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IS HEALTH TRULY WEALTH? RELATIONSHIP AMONG HEALTH EXPENDITURE, HEALTH OUTCOME, AND LABOUR PRODUCTIVITY IN NIGERIA

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ABSTRACT

Healthy workers are critical in enhancing productivity and hence the national income of a nation. It is, however, pertinent to note that despite the increase in government spending on health care provision in Nigeria, the health system is in shambles with serious threat to productivity and a drag on overall economic growth. This study examined the interaction among health expenditure, health outcome, and productivity in Nigeria with the intention of empirically determining the feedback effects among the variables in the country. The study explored annual time series secondary data covering 1996 to 2020 on health expenditure, life expectancy (health outcome measure), labour productivity, and government efficiency, with data sourced from the World Development Indicator. The stability of the relationship was established through the use of AR roots tables and graph stability test, and Vector Auto Regression (VAR) technique of analysis was adopted in the analysis of the study. The study found that efficiently appropriated health expenditure allocation could produce good health outcome and consequently increased labour productivity which is paramount in achieving increased national income. The study recommends transparency and accountability in the appropriation of government health spending so that rising labour productivity can be attained through an improved health outcome of citizens thereby enhancing the national income

Keywords: health, wealth, productivity, health expenditure

INTRODUCTION

It is often said that health is wealth, implying that a healthy worker or nation is capable of enhancing the productivity and consequently the aggregate output and income of the nation. The gain in the output and income could be as a result of less lost time due to increased efficiency of healthy workers. Bloom and Canning (2000) identified the channels through which improvement in people's health can enhance their productivity. Healthier individuals, according to them, may earn higher productivity at work when more time are spent at work as there would be less time of absenteeism from work or early retirement due to sickness. Also, when healthier individuals invest more in their own education, and when in expectation of a

longer life people save more for the future thereby increasing the funds which are available for investment in the economy.

In more affluent developed countries, they have a firm belief that when a higher proportion of the budget is allocated towards health improvement, they receive higher productivity results and hence better economic performance. It is noted that about 50 percent of economic growth differentials between developed and developing nation are attributable to ill-health and low life expectancy of the latter (World Health Organization, 2005). Considering the importance of health care in the economic developmental process of nations, the different countries of the world have witnessed fundamental transformations in their health care systems in terms of structural designs, institutional regulations, and socio-economic and demographic dimensions (Okunade & Osmani, 2018). Nigeria operates both orthodox and traditional health care delivery systems, and the provision of health care in the country remains the responsibility of the three tiers of government (the federal, state, and local government). The primary health care system is managed by the local governments (LGAs), the secondary health care system by the Ministry of Health at the state level, and the tertiary health care by teaching hospitals and specialist hospitals at the federal level.

Over the years, there have been fluctuations in the annual health budget from the Nigerian government.. According to Oni (2014), both the capital and recurrent expenditures on health have witnessed significant increase from 1970. Nigerian government capital expenditure on health was shown to have witnessed an upsurge from the ebb of ₦ 7.3 million in 1970 to ₦ 126.75 in 1987, and ₦ 297.96 million in 1988. By 1993, it was ₦ 586.2 million, from where it significantly rose to ₦ 17717.42, ₦ 33396.97 and ₦ 34647.9m in 2003, 2005 and 2007 respectively. (The current exchange rate is US1 to 459₦.) This also increased from ₦ 64922.9 in 2008 to ₦ 98211.51 in 2010. Following the same pattern, the recurrent expenditure on health increased from 12.48 million in 1970 to ₦ 52.79 million and 134.12 million in 1979 and 1986 respectively (Oni, 2014). This, however, reduced significantly to ₦ 41.31m in 1987 before it rose steadily from ₦ 422.80 in 1988 to ₦ 24522.27m in 2001. Between 2002 and 2010, the recurrent expenditure has witnessed an upsurge from ₦ 40621.42 to ₦ 77657.43 (Oni, 2014). The proposed health expenditure allocation for the year 2022 was ₦16.39 trillion, accounting for just 4.34 per cent of the budget for the year. This translates to ₦3453 per capita, using the estimated 206 million population (Amata, 2021). The above pattern and trend obviously indicate that expenditure on health has generally been on the increase, but what health costs can it cover with the growing population and upsurge in medical care costs, as queried by Amata, (2021). The percentage allocation also falls below the 15 percent benchmark of health sector budget allocation as recommended by the African Union (2001).

