POL, PGDPC, URB)

Equation (1) denotes that, under-five mortality (U5MR) represents under-five mortality (deaths of under 5-year-olds per 1,000 live births), adult mortality (ADMR), Corruption (CRP), political stability (POL) and public health care expenditure (PHEC) GDP per capita (PGDP proxy for economic growth) and Urbanization (URB). This is expressed in a panel model as:

$$(3) \quad logU5MR_{it} = \alpha_{it} + \omega_1 lnCRP_{it} + \omega_2 logPOL_{it} + \omega_3 logHCE_{it} + \omega_4 logPGDPC_{it} + \omega_5 logURB_{it} + \varepsilon_{it}$$

$$(4) \quad logADMR_{it} = \alpha_{it} + \omega_1 logCRP_{it} + \omega_2 logPOL_{it} + \omega_3 logHCE_{it} + \omega_4 logPGDPC_{it} + \omega_5 logURB_{it} + \varepsilon_{it}$$

Where I denote the number of countries (26 countries), t indicates the time frame (2000-2016), α represents the intercept and ω is the vector coefficient.

Panel unit root and Cointegration test

The study used a panel unit root test to examine stationarity among the variables. However, before the unit root test, a cross-sectional dependence test was performed to examine unobserved factors within the countries. Pesaran cross-sectional augmented Dickey-Fuller (CADF) panel unit root and Pesaran and Shin test were estimated for confirmation of the stationarity of the series [34]. After the panel unit root determination, Koa [35] and Pedroni [36] cointegration tests were applied to examine the long-run linkages among the study variables. For robustness, Westerlund and Edgerton [37] panel cointegration was considered to deal with any cross-sectional dependence. The Westerlund cointegration statistics provide robustness of Ga, Gt, Pa, and Pt: Ga (among groups); Gt (between groups); Pa (among panels), and Pt is the robustness between panels.

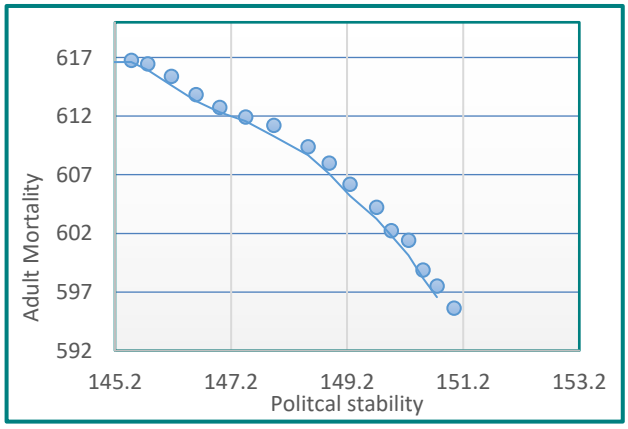

Figure 2: Relationship between adult mortality and political stability

As mirrored in Figure 2. There is a perfect negative relationship between adult mortality and political stability in emerging economies from the period 2000 to 2016.

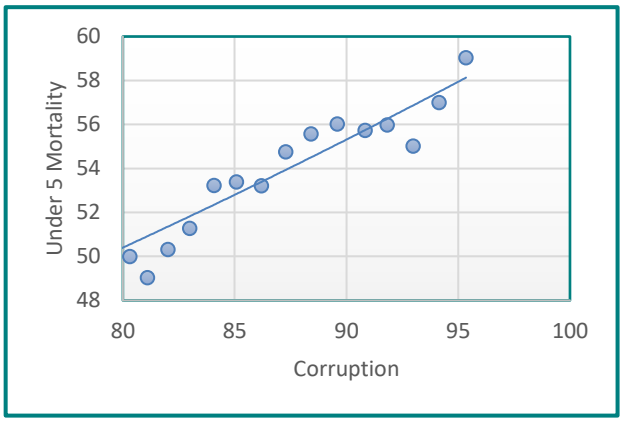

Figure 3: Relationship between corruption and under-five mortality. Source: Authors construction, 2023

Figure 3 also offers a pictorial representation of the association between corruption and under-five mortalities between the years 2010 and 2016. The graph depicts a positive linkage between under-five mortality and corruption.

