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Exploring the Effectiveness of Healthcare Expenditure in Reducing Maternal Mortality in Nigeria

By

[1]Udeorah Sylvester Alor F., [2]Henrrietta Ogadimma Asuzu-Samuel & [3]Elizabeth Ihuoma Amadi

[1]Department of Economics, Faculty of Social Sciences, University of Port Harcourt-Nigeria
[2]Biomedical Technology, University of Port Harcourt-Nigeria
[3]Department of Political & Administrative Studies, Faculty of Social Sciences, University of Port Harcourt-Nigeria

Corresponding author: slyefavor@gmail.com

Abstract

The high rate of maternal mortality and the need to improve on healthcare delivery necessitated the imperativeness to investigate how healthcare spending (both government and private) affect mortality among women in Nigeria between 1981 and 2022. Time series data were collected from the Central Bank of Nigeria (CBN), World Development Indicator (WDI) and the World Health Organization (WHO). Descriptive statistics and Ordinary Least Squares (OLS) were employed as techniques for data analysis and the results revealed that government budgetary allocation to the health sector has significant negative impact on women mortality rate. This explains the effectiveness of public healthcare spending in improving the health status of women. The results further revealed that private sector spending is not significant in reducing the mortality among women. This could be linked to the low of out-of-pocket healthcare spending which limits its potentials in reducing women mortality level. Given the findings, this study recommended among others for the implementation of an expansionary fiscal policy to improve government spending on health sector, and in so doing reduce mortality among women in Nigeria.

Keywords

Healthcare spending, Out-of-Pocket Spending, Mortality Rate, Women and Nigeria.

1. Introduction

The high rate of maternal mortality in Nigeria has been a major cause of public health concern at both national and international levels (Hussein & Okonofua, 2012). In response to recommendations made by experts and in efforts to address this developmental challenge, Nigeria's Federal Ministry of Health in 2013 approved that all maternal health institutions in the country should periodically carry out maternal death review, surveillance and response (Achem & Agboghoroma, 2014), using the technical guidance document as recommended by the World Health Organization (WHO, 2013). This was updated in 2016 to include perinatal death reviews, while the initiative was retitled Maternal and Perinatal Death Surveillance and Response (MPDSR), to take account of the equally high rates of stillbirth, neonatal and perinatal deaths in the country (WHO, 2017). Essentially, it is hoped that with regular reviews of maternal and perinatal deaths, and an analysis of the causes of deaths, that recommendations could be made that if addressed, would reduce the high rates of maternal and perinatal mortality in the country. This approach was required to address the current lack of substantive data on the circumstances under which maternal and perinatal deaths occur in Nigeria, need to design strategies, policies and programmes at a health systems level to reverse the trend.

The promotion of broad-based economic growth is predicted on the quality of healthcare delivery. This paradigm forms the basis for huge allocation of public fund to the health sector to reduce mortality of the citizenry with a view to increasing their contribution to the overall growth and development of the economy. Like other developing countries of the world, Nigeria has been making financial commitment to the health sector overtime. Funding healthcare in Nigeria integrates the efforts of the government, private sector, nongovernmental organizations (NGOs) and international donors (Enesi *et al.*, 2013). However, public expenditure in the health sector has remained outstanding among other sources of funding. Budgetary allocations from both federal and sub-national (state and local) governments constitute bulk of the allocations to the health sector. These allocations are mainly organized into recurrent and capital expenditure of both the private and public sector, (Adegboye *et al.*, 2015).

Each of the categories of health expenditures has different effects on the health status. Increase in out of pocket health expenditure, which is one of the private health expenditures, increases the number of catastrophic expenditures and may lead to more poverty and high maternal mortality, especially in developing countries. In some countries, governors prefer private health expenditures because, they do not have to pay for people. Therefore, people will pay more in exchange for health (expensive health expenditures), this lead to poverty especially in the less developed countries and low life expectancy since this persons cannot sustainably cater for their health due to its expensive nature. It is noteworthy that one of the health policy targets of Nigeria by 2020 is the reduction or maternal mortality. The extent to which this can be achieved depends on short and medium term fiscal allocations to the health sector to reduce the number or maternal death in Nigeria. Despite upward trends in overall health expenditure over the years, Nigeria is still classified among the countries with high maternal mortality. In the light of the above, this study sought to assess the impact of health care expenditure on maternal mortality in Nigeria.

