

The Impact of Health Expenditure on Maternal and Child Mortality in African countries

¹Saifullahi Adam Bayero, ²Babangida Danladi Safiyanu, ³Idris Mohammed Gurin

Abstract

The world has experienced a decline in maternal and child mortality in the last few decades, increase in global health expenditure over the years was the major factor responsible for that. But in Africa and other developing countries, the rate of maternal and child mortality has been soaring. The objective of this paper is to investigate the impact of health expenditure on maternal and child mortality in African countries at different income level. On this note, the paper was based on the panel data covering the period of 2000 to 2017 for 39 African countries. After a cross sectional dependence test and panel unit root test, fixed effect results showed that, government health expenditure has no significant impact on reducing child mortality in African countries at all income level. Whereas, it has an impact on reducing the maternal mortality in low-income and lower middle income countries. It was also found that Private health expenditure has significant impact on reducing child and maternal mortality at all income level. Based on this, the paper recommends that governments at different level especially from low-income and lower middle income countries should provide quality health care services and regular immunization for women and children in order to reduce maternal and child mortality in Africa region.

Keywords: *Child mortality, maternal mortality, Immunization, Government health expenditure, private health expenditure, Adolescence*

Article History:

Received: April 25, 2022

Accepted: June 16, 2022

Revised: June 9, 2022

Published online: August 9, 2022

Suggested Citation:

Bayero, S.A., Safiyanu, B.D. & Gurin, I.M. (2022). The Impact of Health Expenditure on Maternal and Child Mortality in African countries. *International Review of Social Sciences Research*, Volume 2 Issue 3, pp. 20 - 36. DOI: <https://doi.org/10.53378/352903>

About the authors:

¹Post Graduate Diploma in Education, Visiting Research Assistant, Global Entrepreneurship Research and Innovation Centre (GERIC)

²BSc. Economics, Graduate Assistant, Department of Economics and Development Studies, Federal University, Gashua

³MSc. Logistic and Supply-Chain Management, ³Department of Business Administration, Federal University, Gashua



1. Introduction

Over the years, economic theories have identified human capital as basis for economic growth and development at macro and micro levels (Novignon & Lawanson, 2017). Health capital contributes to the national productivity and increases the length of good time available for market and non-market activities (Grossman, 1972; Muurinen, 1982). For this reason, improving health capital remains a top priority for a number of countries around the world. Physical capital was considered the most important input for the production of output before the postulation of human capital theory, which was first proposed in the 1960s. From that time, health and education of the labor force were seen as critical elements in the output. Similarly, human healthy time is essential for both market and non-market activities. In the same vein, health care finance is essential in preserving human capital as well as promoting healthy time to achieve a looming growth and development in the economy. Impact of health-care spending can be measured in terms of health outcomes like maternal and child mortality; however, it was also found that population health is influenced by a variety of factors such as social, political, and economic conditions (Kilanko, 2019).

The literature showed that improvements were recorded in some countries around the world in health outcomes (HO) during the last few decades. This was because of the rising healthcare expenditure (HE). In actual terms, global HE per capita has increased, from US\$587 to US\$1299 in 2000 and 2015 respectively (WHO, 2012). According to the report by World Health Organization (WHO), since 1990 the global under-five mortality rate (U5MR) has declined by 49%, while the maternal mortality ratio has decreased by 45%, and life expectancy at birth (LFE) has grown from 64 to 71 years (WHO, 2013). However, Poullier et al. (2019) pointed out that health spending has received less attention in government budgets in most African and other developing nations with 10% contribution to global health expenditures. This is despite the effort of Abuja Declaration of 2001, which aims to improve public health spending in African countries by allocating 15% of their annual budget to the health sector. Literature showed that few countries in the region are close to meeting the 15 percent target (Tandon & Cashin, 2016). Only six countries have achieved this goal in 2011 after ten years of the declaration, which include Rwanda (23 percent), Liberia (18.9 percent), Malawi (18.5 percent), Madagascar (15.5 percent), Togo (15.4 percent) and Zambia (16.0 percent) (World Bank, 2016).