Results

Descriptive analysis

In Table 2, the descriptive analysis of the data set shows the mean, median, skewness, kurtosis, maximum, probability, Jarque-Bera, and minimum. Kurtosis measures the flatness of the series distribution. The outcome of the analysis shows, that there is leptokurtic distribution among adult mortality, under-five mortality GDP per capita corruption, and political stability whereas public health care expenditure and urbanization display negative skewness. Evidence from Jarque-Bera proved a normal distribution and therefore established the null hypothesis statement that, all the variables are normally distributed at a 5% significance level. The maximum value of the analysis discloses public health expenditure as the variable with the highest value (27.386) and therefore an important variable in emerging economies whilst corruption is found to be the variable with the minimum value (0.039). In addition, the standard deviation exposed urbanization as the utmost explosive variable seconded by under-five mortality.

Cross-sectional dependence test

The results in Table 3 are a cross-sectional dependence test based on Pesaran's [34] approach for the test that confirmed the existence of cross-sectional dependence within the study variables. Therefore, the null statement of no cross-sectional independence is rejected while the alternative of the presence of cross-sectional dependence (CD) among the variables is accepted. Given this, the study employed a Cross-section Augmented Dickey-Fuller (CADF) panel unit root test which is very effective when CD dependence is present.

Panel unit root test

CADF unit root

The CADF panel unit root test Pesaran [34] as mirrored in Table 4, shows that the null hypothesis of non-stationarity

among the variables is confirmed at all levels, except public health care expenditure and corruption. Nevertheless, the alternative statement of stationary among all the variables was accepted in the first difference, leading to the rejection of the null hypothesis. The study however concludes that all the variables are stationary in the first difference.

For a robust check of stationary among the variables, the Im, Pesaran, and Shin test panel unit test was conducted. As seen in Table 5, the results indicate that all variables were stationary in the first difference, confirming the results of the CADF panel unit root test

Table 2: Data descriptive analysis

	*log*AM	*log*U5MR	*log*PGDP	*log*CORP	*log*POL	*log*PHCE	*log*URB
Mean	5.702	3.327	9.309	0.805	2.103	23.399	15.939
Median	5.695	2.884	9.178	0.774	2.066	23.416	17.202
Maximum	6.952	13.314	13.545	1.609	20.120	27.386	20.477
Minimum	4.708	1.131	6.636	0.039	1.585	18.434	6.233
Std. Dev.	0.457	2.084	1.516	0.267	0.884	1.400	3.5765
Skewness	0.381	3.399	0.632	0.300	19.191	-0.525	-1.498
Kurtosis	3.320	15.821	3.027	3.479	391.680	4.674	4.089
Jarque-Bera	12.59	3878.790	29.478	10.883	2809382.	71.967	187.303
Probability	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*
Sum	2520.558	1470.808	4114.584	356.125	929.667	10342.68	7045.099
Sum Sq. Dev.	92.44250	1915.494	1014.330	31.659	344.825	864.983	5641.271

Table 3: Cross-sectional dependence test

Variables	CD-test	P-Value	Cross-Sectional Dependence
*log*U5MR	66.365***	(0.000)	Yes
logAM	67.418***	(0.000)	Yes
*log*PGDP	37.028***	(0.000)	Yes
*log*URB	62.866 ***	(0.000)	Yes
*log*POL	58.231***	(0.000)	Yes
*log*CORP	11.88 8***	(0.000)	Yes

The null hypothesis of the cross–sectional dependence is rejected at 1% a significant level.

Table 4a: CADF panel unit root

	Panel		**Lower-income countries**		**Middle-income countries**		**High-income countries**	
Variables	Level	1st diff.	Level	1st diff.	Level	1st diff.	Level	1st diff.
*log*PGDP	-0.875	-2.770***	-0.347	-2.693**	1.803	-5.665***	-1.204	-2.903***
*log*URB	-0.555	-1.792*	-1.336	-1.551**	0.700*	-3.053***	-1.380	-1.699**
*log*PHCE	-2.064*	-2.325***	-2.196	-3.471***	-1.298	-5.117***	-1.892	-2.792***
*log*U5MR	-1.727	-2.039*	-1.914	-1.321*	-1.462	-2.585**	-1.625	-1.321**
*log*AM	-1.781	-2.601***	-1.493	-2.475**	0.549	-1.734**	-2.407	-1.608**
*log*CORP	-2.559*	-3.304***	-3.364***	-3.933***	-2.139**	-5.855***	-1.616	-2.728***
*log*POL	-1.954	-3.304***	-2.312*	-2.817***	-4.152***	-2.063***	1.321	--2.587**