It is, however, pertinent to note that despite all the increase in government spending on health care, coupled with bilateral and multilateral assistance in Nigeria, the health system is in shambles. The health indicators indicated that Nigeria's infant and under-five mortality rates are close to the highest in the world with an extremely high maternal mortality (Obansa & Orimisan, 2013). Aside from South Africa, Nigeria has the highest HIV/AIDS infection rate in the world. The tuberculosis infection rate in Nigeria is the fourth highest in the world. Furthermore, the HDI value of 0.47 put the country in 153rd position among 187 countries on

the HDI ranking in 2012 (Olarinde & Bello, 2014). The high risk of various health related issues also tended to impede the level of labour's productivity of labour in the country. National Bureau of Statistic's report on Nigerian Labour productivity stated that, though productivity was stable at a time, it started to experience some downward trajectory right after 2015. Specifically, it rose from about ₦ 471.94 in 2011 to ₦ 718.14 in 2015, which represents a 52.5% increase in labour productivity over the 5-year period and a 12.2% between 2014 and 2015 (National Bureau of Statistics, 2016). However, labour productivity went down to about ₦ 605 with the next few years being volatile. The report noted that the constraints on productivity of labour and other factor inputs have continued to put a drag on overall economic growth, with the productivity challenges being a serious threat to realising the country's full growth potential.

LITERATURE REVIEW

Human capital theory hypothesises that an increase in a person's or nation's accumulated stock of health can raise the productivity level in both market and non-market activities. This theory recognizes two forms of human capital: education and health capital. According to Grossman (2000), health capital determines the total amount of healthy time that is available for productive activities, while education (knowledge) capital determines the productivity of the time spent on productive activities. The healthy time is gained as a result of reduced absenteeism from work due to ill health. Capital health like others is assumed to depreciate over time with increase in age, requiring investment in the form of nutrition and health care provision to be restored to maintain the health stocks. At the individual level, health capital can increase labour productivity through enhanced physical energy and mental acuity, reduced work absenteeism, and through a longer career as morbidity decreases and longevity increases. The individual increases in output can translate into increases in the aggregate labour productivity (Tompa, 2002).

Many of the earlier studies have examined how improved health could enhance economic growth. Among these in Nigeria is Oni (2014) who employed multiple regression analysis to study the impact of health expenditure in Nigeria on the growth of the economy for 1970 to 2010. His results showed a positive relationship among economic growth, total health expenditures, and the labour force productivity in Nigeria; however, economic growth did not appear to increase life expectancy rate. Oni's results were consistent with some earlier studies (Odior, 2011; Dauda, 2004; Chete and Adeoye, 2002; and Adeniyi and Abiodun, 2011) despite using different methodologies. However, Ogundipe and Lawal (2011) found a negative relationship between economic growth and total health expenditures. Ugwu *et. al.* (2021) examined the possible effect of health outcome on labour productivity in Nigeria using Auto Regressive Distributed Lag (ARDL) bound cointegration test technique on Nigerian time series data from 1970 to 2018. Data on life expectancy variable was also used as a proxy health indicator. The study found that improvement in life expectancy significantly increased labour productivity. Cole and Neumayer (2004), through a panel data on one hundred and twenty developing countries for the period of 1975 to 2000, found that health expenditure affected

growth only within the same period of spending, while lagged health expenditures appeared to have no effect on growth.

Some studies have also concentrated on the effect of public expenditure on health outcome. Anyanwu and Erhijakpor (2007) examined the linkage between African countries' government health expenditures and infant mortality and under-five mortality between 1999 and 2004, and showed that health expenditure was a significant determinant of infant mortality and under-five mortality in African countries. Remman et al. (2011), however, found that life expectancy and literacy rate were negatively related with healthcare expenditure in the short and long run.

Meanwhile, Filmer and Pritchett, (1997) had found that public health spending was not a significant determinant of child mortality rate, but rather, major differences in child mortality across countries was mainly determined by poverty, income inequality, female education, and other socio - cultural factors. Murthy and Okunade, (2009) also found that maternal mortality rate had no relationship with health expenditure in African countries.