Although the meaning of health spending varies across countries, Poullier et al. (2012) developed a model that classifies the overall health spending, which includes total health spending calculated by adding public and private spending on all health-related goods and services. Social security contributions, various forms of taxation to various parts of government, and external sources, such as grants and loans, are typically used to fund governmental expenditures. Private outlays, on the other hand, include private insurance premiums and prepaid plans, mandated enterprise health expenditure, health expenditure through non-profit health services, and direct payments or out of pocket (OOP) expenditure on health goods, such as co-payments and direct payments by uninsured individuals.

In some African countries, public health spending is mostly funded through grants and loans (WHO, 2010), which may be attributed to ineffective taxation and social security systems. This explains the region's high levels of private health spending as well as the region's high degree of poverty and increasing catastrophic (out-of-pocket) health spending (World Bank, 2016). This could also explain the region's poor health infrastructure and personnel, as little resources are allocated to health-related infrastructure provision and maintenance (WHO, 2010). Furthermore, majority of nations in the region have inadequate public health insurance systems, with most health-care systems reliant on ability-to-pay (Ataguba & Goudge, 2012).

A country's health system is said to be effective if its citizens' health status and results are better than those of a similar country with equivalent health-care resources. Infant, under-five, and maternal death rates are major health outcomes on which this study focuses. The infant mortality rate is the number of newborns (under one-year-old) who die per 1000 live births in a particular year. The rate of neonatal and post-neonatal mortality is included in infant mortality. The neonatal mortality rate refers to deaths in the first four weeks of life, which are usually caused by difficulties during pregnancy, such as congenital abnormalities and low birth weight, as well as issues during delivery, such as birth injuries and asphyxia, and problems after delivery, such as measles and other infections. The rate of post-neonatal death is linked to maternal and some variables such as poverty, insufficient health care, infectious illnesses, and traumas (UNICEF, 2011). Under five mortality rate is the probability that a child will die between birth and exactly five years of age per 1000 live births. Diarrhea, malaria, pneumonia, and other illnesses are among the leading causes of death. The majority of these disorders are caused by poverty, civil war, and malnutrition, all of which are prevalent in the African continent. The

likelihood that a woman may die during childbirth is known as the maternal mortality rate. This is calculated as the number of female deaths per 100,000 live births from any cause related to pregnancy and childbirth. Pregnancy-related mortality account for more than half a million deaths each year, with the majority of these deaths occurring in developing countries (WHO, 2012). This is mostly due to lack of access to emergency care, inadequate health care, and family planning procedures.

The infant under-five, and maternal mortality rates are serious concerns, particularly in developing countries, and have drawn the attention of various stakeholders and researchers. The burden of mortality and morbidity among the poor is commonly regarded as one of the world's most pressing public health issues, and it has become a significant worldwide concern. This was expressed in the Millennium Development Goals, and is now mirrored in the 2030 Agenda for Sustainable Development Goals. As a result, UNICEF and the World Bank have made child mortality reduction a priority in their future programs (UNICEF, 2019). According to UNICEF, (2019) over 29,000 children under the age of five die every day, or 21 every minute, primarily due to preventable causes. The majority of these deaths occur in poor nations such as Nigeria, Ghana, and Mali.

The main objective of this paper is to investigate the impact of health expenditure on maternal and child mortality in selected African countries at different income level by disaggregating health care spending into public and private. This paper contributes to the existing literature by examining the link between health expenditure and health outcome in African countries at different income level unlike previous studies such as Anyanwu and Erhijakporet (2015) who concentrated their research only in sub-Saharan African countries, Novignon, Olakojo and Nonvignon (2012) in East Africa, Zounkifirou et al. (2021) in India, and other researchers in specific countries. This study considered 39 African countries based on World Bank classification. The classification of the countries based on income level was given by World Bank upon which the analysis was carried out.