Table 4b: CADF panel unit root

	Main Panel		**Lower-income countries**		**Middle-income countries**		**High-income countries**	
Variables	Level	1st diff.	Level	1st diff.	Level	1st diff.	Level	1st diff.
*log*PGDP	-0.875	-2.770***	-0.347	-2.693**	1.803	-5.665***	-1.204	-2.903***
*log*URB	-0.555	-1.792*	-1.336	-1.551**	0.700*	-3.053***	-1.380	-1.699**
*log*PHCE	-2.064*	-2.325***	-2.196	-3.471***	-1.298	-5.117***	-1.892	-2.792***
*log*U5MR	-1.727	-2.039*	-1.914	-1.321*	-1.462	-2.585**	-1.625	-1.321**
*log*AM	-1.781	-2.601***	-1.493	-2.475**	0.549	-1.734**	-2.407	-1.608**
*log*CORP	-2.559*	-3.304***	-3.364***	-3.933***	-2.139**	-5.855***	-1.616	-2.728***
*log*POL	-1.954	-3.304***	-2.312*	-2.817***	-4.152***	-2.063***	1.321	--2.587**

Notes: * designate statistically significant at 5%, respectively, while figures in parenthesis signify t –statistics of variables respectively.

Table 5: Im, Pesaran, and Shin unit root test

Main panel			**Lower-income countries**		**Middle-income countries**		**High-income countries**	
Variable	Level	1st diff.	Level	1st diff.	Level	1st diff.	level	1st diff.
*log*PGDP	1.330*	-4.370***	3.392*	-2.282**	-0.120	-2.694**	-0.636	-2.470**
*log*PHCE	3.289	-6.562***	1.849	-3.700***	2.347	-5.468***	0.591	-3.730***
*log*U5MR	4.705	-5.023***	3.330	-1.114***	2.673	-1.282*	2.265	1.070*
*log*AM	5.266	-5.737***	4.812	-7.307***	-0.251	-1.750**	3.670*	-2.148**
*log*CORP	7.193	-12.924***	-1.197	-7.465***	-7.121**	-8.036**	-2.163	-6.052***
*log*POL	-2.157*	-9.732***	-0.952	-4.014***	-1.377*	-7.201***	-0.971	-6.052***

Notes: [a]*P*-values are in parenthesis. [b]*** represents a 1% significance level. [c]CD-test notes cross-section dependence test.

A diverse procedure is used in estimating the order of integration in the data series. Because of the presence of cross-sectional dependence within the series, however, this study employed the Westerlund and Edgerton [37] cointegration test. Evident in Table 6 is an indication of cointegration; the existence of a long-run relationship between the variables.

In addition, the p-value and the robust p-values support the rejection of the null statement of no cointegration and acceptance of the alternative hypothesis. The findings of the Koa cointegration test in Table 7 indicate that the study variables are cointegrated and hence have long-run linkages. However, this led to the rejection of the null statement of no cointegration.

Table 6: Westerlund cointegration

		Main Panel			**Lower-income countries**	
	Value	p-value	Robust p-Value	Value	p-value	Robust p-Value
GT	-2.506	0.0431**	0.000***	-0.992	0.745	0.000***
G_a	-0.71	0.654	0.000***	-0.599	0.851	0.000***
P_t	-27.161	0.000***	0.000***	-3.431	0.541	0.000***
P_a	-1.184	0.621	0.000***	-0.168	0.652	0.000***
		Middle-income countries			**High-income countries**	
	Value	p-value	Robust p-Value	Value	p-value	Robust p-Value
GT	-0.438	0.658	0.745	-3.178	0.010**	0.000***
G_a	-0.949	0.045*	0.021*	-0.967	0.654	0.801
P_t	-1.697	0.654	0.032*	-23.25	0.000***	0.000***
P_a	-0.95	0.065*	0.042*	-1.61	0.714	0.581

Notes: * designate statistically significant at 5%, respectively, while figures in parenthesis signify t –statistics of variables respectively.

Table 7: Results of the Kao cointegration test

	Main Panel		**Lower-income countries**		**Middle-income countries**		**High-income countries**	
	Statistics	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
ADF	-7.002	(0.000) *	-5.158	(0.000) *	2.171	(0.015) *	7.002	(0. 000)*

Note: * designate statistically significant at 5%, respectively, while the figure in parenthesis denotes probability values.