Some of the studies that were conducted in Nigeria on the effect of healthcare expenditure on health sector outcomes have advanced the role of government in promoting institutions to achieve good health outcomes. Studies such as those by Gupta et al. (2001) and Kaufmann *et al*., (1999) have alluded to the fact that good governance indicators are capable of pinpointing strong and negative impact on child and infant mortality, while corruption could lead to high child and infant mortality rates. Lewis (2006) further supported this when he concluded that where good governance was lacking, effectiveness of healthcare delivery and returns to investments in health spending were in jeopardy. Yaqub et al. (2010), using data on Nigerian public health expenditure and governance, examined how the effectiveness of public health expenditure was determined by governance in Nigeria. Adopting both the ordinary least squares and the two-stage least squares, they found that public health expenditure had negative effect on infant and under-5 mortality rates when there was corruption in government. Olarinde and Bello (2014), employing autoregressive distributed lag (ARDL) and VECM granger non-causality techniques, stressed also that good quality institutions contributed positive impact of public health expenditure on health sector indicators. They claimed that good institutions are important determinants of positive health outcome. Hu and Mendoza (2010) used panel data on 136 countries over the period of 1960-2005 to examine the determinants of infant and child mortality rate in developing countries and how public policy might interact with them. The results consistently found that governance matters in enhancing child health through public spending.

As a way of departure from the above reviewed studies, this particular study was thus designed to examine the interactive effects of health spending, health outcomes, institution, and labour productivity in Nigeria.

METHODOLOGY

Annual time series data on Nigeria were sourced from the World Development Indicator database on Labour Productivity, Life Expectancy (Proxy of health indicators), Health Expenditure, and Government Efficiency. The data spanned over the period of 1996 to 2020.

A Vector Auto Regression (VAR) model was constructed to analyse the relationship. A VAR model is an econometric model for capturing the evolution and the interdependencies among multiple time series that generalize the univariate AR models. It describes the evolution of a set of k variables over the same sample period as a linear function of only their past evolution.

Table 1: The measurement of variables and sources of data

Variables	Measurements	Sources of data
Labour productivity (LPROD)	Labour productivity is measured as the ratio of GDP in a particular year to the labour input employed in that same year. Labour productivity refers to the quantity of labour that is required to produce a unit of output.	World Development Indicator (WDI)
Health expenditure (HEEXP)	This is measured as health expenditure as percentage of GDP.	World Development Indicator (WDI)
Government efficiency index (GEFF)	The index is with the value of -2.5 when weak, and 2.5 when strong. It measures the perceptions of the quality of public services, the quality of the civil service, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Development Indicator (WDI)
Life expectancy (LEXP)	Life expectancy variable measures the number of years a new born infant from birth would live if prevailing patterns of mortality at the time were the same throughout his life.	World Development Indicator (WDI)

Source: authors' compilation 2022

Model specification

The framework for the VAR model is specified below:

$$LPROD_t = \alpha_0 + \alpha_1 LPROD_{t-j} + \alpha_2 \text{HEEXP}_{t-j} + \alpha_3 \text{GEFF}_{t-j} + \alpha_4 LEXP_{t-j} + \varepsilon_1$$

$$\text{HEEXP}_t = \beta_0 + \beta_1 LPROD_{t-j} + \beta_2 \text{HEEXP}_{t-j} + \beta_3 \text{GEFF}_{t-j} + \beta_4 LEXP_{t-j} + \varepsilon_2$$

$$\text{GEFF}_t = \mu_0 + \mu_1 LPROD_{t-j} + \mu_2 \text{HEEXP}_{t-j} + \mu_3 \text{GEFF}_{t-j} + \mu_4 LEXP_{t-j} + \varepsilon_3$$

$$LEXP_t = \Psi_0 + \Psi_1 LPROD_{t-j} + \Psi_2 \text{HEEXP}_{t-j} + \Psi_3 \text{GEFF}_{t-j} + \Psi_4 LEXP_{t-j} + \varepsilon_4$$

t= 1996... 2020; j= 0, 1, 2

where

LPROD is labour productivity

HEEXP is health expenditure

GEFF is government efficiency index

LEXP is life expectancy

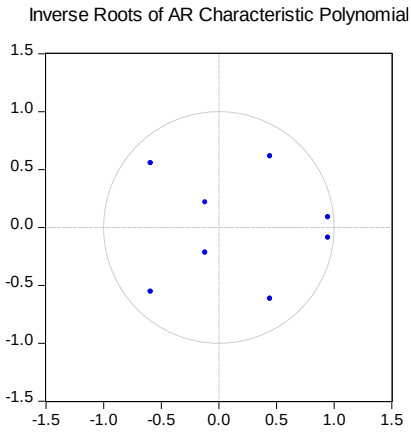
$\alpha_i, \beta_i, \mu_i, \Psi_i$ *are the* coefficients of the variables to be obtained from the VAR model. The one standard deviation to the values of ε_i shows the impulse, shocks or innovations of the dependent variables which are measured in reaction to the independent variables. As the variables are assumed to be endogenous, they can have feedback effects on one another.