2. Review of the Related Literature

2.1 Theoretical Literature Review

The theoretical framework for this study is anchored on the Wagner's law of increasing state activity. Wagner (1883) pioneered the Wagner's law if increasing state activities following his findings on the

empirical analysis of the economy of Western Europe at the end of the 19th century. Wagner outlined three reasons for increasing state activities to include growing demand for health and education services by the citizens, provision of enabling environment for business to thrive and the realities of market failure. The excess demand for services such as: health and education over per capita income necessitates government intervention to help in meeting the needs. The provision of conducive environment for economic progress as prescribed by Wagner entails adopting proactive policy actions that increase public spending to ensure protection of the state and the and the administration of justice system. More so, the realities of market failure prompted the intervention if government to engage in capital investment with a view to providing public goods which are prerequisites for effective and efficient functioning of the private sector.

The key assumption of Wagner's law is that increase in real income provides the long-run tendency for public spending to increase relative national income. Magazzino, Giolli and Mele (2015) asserted that Wagner's law reveals that the share of government spending to the gross domestic product tends to increase in the process of economic development. This underscores the role of the state in improving the welfare of citizens and provision for socio-economic infrastructure which Adam Smith describes as social overhead capital. Wagner observed that economic development in societies passing through the process of industrialization is associated with increasing state activity relative to the economy (Magableh, 2006).

Notably, Wagner's view of the government is from the point of an organic entity. Thus the tendency of the state to grow is assumed to be a direct function of the growth of the entire economy. Specifically, the cause of the increase in government activity or infrastructure is assumed to run from the level of overall activity in the economy which is a force for state expansion. As a long-run phenomenon, the effectiveness of Wagner's law in terms of significant results in the long-run period. In conclusion, the Wagner's law will help the Nigerian government to determine when and how to increase its expenditures in the health sector with a view to bringing high life expectancy and overall economic development in the country.

2.2 Conceptual Clarifications

Public healthcare expenditure has been characterized by competing and mixed conceptualizations in both economic and medical literature. The OECD (2001) describes public healthcare expenditure as spending on healthcare incurred from public funds. More broadly, public healthcare expenditure measures government expenditure on the health sector as a percentage of overall government expenditure it encompasses recurrent and capital spending from government budget allocation, external borrowing, grants and social health insurance funds. The World Health Organization (2006) defines public healthcare spending as aggregate expenditure on health as a percentage of the gross domestic product (GDP). Furthermore, government expenditure on healthcare comprises the total outlays by the public sector to procure healthcare services and goods. This spending on health sector cuts across all levels of government including federal, state and local governments. Catlin (2010) asserted that public healthcare expenditure in the National Health Expenditure Accounts (NHEA) encompasses spending on epidemiological surveillance, immunization and vaccination, disease prevention programs, public health laboratories and other similar population oriented health services.

Additionally, Kea *et al.* (2011) described government healthcare spending from domestic sources as spending on health from government revenue and payroll taxes. These exclude external funds channeled to the health sector through the government. Thus, government expenditure on healthcare often involves capital and recurrent expenditure which helps to improve the health conditions of the population. Health expenditure could be either private or public. Maternal mortality rates, according

to (Roberts, 2003), are perhaps a better indicator of the effectiveness of a health system, but they are not measured so accurately and are slow to change. A healthy mother begets a healthy child and if mothers are not properly handled with care before and after pregnancy, they will end up begetting unhealthy children who in the long run affect both the quality and quantity of labour force.

On another note, mothers are stratum of labour force and if mothers die as a result of pregnancy-related problems, unarguably, it will reduce not only the quantity but also the quality of labour force, and this will impact negatively on the aggregate output of an economy. Previous studies on the impact of health expenditure on health outcomes discovered that there is either evidence or no evidence of impact of total spending on health outcomes. In some developed countries like the United States who spent five times more on health than Republic of Korea yet achieves similar health outcome. Maruthapu *et. al.* (2016) found that reductions in government healthcare spending are associated with increased maternal mortality rates in the EU which occur through a variety of mechanisms such as reductions in the number of births attended by skilled health professionals. They also discovered that policies aimed at reducing government healthcare spending, such as the implementation of austerity measures and budgetary cuts tend to worsen maternal mortality in the EU.

2.3 Empirical Literature Review

Using a pooled generalized least square estimation procedure, Cremieux, Ouellette & Pilon (1999) and Kee (2001) examined the relationship between health indicators and total (public and private) per capita spending on health. They regressed indicators of population health status on a number of variables including real per capita public health expenditure using instrumental variables estimation to control for possible simultaneity between health status and public spending on health. They found a statistically significant relationship between health status and both health spending and per capita income.