The results of FMOLS estimations in Table 8 show that, a surge in corruption will increase adult mortality in the main panel, lower, upper, and high-income countries among the emerging economies. Specifically, a unit rise in corruption among the emerging economies will increase adult mortality by 0.096% in the main panel, 6.112% in lower-income, 0.742% in upper-income, and 6.496% in the high-income countries respectively. Again, an increase in Political stability will also affect adult mortality negatively. Thus, a surge in political stability will decline the adult death rate by 0.077% in the main panel, 0.651% at lower-income countries, 0.572% at the upper income, and 1.222% at the high-income level respectively within the emerging economies. Public health care expenditure was found to be negative and significant among all four panels. Precisely, based on the FMOLS results, a unit increase in government health care expenditure correspondingly reduces the adult death rate by 0.228%, 0.862%, 0.524%, and 3.331% at the main panel, lower, upper, and high-income countries within the emerging economies. Regarding economic growth, the results indicate, that an upsurge in economic growth will increase adult morality at the main panel, lower- and upper-income countries. Yet, in high-income countries, growth in the economy is found to decrease adult mortality. Thus, in essence, a unit increase in economic growth will yield a downward trend of 4.882% in mortality within the high-income countries but produce a respective upsurge of 1.273%, 2.078%, and 1.967% at a 1% significant level in adult mortality within the main panel, lower- and upper-income countries. The results of urbanization are considered to be negatively significant towards the reduction of adult mortality in the study area. The result is suggestive that a 1% increase in urbanization will cause a respective decrease in adult mortality by 0.366%, 0.598%, 2.099%, and 1.411% within the main panel, lower, upper and high-income countries.

Table 8: Fully Modified Least Square Regression (FMOLS) results

Variable	Main Panel	Lower-income countries	Upper-income countries	High-income countries
	Coefficient	Coefficient	Coefficient	Coefficient
logCORP	0.096**	6.112***	0.742***	6.496***
	(0.036)	(0.084)	(0.106)	(0.032)
logPOL	-0.077*	-0.651***	-0.572***	-1.222***
	(0.044)	(0.029)	(0.092)	(0.046)
logPHCE	-0.228**	-0.862***	-0.524****	-3.331***
	(0.084)	(0.033)	(0.095)	(0.026)
logPGDP	1.273***	2.078***	1.967***	-4.882***
	(0.146)	90.016)	(0.079)	(0.043)
logURB	-0.366**	-0.598***	-2.099***	-1.411***
	(0.149)	(0.001)	(0.057)	(0.017)
R2	0.974	0.560	0.916	0.788
Adj R2	0.909	0.548	0.901	0.763

Note: ***, **, * designate significance level of 1%, 5% and 10%, respectively.

The findings from Table 9 give a positive relationship between corruption and under-five mortality among the four panels. However, among the upper and high-income countries, corruption was statistically insignificant. This means that a percentage surge in corruption in the emerging economies will produce a respective 49.409% and 0.644% rise in under-five mortality among the main panel and lower-income countries. Political stability was also found to be negative and statistically significant in the regions under study; such that, an increase in political stability will correspondingly increase under-five mortality by 10.474% 0.542% 0.161%, and 0.163% at the main panel, lower, upper, and high-income countries of the emerging economies. Healthcare expenditure for under-five mortality is significantly negative. That means, healthcare expenditure lessens under-five mortality in the main, lower, upper, and high-income countries. This is to say that, a 1% upsurge in healthcare expenditure will respectively reduce under-five mortality by 16.202% 0.473% 0.169% 0.164% in the main, lower-upper, and high-income countries.

Also, economic growth within the emerging economies was found to be positive and significant among the main panel, lower- and upper-income countries, yet a negative and statistically significant relationship was found in the high-income countries. Realistically, a unit increase in economic growth will cause a respective proportionate upsurge in under-five mortality by 22.664%, 0.305%, and 0.319% within the main panel, lower, upper, and high-income countries and a reduction in the high-income countries by 0.164%. Additionally, urbanization was found to be positive and significant in associations with under-five mortality in the main, lower- and upper-income countries but negatively significant in the high-income countries. The specifics are such that, a 1% increase in urbanization will respectively escalate under-five mortality by 2.494% 1.566%, and 1.277% at the main panel, lower- and upper-income countries but a decline in high-income countries by 0.049% among the emerging economies.

Table 9: Fully Modified Least Square Regression (FMOLS) of Under-five mortality.