2. Literature Review

Literature showed that the relationship between health expenditures and health status has variety of outcomes. The health production function model (Wang, 2008) and the human capital model (Wang, 2008) are two theoretical frameworks that are frequently used in making analysis

in this area. Health spending is one of the most important aspects in the creation of health care. According to Musgrove et al. (1996), on the health expenditure and health outcome nexus, health expenditure has no impact on health outcomes. Similarly, Filmer and Pritchett (2000) found that healthcare spending does not appear to be a key determinant of health status. Based on these studies, public health expenditures have no impact on newborn mortality when using infant mortality as a measure of health outcome. Thus, this study argues that an increase in health status as a result of a decrease in infant mortality is explained by certain characteristics such as income, women's level of education, and the degree of ethnolinguistic fragmentation, not by the amount of public health spending. Similarly, Kim and Moody (1992) and Burnside (1998) have reached the same result. For instance, Kim and Moody (1992) concluded that health expenditure as a whole does not significantly contribute to changes in infant mortality rates, using a sample of 117 countries from the industrialized developing and underdeveloped worlds. In comparison to socioeconomic resources, health spending makes a minor contribution. In low-resource nations around the world, this negligible link between health expenditure and infant mortality has also been investigated (Burnside, 1998).

Some studies have also shown a significant positive link between public health spending and health outcomes around the world such as Jaba et al. (2014), Rezapour et al. (2019) and Thomas (2020). Jaba et al. (2014) used data collected for 175 world countries classified by geographic location and income level from 1995 to 2010 to examine the association between life expectancy at birth and health expenditures. The result showed that health expenditures and life expectancy have a significant positive association. However, country effects are considerable, indicating that there are major variations across countries around the world. Between 2010 and 2017, Thomas (2020) identified a positive association between overall health expenditure and health outcomes in 217 nations around the world. He further identified that public health spending has a large positive impact on infant and under-5 death rates; nevertheless, any changes in life expectancy is negligible. In addition, private health spending has a considerable positive influence on life expectancy; any change in infant and under-5 mortality rates is negligible. This is in contrast with the study of Maruthappu et al. (2015) that indicates a significant negative relationship between government health expenditure and health outcomes. Using 176 countries covering the years 1981 to 2010, the study also showed a significant negative relationship

between government health care spending and health outcomes measures (neonatal, post-natal, and under five) mortality rate.

A study by Rana and Goli (2017) covered the period of 1995 to 2013 to evaluate how public and private health spending affect child mortality in 146 developing countries. Random effects model results found that total health care spending has a considerable negative impact on child mortality. The study has linked public spending to lower child mortality while private spending remained unlinked but serves as a supplement to public spending on child care. According to the study, spending on health care by the government reduces the risk of child death in both absolute and relative terms. Another study used data from 1990 to 2010 to examine the impact of maternal and child health outcomes on economic growth in 180 higher and lower middle income countries. The study found that in 105 nations, under-five mortality and economic growth have a bi-directional association, while maternal mortality and economic growth have a bi-directional relationship in 68 countries (Amiri & Gerdtham, 2013). Furthermore, using data of 133 low and middle-income countries covering the period of 1995, 2000, 2005, and 2006, Farag et al. (2013) investigated the relationship between health expenditure, health outcomes (infant mortality and child mortality), and the impact of governance. The fixed effect results showed that health spending has a significant effect on reducing infant and under-5 child mortality. The study also discovered that government health spending has a significant effect on reducing infant and child mortality, and the size of the coefficient is dependent on the country's level of good governance, indicating that good governance increases the effectiveness of health services. Evidence from the COVID-19 pandemic, Luong (2020) investigated the influence of health expenditure on health outcomes. The most recent report of the European Center for Disease Prevention and Control (2022) on cases and deaths for 200 nations showed that GDP share of total health expenditure has a considerable negative impact on case fatality rate.

According to Anyanwu and Erhijakporet (2015), health expenditures have statistical significance and beneficial influence on infant mortality. Similarly, under-five mortality for a sample of 47 African nations between 1999 and 2004 using fixed effect and two stage least squares have the same influence. The study also found ethnolinguistic fractionalization and HIV prevalence have positive and significant impact on health outcomes, while larger physician numbers and female literacy had a significant negative impact. However, a study conducted in 45

Sub-Saharan African nations by Novignon and Lawanson (2017) found a negative and substantial association between health expenditure and child health outcomes, with elasticities of -0.11 for infant mortality, -0.15 for under-five mortality, and -0.08 for under-five mortality (neonatal mortality). The cost of public health care was determined to be significantly higher than the cost of private health care. The fixed and random factors, as well as the time frame 1995-2011, were used to estimate positive and substantial lagged effects between health spending and child health.