Using the robust ordinary least square (ROLS) method of estimation, Anyanwu and Erhijakpor (2009) examined the relationship between health expenditure and health outcomes in Africa. In their findings, they realized that health expenditures are statistically significant. The relationship between them is inverse. The study therefore, concludes that an increase in health expenditure will result in corresponding reduction in health outcome ceteris paribus. Similarly, Gottret and Scieder (2006) surveyed eighty-one countries covering mainly low income and middle income countries to determine the link between healthcare spending and socio-economic outcomes. The study utilized a dynamic panel regression method and found that an increase in government health expenditure has a larger impact in reducing under-five mortality and maternal mortality than an increase in education, roads and sanitation. This research is informed and based on the fact that scholars have theorized on the effect of government role on socio-economic development both in developed and developing countries. An increased government role in socio-economic development both in developed and developing countries was highly recommended.

Abdullahi and Abu (2010) explored the empirical relationship between healthcare spending and maternal mortality in Nigeria. The study applied econometric techniques and found that government function of provision of socio-economic goods like defense, roads, education, health and physical infrastructures encourage economic growth. The study further revealed that government expenditure on health and education raised the productivity of labour force and increased the growth of national output.

Filmer and Pritchett (1999) used cross-national data and panel regression model to examine the impact of both public spending on health and non-health factors (economic, educational, and cultural)

in determining child (under-5) and infant mortality among developing countries of the world. The study applied regression analysis and found that the impact of public spending on health is quite small, with a coefficient that is typically both numerically small and statistically insignificant at conventional levels. The estimates imply that for a developing country at average income levels the actual public spending per child death averted is $50,000–100,000. This stands in marked contrast to the typical range of estimates of the cost effectiveness of medical interventions to avert the largest causes of child mortality in developing countries, which is $10–4000. The study, therefore, concludes that ethnic fragmentation is a major factor affecting the impact of healthcare spending on mortality.

3. Materials and Methods

3.1 Research Design

Considering the nature of this study, an ex-post facto design research was adopted. This is considered appropriate in estimating the long term impacts of the underlying explanatory variables on the each of the response variables.

3.2 Model Specification

The functional relationship is shown as follows:

$MMR = f(GHEXP, PHEXP)$ (1)

The mathematical form of the model is specified as follows:

$MMR = \beta_0 + \beta_1 GHEXP + \beta_2 PHEXP$ (2)

The linear econometric form of the model is specified as follows:

$MMR = \beta_0 + \beta_1 GHEXP + \beta_2 PHEXP + U_t$ (3)

The log form of the model is provided as:

$MMR = \beta_0 + \beta_1 Log(GHEXP) + \beta_2 Log(PHEXP) + U_t$ (4)

A Priori: $\beta_1 < 0$ and $\beta_2 < 0$

Where: MMR= Maternal Mortality Rate

GHEXP= Government Health Expenditure

PHEXP= Private Health Expenditure

β_0 = Intercept/Constant Variable

β_1 and β_2 = Parameters to be estimated

U_t = Error term

3.3 Sources of Data

The sources of data for this study are basically secondary. Data were sourced from the annual statistical bulletin of the Central Bank of Nigeria, World Development Indicator (WDI) and the World Health Organization (WHO).

3.4 Method of Data Analysis

The Ordinary Least Square (OLS) estimation technique is employed to analyse the relationship between the dependent and independent variables. This technique is considered appropriate because of its BLUE (Best, Linear, Unbiased Estimator) property. The coefficients, t- statistics, probability statistics, F-statistics, Adjusted R-squared and Durbin Watson (DW) statistics formed the focus of the interpretation of the estimated model. Additionally, the descriptive statistics and post-estimation tests are equally undertaken in this study.

4. Results and Discussion

4.1 Descriptive Statistics

The descriptive statistics for each of the variables in the model are provided in Table 1.

Table 1: Summary of Descriptive Statistics

	Maternal Mortality (per 1,000 female adults)	Government Health Expenditure (N Billion)	Domestic Private Health Expenditure per Capita ($ US)
Mean	363.90	76,704.38	50.73
Maximum	393.74	272,604.50	79.83
Minimum	328.41	190.20	11.00
St. dev.	16.61	95,930.23	22.38

Source: Author's Computation using EViews 12.