Variable	Main panel	Lower-income countries	Upper-income countries	High-income countries
*log*CORP	49.409***	0.644***	0.147	0.132
	(0.034)	(0.055)	(0.104)	(0.080)
*log*POL	-10.474***	-0.542***	-0.161*	-0.163*
	(0.016)	(0.055)	(0.087)	(0.095)
*log*PHCE	-16.202***	-0.473***	-0.169*	-0.164**
	(0.013)	(0.049)	(0.094)	(0.060)
*log*PGDP	22.664***	0.305***	0.319***	-0.109*
	(0.010)	(0.041)	(0.071)	(0.066)
*log*URB	-2.494***	-1.566***	-1.277***	0.049**
	(0.000)	(0.033)	(0.004)	(0.023)
R^2	0.87	0.89	0.60	0.94
Adj. R^2	0.79	0.87	0.50	0.93

Note: ***, **, * designate significance level of 1%, 5% and 10%, respectively.

The results in Table 10 demonstrate that corruption increases under-5 mortality at the main panel, and lower and higher income economies within the emerging countries. Specifically, a percentage increase in corruption will cause a respective proportional upsurge in the death of children under age five of about 0.0145% in the main panel, 0.0366% in lower and 0.154% in the high-income countries. Political stability is significant and positively related to under-five mortality. An indication that political stability curtails the death of children under age five within all the panels studied except the upper-income economies which remained insignificant. In detail, a unit surge in political stability will reduce the death of children under years at the main panel, lower income, and the higher income nations by 0.00327%, 0.00295%, and 0.0029% respectively. Furthermore, healthcare costs in connection with under-five mortality are significantly negative. This means healthcare expenditure declines under-five mortality in the main, lower, and upper countries. Denoting that, a unit increase in health expenditure will respectively lessen the death of under-five children by 0.161%, 0.229%, and 0.0287% at the main panel, lower, and upper-income countries. Economic growth (GDP per capita) negatively affects under-five mortality but is only significant in lower-income countries, however, a positive significant relationship was found among the high-income countries. Precisely, a 1% increase in economic growth will lessen the death of under-five children by about 0.0170% whereas intensifying death among children under five by 0.0710% within the upper-income economies. Finally, urbanization showed a negative and significant association with under-five mortality in the main panel, lower- and upper-income countries. This implies 1% increase in urbanization will cause a respective reduction in under-five mortality by 0.0612%, 0.32%, and 0658% in the main panel, lower- and upper-income countries. The fixed effects estimation results from Table 11 indicate that corruption induces the death of adults within emerging countries. More precisely, a 1% upsurge in corruption will lead to a rise in adult mortality by 0.137% and 0.168%. The results of political stability also demonstrate good governance reduces adult death within the lower and the high-income nations. Health expenditure reduces the death of adults except in upper-income countries with evidence of a positive and significant relationship. Income showed a negative significant relationship within all the panels. Income increase reduces the death of an adult in the main panel, lower, upper, and high-income nations by about 0.232%, 0.0721%, 0.374%, and 0.183% respectively. On one hand, the finding from Table 12 exhibits that urbanization is negative at the main and high income but only significant at the main panel. On the other hand, the study denotes a positive relationship between urbanization and adult death within the lower and upper-income countries.

Table 10: Fixed effect model results of under-five mortality (Dependent variable: under-five mortality)

	Main Panel	**Lower-income countries**	**Upper-income countries**	**High-income countries**
Variable	Coefficient	Coefficient	Coefficient	Coefficient
*log*CORP	0.0145***	0.0366***	-0.0139	0.154***
	(0.0033)	(0.0135)	(0.0272)	(0.0421)
*log*POL	-0.00327***	-0.00295***	-0.0262	-0.0029***
	(0.00049)	(0.0005)	(0.32)	(0.0005)
*log*PHCE	-0.161***	-0.229***	-0.0287*	0.0192
	(0.0139)	(0.0283)	(0.017)	(0.0132)
*log*PGDP	-0.0142	-0.0170**	0.0710*	0.0249
	(0.0109)	(0.00771)	(0.0422)	(0.021)
*log*URB	-0.0612***	-0.324***	-0.658***	0.00734
	(0.0187)	(0.0347)	(0.0549)	(0.0266)
Constant	10.54***	10.95***	17.44***	10.03***
	(0.226)	(0.367)	(1.02)	(0.53)
Obs	442	119	152	170
R-sq	0.559	0.87	0.701	0.561

Note: ***, **, * designate significance level of 1%, 5% and 10%, respectively.