3. Methodology

The theoretical framework for this research is a model developed by Michal Grossman (1972) to examine the impact of health expenditure on maternal and child mortality in African countries. The key premise of the Grossman model is that health may be considered as a long-term investment that yields a healthy time output. Individuals are thought to inherit a starting stock of health that depreciates with age and can be improved through investment. In this approach, the "shadow price" of health is influenced by a variety of factors other than the cost of medical care (Grossman, 1972). It is shown that the shadow price rises with age if the rate of depreciation on the stock of health rises over the life cycle and falls with education if more educated people are more efficient producers of health. Of particular importance is the conclusion that, under certain conditions, an increase in the shadow price may simultaneously reduce the quantity of health demanded and increase the quantity of medical care demanded.

The model structure has been derived from the Grossman demand for health model (Grossman, 1972). The Grossman model specifies the gross investment in stock of health with the following equation:

$$I_t = I_t(M_t, TH_t, E_t) \dots \dots \dots 1$$

where:

M_t – stands for medical care

TH_t – stands for time input in the gross investment function

E_t – stands for human capital stock

Any change in these variables affects the net investment in health stock. Medical care, however, being the most important market good component of the gross investment function, is related with prices and expenses. As a result, when all other factors are held constant, higher medical care usage is associated with higher health care expenditure (HE), and vice versa.

Guided by Grossman (1972), (Wagstaff, 1986), and other empirical literature on the subject matter, we present our health outcomes model as given below.

$$Y_{it} = f(HE_{it}, X_{it}), t = 1, 2, 3 \dots T \dots \dots \dots 2$$

where Y_{it} is a vector of the two dependent variables, i.e., health outcome measure at time t . The health outcome measures are child mortality rate (CMR) and maternal mortality (MMR). HE_{it} is the public and private health expenditure and X_{it} is a vector of other factors influencing health status or outcomes at time, i implies individual countries.

3.1. Econometric Techniques

a. Cross sectional dependence Test

Cross-sectional dependence is one of the key problems with panel data analysis. As a result, a test of cross-sectional dependence is critical in deciding which econometric technique to use in the research. Cross-section dependence occurs when the error terms of nearby units (country, corporation, or state) are correlated, which can happen as a result of spillover effects (Wooldridge, 2011) or unobserved shared causes (Pesaran, 2006). Many earlier research have looked into the issue of cross-section dependence in panel data and warned against overlooking it (Chudik et al., 2011). The problem can make the unit root test challenging (Bai & Ng, 2010) resulting in erroneous estimations and bias standard errors. The dependence could be caused by a number of factors, including geographic correlation, distance, and common unobserved elements.

This study used four well-known cross-sectional dependency tests: BP LM (Breusch & Pagan, 1980), scaled LM (Pesaran, 2004) CD and biased-corrected scaled LM (Baltagi et al., 2012).

Breusch and Pagan (1980) propose the following model to investigate cross-sectional dependence among panel data:

$$CDBp = \sum_{i=1}^{N-1} \sum_{j=i+1}^N \widehat{p}_{ij}^2$$

Pesaran (2004) provides the following LM statistics to overcome the constraints of the above:

$$CDlm = \sqrt{1/N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (\widehat{p}_{ij}^2 - 1)$$

If the cross-sectional size is bigger than the time dimension, Pesaran (2004) suggests using the following test statistic instead.

$$CD = \sqrt{2T/N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \widehat{p}_{ij}^2$$

From the simple asymptotic bias correction, the scaled LM test as recommended by Baltagi et al. (2012) is:

$$CDbc = \sqrt{1/N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (\widehat{p}_{ij}^2 - 1) - N/2(T-1)$$

Where \widehat{p}_{ij} denotes a correlation between the errors. H_0 : no cross-sectional reliance is the null hypothesis, while H_1 : cross-sectional dependence is the alternative hypothesis.