Relationship stability is equally important for policy purposes. AR roots tables and graph stability test were done to examine the appropriate properties of the VARs. An estimated VAR is stable if the modulus of all roots have is less than 1 and lie inside the unit circle.

FINDINGS AND DISCUSSION

The stability test shows that all the VAR satisfies the stability test as the modulus of all roots is less than one and they all lie inside the unit circle. See Figure 1 and Table 1.

Figure 1: AR Roots Graph

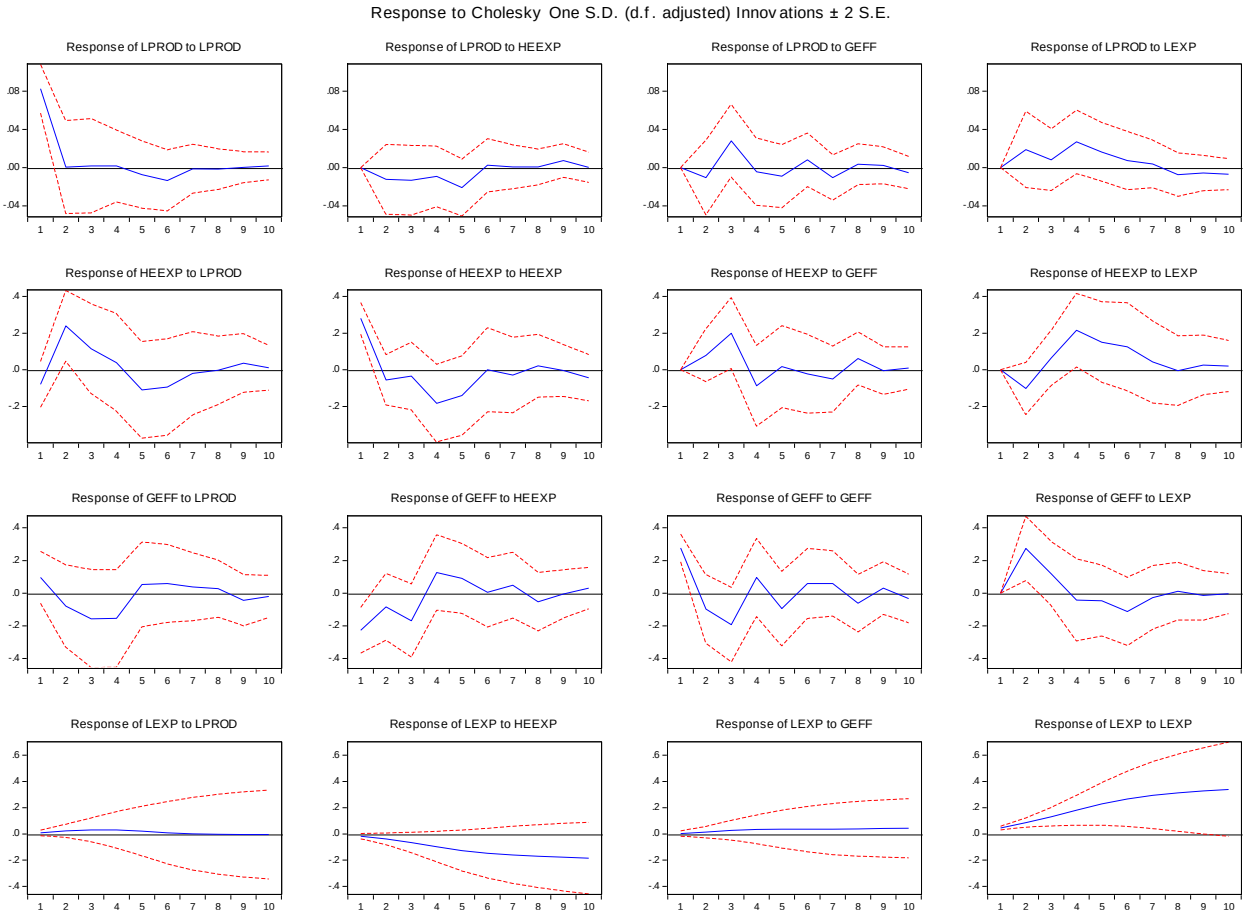


Source: Author's computation 2022.

Table 1: AR Roots Table

Roots of Characteristic Polynomial	
Indogenous variables: LPROD HEEXP	
GEFF LEXP	
Exogenous variables: C (Constant)	
Lag specification: 1 2	
Root	Modulus
0.947396 - 0.087974i	0.951472
0.947396 + 0.087974i	0.951472
-0.590704 - 0.555110i	0.810604
-0.590704 + 0.555110i	0.810604
0.444994 - 0.614474i	0.758681
0.444994 + 0.614474i	0.758681
-0.117285 - 0.217543i	0.247145
-0.117285 + 0.217543i	0.247145
Source: Author's own computation. Note: No root lies outside the unit circle. VAR satisfies the stability condition.	