Table 11: Fixed effect model results of adult mortality

Variable	**Main Panel**	**Lower-income countries**	**Upper-income countries**	**High-income countries**
Variable	Coefficient	Coefficient	Coefficient	Coefficient
*log*CORP	0.137***	0.168**	0.0359	-0.0468
	(0.0402)	(0.0676)	(0.0252)	(0.0392)
*log*POL	0.00767	-0.835***	-0.0312	-1.526***
	(0.0074)	(0.109)	(0.066)	(0.133)
*log*PHCE	-0.378***	-0.0954**	0.128***	-0.383***
	(0.0314)	(0.0415)	(0.0412)	(0.0546)
*log*PGDP	-0.232***	-0.0721***	-0.374***	-0.183***
	(0.0247)	(0.0242)	(0.103)	(0.0405)
*log*URB	-0.135***	0.0823*	0.417***	-0.0586
	(0.0422)	(0.0426)	(0.0812)	(0.0513)
Cons	16.35***	20.47***	31.14***	12.72***
	(0.51)	(1.152)	(2.476)	(1.022)
Obs	442	119	152	170
R-sq	0.67	0.897	0.792	0.633

Note: ***, **, * designate significance level of 1%, 5% and 10%, respectively.

Discussion

The study unveils corruption to induce the death of children under five years: within the main panel, lower, upper, and high-income countries, and also increases adult mortality in the main panel and the lower-income nations among the emerging economies. It is thus evident that corruption impedes the subsistence of the healthcare sector to deliver high-quality care adequately and effectively to people who need it the most. This outcome could be attributed to the higher cost of health care services that reduces the demand for health as the rise in cost drives poor people away from seeking medical attention. The reason could also be that as corruption increases in health settings, it also reduces the required number of resources to be used for effective healthcare delivery, especially in deprived areas [16]. Similar findings were found by Gupta, Verhoeven [14], and Ahmad and Hasan [10] who justify this outcome with the notion that countries with weak governance, waste public resources without investing in the population's health. From the results, political stability has a negative influence on the mortality of children under five and adults in all four panels under study. This indicates that political stability plays a significant role in preventing untimely death in emerging economies. This outcome can be ascribed to the fact that holding up to the necessary responsibilities in ensuring the optimization of resources, guarantees accountability and facilitates a high level of trust among patients and health providers. This implies that enacting and abiding by stricter health laws and regulations and providing necessary equipment will go a long way to help promote good health. As such we agree with Ahmad and Hasan [10] and Kaufmann, Kraay [38] attestation that political stability enhances the survival chances of an individual. The FMOLS and fixed effect models results show that under-five and adult mortality rates reduced in all the panels with a unit upsurge of public health care expenditure except the upper-income countries in the fixed effect model showed a positive sign. This implies that government provision of medical equipment, health facilities, essential drugs, and training of health staff are crucial in achieving better health status. These findings corroborate with Farag, et al. [39] outcomes from 133 lower- and upper-income nations supporting the idea that government funds in supporting the healthcare system promote child health. However, the positive relationship between health expenditure in upper-income countries could be an indication of poor management and misallocation of funds apportioned for improving public health in the region. The findings are suggestive that, economic growth accelerates under-five mortality and adult mortality in the main panel, lower- and upper-income countries. This could be because a surge of economic growth could attract migrants of whom some are carriers of new diseases [40]. Economic growth could also result in urbanization and when combined with insufficient health infrastructures might promote the outbreak of diseases and death. In Durkheimian fashion, rapid

growth may also generate social disruptions, mental distress, and deteriorating health conditions [41]. Overconsumption and sedentary lifestyles often contribute to obesity and other diseases of affluence which tend to increase mortality [40]. Although our findings contradict the results of Preston [27] and Mackenbach and Looman [28] who found that income reduces mortality rate Cole [42] asserted that though economic growth escalates personal earnings, nothing warrants the income will be spent in promoting health. Therefore, an increase in economic growth and income may not necessarily translate into better health for the citizens. This study revealed that urbanization in emerging economies reduces under –five mortalities in the main panel, lower, upper, and higher income countries since urbanization is efficient in the supply of basic amenities, such as fresh, improved sanitary services, transportation, and recreational centers that aid in the promotion of well-being comparative to the rural areas. Another reason could be the fact that urbanization offers better chances for people's access to public health care lacking in many rural areas and this therefore confirmed a study outcome by Gong, et al. [43]. Moreover, within the emerging economies, urbanization escalates the adult mortality rate in the high-income countries, but in contrast, reduces death among adults in the main panel, lower- and upper-income countries. Potential reasons could be that urbanization may affect population health through the modification of diet. People living in urban areas, for instance, tend to rely most on fast food. Such kind of food may contain large amounts of sugar, bad cholesterol, and sodium which is attributable to heart diseases, diabetes, hypertension, obesity, and other health-related conditions [44].