3.2. Panel unit root test

The variables' stationarity was investigated. Because of the consideration of cross-sectional panel data, the study employed the cross-sectional augmented Dickey-Fuller (CADF) test as described by Pesaran (2007) under the following equation.

$$\Delta x_{it} = a_i + p_1 x_{it-1} + \delta_1 \bar{x}_{t-1} + \sum_{j=0}^n \eta_{ij} \Delta x_{it-j} + \sum_{j=0}^k \Psi_{ij} \Delta x_{it-j} + e_t$$

Where, \bar{x}_{t-1} and $\Delta \bar{x}_{t-1}$ indicate the cross-sectional averages of lagged levels and first difference individual series respectively.

3.3. Panel data Regression

The impact of health expenditure on maternal and child mortality in African countries was analyzed at each income level using fixed effect model. The country fixed effects model used in this study is the following:

$$HOit = \alpha_0 + \alpha_1 HE + \alpha X_{it} + \gamma_i + \varepsilon_{it}.$$

Where HOit implies the dependent variables (maternal and child mortality), HE is the private and public health expenditure, Xit is the other explanatory variables used in the study. i represents the country identifier, $i=1, \dots, 39$; t represents the time identifier, $t=1, \dots, 17$; α_0 is the intercept of the fixed effects model; ε_{it} is the error term of mean equal to 0.

3.4. Data and Variables used

The data for this study are annual for 39 countries for the period of 2000 to 2017. The source of the data set is the World Development Indicators (www.ourworldindata.com). It was analyzed using STATA 13 and EVIEWS 11.

The empirical rationale for selecting variables is mainly on the basis of the data availability, past and existing literature. The data on maternal and child mortality were accessed as the health outcomes following Chirwa (2019), Yaqub et al. (2012), Novignon et al. (2012), Frank (2020) and others; public and private health expenditure were considered following Issa and Ouattara (2012), Rezapour et al. (2019), Luong (2020) and others; adolescence fertility following (Goli, 2017) and others; Dhrifi (2018), Weibo and Yimer (2019) and other researchers; urbanization, and incidence of malaria following Kilanko (2019).

The study used maternal and child mortality as dependent variables while immunization, urbanization, incidence of malaria, adolescence fertility, government and private health expenditure were used as independent variables. Immunization rate is used as a proxy to measure the effect of the use of preventive health care services on health outcomes such as child and maternal mortality and increase in immunization is expected to reduce maternal and child mortality. Urban population as a measure of urbanization shows the percentages of population leaving in urban areas, the coefficient is expected to be negative because increase in urbanization lead to increase in health facilities, which will improve health outcomes. Incidence of malaria increases child and maternal mortality, which is expected to be positively related to health

outcomes. Marriages of women during the adolescent period also affect the physical growth of their children. Domestic general government health expenditure as a percentage of Gross Domestic Product is used and private health expenditure as a percentage of current health expenditure are expected to reduce maternal and child mortality.

4. Results and Discussion

4.1. Summary statistics

Table 1 shows the summary statistics for all the variables, indicating that maternal mortality has an average value of 559.67 in Africa while child mortality shows a mean value of 95.22 per 1,000 population during the period of analysis. The average values of private and public health expenditure were 50.58324 and 1.5738, respectively.

Table 1

Summary statistics

Variables	Obs	Mean	Stan. Dev	Min	Max
Maternal Mortality	702	559.6795	332.7226	37.000	2480.00
Child Mortality	702	95.22991	42.51207	16.800	227.700
Govt.Health Exp	702	1.5738	0.952142	0.145509	5.27504
Priv.Health Exp	702	50.58324	18.01641	8.465190	88.1087
Adolescence fertility	702	114.3147	46.33564	9.68000	46.33564
Immunization	702	72.69516	17.38852	16.0000	99.0000
Incidence of Malaria	702	246.5244	167.3349	0.0000	589.32
Urbanization	702	37.65372	15.09190	8.917568	90.70725

4.2. Cross sectional Dependence Test

The results of four cross-sectional dependence tests are listed in table 1. All variables, with the exception of malaria incidence (for which values are unavailable), confirmed the significance in all four tests. As a result, the null hypothesis of cross sectional independence is rejected at 1% for all variables, indicating that cross sectional dependence exists between the series. It is crucial to analyze the stationarity of the variables included when cross sectional dependence exists.