From Table 1, the average maternal mortality in Nigeria is approximately 364 per 1,000 female adults. The maximum maternal mortality in Nigeria is approximately 394 per 1,000 female adults. The minimum maternal mortality in Nigeria is approximately 328 per 1,000 female adults. A standard deviation of 16.61 indicates that there has not been a significant variation in maternal mortality in Nigeria. This further implies that there has not been improvement in the reduction of the number of deaths among women in Nigeria. It, therefore, follows that maternal mortality in Nigeria has remained a household menace over the years. Secondly, the average amount spent by the Nigerian government on healthcare is approximately ₦76.704 billion yearly. The maximum amount ever spent by the Nigerian government on healthcare is ₦272.606 billion during a particular year. The Nigerian government also spent as low as ₦0.190 billion on healthcare. A standard deviation of 95,930.23 shows that there has been a significant variation in spending on healthcare by the Nigerian government over time. This further implies that the Nigerian government has not been consistent in its spending to the health sector during the period under review. Lastly, the mean amount spent by each individual Nigerian on healthcare is US $50.73 annually. The maximum amount ever spent by each individual Nigerian on healthcare is US $79.83 during the study period. Each Nigerian also spent as low as US $ 1100 on healthcare. A standard deviation of 22.38 indicates that there has not been any significant variation in domestic private health expenditure by each Nigerian over time. This further implies that domestic private health expenditure among Nigerian has not increased significantly during the period under review.

4.2 Model Estimation

The regression result depicting the relationship between healthcare expenditure and maternal mortality is summarized in Table 2:

Table 2: Summary of the OLS Regression Results

Dependent Variable: MMR			
Variable	**Coefficient**	**t-Statistics**	**Prob.**
C	402.2526	77.23543	0.0000
LOG(GHEXP)	-0.000186	-3.281420	0.0047
LOG(PHEXP)	-0.227463	-1.044749	0.3117
	R-squared = 0.8681 |	F-statistics = 52.67 |	Durbin-Watson stat = 1.77

Source: Author's Computation using EViews 12.

The result in Table 2 showed that government healthcare expenditure has a negative but significant impact on mortality. The coefficient of government healthcare expenditure is -0.000186. This implies that a unit change in government healthcare expenditure will led to a decrease in mortality by 0.000186 per 1,000 female adults. The statistical significance of the coefficient of government healthcare expenditure is determined based on the t-Statistics and probability. First, the absolute value of the t-Statistics for the coefficient of government healthcare expenditure is approximately 3.28. This shows that the calculated t-statistics is greater than the critical value of approximately 2.00. Secondly, the probability is approximately 0.00. This shows that the calculated probability is less than the 0.05 significance level. It is deduced from the t-Statistics and probability that the coefficient of government healthcare expenditure is statistically significant. Furthermore, that private healthcare expenditure has a negative and non-significant impact on mortality. The coefficient of private healthcare expenditure is -0.227463. This implies that a unit change in private healthcare expenditure led to a decrease in mortality by 0.227463 per 1,000 female adults. The statistical significance of the coefficient of private healthcare expenditure is determined based on the t-Statistics and probability. First, the absolute value of the t-Statistics for the coefficient of private healthcare expenditure is approximately 1.04. This shows that the calculated t-Statistics is less than the critical value of approximately 2.00. Secondly, the probability of the coefficient of private healthcare expenditure is approximately 0.31. This shows that the calculated probability is greater than the 0.05 significance level. Based on the t-Statistics and probability, the coefficient of private healthcare expenditure is not statistically significant.

The value of the coefficient of determination (R-squared) is approximately 0.87. This implies that 87 percent of the variation in mortality among women is explained by the healthcare financing options under consideration. Hence, the explanatory power of the model is high. The remaining 13 percent is accounted for by other healthcare financing options not included in the model. The value of the calculated F-statistics is approximately 52.67. The calculated F-statistics value is greater than the critical value of 4.00. This implies that the 'mortality among women' model is statistically significant. Moreover, it also shows that the healthcare financing options are jointly significant in predicting mortality among women in Nigeria. Lastly, the Durbin Watson statistic of 1.77 indicates that there is absence of serial correlation in the model

5. Concluding Remarks

This study examined the effect of healthcare expenditure on maternal mortality among Nigerian women during the period 1981-2018. Both the government and private health expenditure were considered in the study. Maternal mortality rate was used to proxy mortality (dependent variable). Time series data used for the trend and econometric analysis were collected from the World Development Indicator (WDI) published by the World Bank, Central Bank of Nigeria (CBN) Statistical Bulletin, and the World Health Organization (WHO). Based on the findings, this study concludes that government poor allocation to the healthcare sector has made reduction of mortality among women difficult in Nigeria. Another conclusion drawn from this study is that the low level of income among Nigerians, especially women has made private spending on healthcare low and as, such there has not been a significant reduction in mortality among women due to low demand for quality healthcare services. To this end, this study recommends for the implementation of an expansionary fiscal policy in government spending on health. This will go a long way to improve government spending on health, and in so doing reduce mortality among women in Nigeria. It is also recommended that household health spending should also be encouraged through affordable health service policy.

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