Conclusion

The continuous health menace posed by weak governance has compelled the World Health Organization to strongly kick against corruption in the health sector. This levitated the attention of scholars to find out governance effects on health outcomes. This study therefore examines the impact of corruption on health outcomes for 26 lower, middle-, and high-income nations in some selected emerging economies from the year 2000 to 2016. Thus, a study on emerging economies is necessary since they contribute to more than 40% of the world's total population and are also experiencing an epidemiological shift from infectious to non-communicable diseases. As such, the findings of a comprehensive study on the effect of corruption and political stability on health outcomes will be necessary and useful in shaping and implementing specific policies for addressing the new health challenges that accompany economic transitions. The study employed a panel approach that provides efficient results in the presence of cross-sectional dependence. The first- and second-generation unit roots indicated that the variables are stationary. Westerlund and Kao's cointegration tests confirmed a long-run relationship among the variables. The empirical results from the fully modified ordinary least squares (FMOLS) and the fixed effect model showed that bad governance (corruption) increases the mortality rate while good governance (political stability) decreases mortality in all four panels. Major findings of the study are summarized as follows: Increase in public health care expenditure in emerging economies reduces under-five mortality and adult mortality in the main panel, lower, middle- and high-income countries. A surge in economic growth worsens under-five mortality and adult mortality, in the main panel, lower- and middle-income countries excluding the high-income countries where a surge in economic growth reduces under-five and adult death rates. The study revealed that an upsurge in urbanization in emerging economies reduces under–five moralities in the main panel, lower, middle-, and higher-income countries except in the high-income countries of emerging economies where urbanization increases death among adults.

Different policy implications are therefore offered:

Upsurge in corruption was found to be devastating to the health status in all sub-regions of emerging countries, governments are required to implement more effective novel measures for accountability and auditing as well as effective monitoring, exposing and severely punishing culprits of such malicious actions. Also, since increasing public care expenditure is likely to lead to improved health status within emerging countries, governments in the lower- and upper-income countries in emerging economies need to increase their expenses on health. This will increase funding for the provision of required equipment and the training of health professionals for efficient and effective health care delivery. The study found a surge in economic growth among the emerging economies to worsen under-five and adult mortality rates in the lower- and middle-income nations. As the economy grows so thus unhealthy lifestyles that could expose people to other preventable diseases. Governments from lower- and middle-income nations as a matter of urgency invest more in health educational programs to help modify behaviors to keep a healthy population. Though the study focused on the role of governance on health outcomes, the paper revealed an increase in urbanization to induce death among adults with high income. To curb the negative consequences of rapid urbanization on population health among the high-income countries of emerging economies, the individual is admonished to explore more innovative ways of creating job opportunities in the rural areas to help deter people from trooping massively to the urban regions.

Abbreviation

CADF: Cross-Section Augmented Dickey-Fuller; FMOLS: Fully Modified Least Squares; WHO: World Health Organization; ICRG: International Country Risk Guide; ADMR: Adult Mortality; U5MR: Under-five mortality; U URB: Urbanization; GDPc: Gross Domestic Product per capita%; POL: Political Stability; PHCE: Public health expenditure; CRP: Corruption; IMF: International Monetary Fund

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Availability of data and materials

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Authors' contributions

All authors are equally participated. All authors have read the final manuscript.

Ethics approval and consent to participate

The study was conducted by the ethical principles of the Declaration of Helsinki (2013). The protocol was approved by the Ethics Committee of the Graduate School of Business Management, Philippine Christian University, Philippines, and the Faculty of Health and Allied Science, Catholic University College, Ghana; 2021.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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Author Details

[1]Graduate School of Business Management, 1648 Taft Ave, Malate, Manila, 1004 Metro Manila, Philippine Christian University, Philippine. [2]Faculty of Health and Allied Science, Catholic University College, Box 363, Ghana.

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