Table 2*Cross sectional dependence test*

Variables	Breusch Pagan	Pesaran scaled LM	Bias-corrected	Pesaran CD
	LM		scaled LM	
Maternal Mort.	11205.97***(0.000)	271.84***(0.000)	270.69***(0.000)	105.12***(0.000)
Child Mort.	12765.83***(0.000)	312.3595***(0.000)	311.21***(0.000)	112.92***(0.000)
Govt.Health.Exp	3443.43***(0.000)	70.19***(0.000)	69.061***(0.000)	1.696*(0.094)
Priv.Health Exp	3469.71***(0.000)	70.88***(0.000)	69.73***(0.000)	9.397***(0.000)
Adolec.Fertility	10486.6***(0.000)	253.15***(0.000)	252.007***(0.000)	79.92***(0.000)
Immunization	4015.97***(0.000)	85.07***(0.000)	83.92***(0.000)	41.82***(0.000)
Incidence of Mal.	NA	NA	NA	NA
Urbanization	8860.7***(0.000)	210.91***(0.000)	209.77***(0.000)	14.627***(0.000)

Note: ***, **, and * denote significant level at 1%, 5%, and 10% respectively. Source: Authors computation

4.3. Panel unit root Test

Due to the presence of cross-sectional dependence, a cross sectional ADF unit root was used utilizing the methods of Pesaran (2007). The results in Table 3 revealed that maternal mortality, child mortality, immunization, and malaria incidence are all stationary at level when using the constant while government health spending, private health spending, adolescent fertility, and immunization are all stationary at first difference.

Table 3*Panel unit root test*

Variables	Constant			Order of Integration
	Level	p-value	1 st Difference	
Maternal Mort.	-1.2486	0.010	-	I(0)
Child Mort.	-14.3340	0.000	-	I(0)
Govt.Health.Exp	1.4691	0.9291	-9.97266	I(I)
Priv.Health Exp	-0.13060	0.4480	-9.30318	I(1)
Adolec.Fertility	9.23731	1.0000	-5.73738	I(1)
Immunization	-2.88651	0.0019	-	I(0)
Incidence of Malaria	-7.7396	0.0000	-	I(0)
Urbanization	4.07745	1.0000	-9.5061	I(1)

4.4. Regression result

Table 4

Impact of health expenditure on Child mortality

Variables	Low income	Lower middle income	Upper-middle and high income
Govt. Health Exp	-2.576 (1.90)	0.554 (1.57)	-2.668 (1.99)
Priv. Health Exp	0.237* (0.12)	-0.349*** (0.10)	-0.339** (0.15)
Adolec. Fertility	1.204*** (0.11)	1.374*** (0.09)	1.391*** (0.24)
Immunization	-1.030*** (0.12)	-0.264*** (0.07)	-1.027*** (0.19)
Incidence of malaria	0.048*** (0.012)	0.092*** (0.01)	0.061*** (0.02)
Urbanization	0.3939 (0.29)	-1.384*** (0.34)	-2.652*** (0.91)
Observations	342	252	108
R-Squared Within	0.6859	0.8549	0.7531
Between	0.4838	0.6202	0.2334
Overall	0.4392	0.6225	0.2372

*Note: ***, **, and * denote significant level at 1%, 5%, and 10% respectively.*

The fixed effect results presented in tables 4 and 5 show the impact of health expenditure on maternal and child mortality in African countries at different income levels. All the coefficients with standard error in parentheses and the values of R-squared were reported. From table 4, child mortality is not significantly influenced by government health expenditure at all income levels. In other words, government health spending has no impact on reducing child mortality in African countries at all income level. Private health expenditure has significant negative impact on reducing child mortality in lower middle income and upper income countries in Africa. Specifically, a one percent increase in private health expenditure will lead to decrease in child mortality by 0.35 per 1000 population and 0.34 per 1000 population in lower middle income and upper income countries, respectively. Private health expenditure has no impact on reducing child mortality in low income countries. This is a result of the nature of economic expansion and health spending among the countries in line with the findings of Chirwa (2019)

that child mortality is not significantly explained by public health expenditure. Thus, increase in private health expenditure lowers child mortality rate in Malawi. This is also a result of the prevalence of corruption that worsen the health outcomes.

Furthermore, adolescence fertility, immunization, and incidence of malaria have significant impact on reducing child mortality at all income levels. Increase in urbanization reduces child mortality at all income levels except in lower income countries. This implies that urbanization helps provide available infrastructure and ways of tackling diseases that help society remain healthy, leading to reduction in infant and child mortality to the barest minimum. The insignificant value of urbanization in low income countries has do with the absence of basic infrastructure and health facilities resulting to increase in child mortality. This result is similar to the finding of Anyanwu and Erhijakpor (2009), Novignon et al. (2012), and Kilanko (2019).

Table 5

Impact of health expenditure on maternal mortality

Variables	Low income	Lower middle income	Upper-middle and high income
Govt. Health Exp	-25.92* (13.76)	-21.24*** (7.88)	9.690 (8.53)
Priv. Health Exp	0.127 (0.89)	1.68*** (0.48)	-0.98 (0.63)
Adolec. Fertility	7.59*** (0.78)	7.24*** (0.44)	4.01*** (0.99)
Immunization	-4.86*** (0.84)	-2.28*** (0.33)	-4.35*** (0.85)
Incidence of malaria	0.077 (0.10)	0.11* (0.07)	0.35*** (0.93)
Urbanization	5.27** (2.08)	-12.72*** (1.71)	-5.86 (3.91)
Observations	342	252	108
R-Squared Within	0.571	0.83	0.68
Between	0.07	0.40	0.018
Overall	0.11	0.43	0.0047

*Note: ***, **, and * denote significant level at 1%, 5%, and 10%, respectively.*

Table 5 shows that government health expenditure has significant impact in reducing maternal mortality in low income and lower middle income countries while in high income countries has no significant impact on maternal mortality. A one percent increase in government health expenditure will decrease material mortality by 25.95 and 21.24 per 100000 live birth in lower and lower middle income countries, respectively. Private health expenditure has

significant impact on reducing maternal mortality only in upper income countries but is statistically insignificant. This result is in line with the findings of Akinci et al. (2014) and Novignon (2017). Furthermore, adolescent fertility, immunization, and urbanization are statistically significant in reducing maternal mortality in both low incomes, lower middle income, and higher income countries. Emmanuel (2018) obtained the same result that urbanization reduces maternal mortality in Nigeria.

Private health expenditure has more impact on reducing child and maternal mortality in lower middle income and upper income countries in Africa. This is a result of high out-of-pocket private health expenditure that becomes prominent in the region and low government health spending. Given the percentage of public health expenditure spent every year by these African countries, the findings show that this expenditure has no impact in reducing child mortality at all income levels. This may be attributed to quality of institutions and governance in these countries.

5. Conclusion and Recommendation

A number of research examined the relationship between health expenditure and health outcomes but arrived at different conclusion. In this study, the impact of health expenditure on maternal and child mortality in African countries at different income level using a panel data from 2000 to 2017 was measured. After cross-sectional dependence and unit root test, the result shows that government health expenditure has no significant impact on reducing child mortality in African countries at all income level. However, the impact on maternal mortality is only in low income and lower middle income countries. Furthermore, private health expenditure has significant impact on reducing child and maternal mortality at all income levels.

This study therefore recommends that government at all income level in Africa, especially low income and lower middle income countries, should provide quality health care services and regular immunization for women and children in order to reduce maternal and child mortality in Africa region.

References

- Baltagi, B. H., Feng, Q., & Kao, C. (2012). A Lagrange Multiplier test for cross-sectional dependence in a fixed effects panel data model. *Journal of Econometrics*, 170(1), 164–177. <https://doi.org/10.1016/j.jeconom.2012.04.004>

- Chirwa, G. C. (2019). *Government health expenditure and health outcomes in Malawi : does governance matter ? Government Health Expenditure And Health Outcomes In Malawi: Does. November 2018.*
- Dhrifi, A. (2018). Health-care expenditures, economic growth and infant mortality: Evidence from developed and developing countries. *Cepal Review*, 125, 71–97. <https://doi.org/10.18356/02c1a26c-en>
- Frank, O. (2020). *Maternal Health Outcome and Economic Growth in Sub-Saharan Africa : A Dynamic Panel Analysis. 14(9), 696–704.*
- Goli, S. (2017). *The Effects of Public and Private Health Care Spending on Child Mortality in Developing Countries Full Paper The Effects of Public and Private Health Care Spending on Child Mortality in Developing Countries First Author : Presenting Author Md Juel Rana Ph. December.*
- Grossman, M. (1972). On the Concept of Health capital and the Demand for Health. In *Journal of Political Economy* (Vol. 80, Issue 2, pp. 223–255).
- Grossman, M. (2004). The demand for health, 30 years later: A very personal retrospective and prospective reflection. *Journal of Health Economics*, 23(4), 629–636. <https://doi.org/10.1016/j.jhealeco.2004.04.001>
- Issa, H., & Ouattara, O. (2012). *The Effect of Private and Public Health Expenditure on Infant Mortality Rates : Does the Level of Development Matter ? 28, 21–37.*
- Kilanko, O. (2019). *The Effects of Health Care Expenditures on Health Outcomes in West Africa : Analysis of Selected 14 Countries from 2000 to 2018. 1–55.*
- Luong, T. (2020). The role of health expenditures in health outcomes : Evidence from the Covid-19 pandemic. *ResearchGate Preprint, May.* <https://doi.org/10.17632/4xmz24r2km.1>
- Maruthappu, M., Ng, K. Y. B., Williams, C., Atun, R., & Zeltner, T. (2015). Government health care spending and child mortality. *Pediatrics*, 135(4), e887–e894. <https://doi.org/10.1542/peds.2014-1600>
- Muurinen, J. M. (1982). Demand for health. A generalised Grossman model. *Journal of Health Economics*, 1(1), 5–28. [https://doi.org/10.1016/0167-6296\(82\)90019-4](https://doi.org/10.1016/0167-6296(82)90019-4)
- Novignon, J., & Lawanson, A. O. (2017). Health expenditure and child health outcomes in Sub-Saharan Africa. *African Review of Economics and Finance-Aref*, 9(1), 96–121.
- Novignon, J., Olakojo, S. A., & Nonvignon, J. (2012). *The effects of public and private health care expenditure on health status in sub-Saharan Africa : new evidence from panel data analysis. 1–8.*

- Rahman, Mohammad, M., & Alam, K. (2020). The nexus between health status and health expenditure, energy consumption and environmental pollution: Evidence from SAARC-BIMSTEC regions. *Research Square*, 1–30.
- Rezapour, A., Mousavi, A., Lotfi, F., & Movahed, M. S. (2019). *The Effects of Health Expenditure on Health Outcomes Based on the Classification of Public Health Expenditure: A Panel Data Approach*. 20(12). <https://doi.org/10.5812/semj.88526>.Research
- Wagstaff, A. (1986). The demand for health: Theory and applications. *Journal of Epidemiology and Community Health*, 40(1), 1–11. <https://doi.org/10.1136/jech.40.1.1>
- Weibo, X., & Yimer, B. (2019). The Effect of Healthcare Expenditure on the Health Outcomes in Sub-Saharan African Countries. *Asian Journal of Economics, Business and Accounting*, 12(4), 1–22. <https://doi.org/10.9734/ajeba/2019/v12i430158>
- World Bank. (2016). *World development indicators dataset*. Washington D.C: *The World Bank*.
- Yaqub, J., Ojapinwa, T., & Rukayat, Y. (2012). *PUBLIC HEALTH EXPENDITURE AND HEALTH OUTCOME IN NIGERIA : THE IMPACT OF GOVERNANCE*. June.
- Zounkifirou, M., Francois, N., Ousseni, M., & Zakariaou, N. (2021). Health Expenditure , Democracy and Child Mortality in Developing Countries. *Journal of Health & Medical Economics*, Vol.7 No.2, 1–5. iMedPub Journals www.imedpub.com