Figure 2: Impulse Response Functions



The IRF tracing the impact of the shock to health expenditure on labour productivity shows that there was no first-period impact of health expenditure shock on labour productivity. From the second to the fifth period, labour productivity was inversely impacted due to shock to health expenditure. This implies that an increase in government health spending reduced labour productivity. The shock to health expenditure later (from the sixth to the tenth periods) indicated a direct response from labour productivity, implying that an increased health spending enhanced labour productivity at a later period of time.

The IRF tracing the impact of the shock to health outcome (life expectancy) on labour productivity shows that there was no first-period impact of shock to health outcome on labour productivity. From the second to seventh period, labour productivity was directly impacted due to shock to health outcome (life expectancy). This implies that an improvement in health outcome increased labour productivity during the period. However, the shock to health outcome later in the period (from the eighth to tenth periods) indicated an indirect response from labour productivity, implying that an improved health outcome hampered labour productivity at a later period. The impulse response functions responses are as shown in Figure 2 and Tables 2a to 2d.

Table 2a: Response of LPROD

Period	LPROD	HEEXP	GEFF	LEXP
1	0.082506	0.000000	0.000000	0.000000
2	0.000600	-0.012314	-0.010487	0.019003
3	0.001864	-0.013249	0.028124	0.008290
4	0.001699	-0.009243	-0.004284	0.026971
5	-0.007431	-0.020996	-0.008947	0.016405
6	-0.013440	0.002451	0.008240	0.007347
7	-0.001186	0.000852	-0.010440	0.003856
8	-0.001597	0.000665	0.003580	-0.007380
9	0.000382	0.007329	0.002412	-0.005698
10	0.001770	0.000253	-0.005216	-0.006925

Table 2b: Response of HEEXP

Period	LPROD	HEEXP	GEFF	LEXP
1	-0.078633	0.280753	0.000000	0.000000
2	0.239633	-0.054787	0.079482	-0.101856
3	0.115060	-0.034160	0.200389	0.063966
4	0.039516	-0.182368	-0.087615	0.215697
5	-0.109937	-0.140160	0.017374	0.150919
6	-0.093981	-9.50E-05	-0.022268	0.125378
7	-0.019341	-0.028305	-0.050504	0.042326
8	-0.002823	0.021449	0.061804	-0.005044
9	0.036419	-0.004118	-0.004729	0.026194
10	0.010469	-0.043338	0.009412	0.020139

Table 2c: Response of GEFF

Period	LPROD	HEEXP	GEFF	LEXP
1	0.097083	-0.226482	0.276866	0.000000
2	-0.078786	-0.084103	-0.097306	0.273696
3	-0.156325	-0.168007	-0.192928	0.119309
4	-0.154282	0.126276	0.096077	-0.041250
5	0.053390	0.089862	-0.094284	-0.046285
6	0.059226	0.005078	0.059329	-0.112082
7	0.039104	0.048856	0.059693	-0.026620
8	0.027540	-0.052194	-0.061064	0.012249
9	-0.043581	-0.004742	0.030701	-0.013893
10	-0.020280	0.031199	-0.032832	-0.002913

Table 2(d): Response of LEXP

Period	LPROD	HEEXP	GEFF	LEXP
1	0.007802	-0.016574	0.003014	0.045291
2	0.023747	-0.037282	0.013255	0.085866
3	0.030537	-0.065400	0.027146	0.130782
4	0.030373	-0.097292	0.034958	0.180492
5	0.021378	-0.126587	0.035688	0.228221
6	0.009256	-0.147172	0.036067	0.266425
7	0.000954	-0.159960	0.036603	0.294169
8	-0.002579	-0.169334	0.038523	0.313263
9	-0.003879	-0.176874	0.041480	0.327363
10	-0.005181	-0.183829	0.042842	0.338567

The IRF tracing the impact of the shock to government efficiency on health expenditure shows that there was no first-period impact. From the second period, it started

oscillating from positive to negative and from negative to positive till the tenth period. The highest value was in the third period, while the lowest was in the fourth period before it converged back to zero. This implies that the impact of government efficiency was not stable in its impact on health expenditure.

The IRF tracing the impact of the shock to government efficiency on health outcome (life expectancy) shows that from the first to the end of the periods, the impact was positive, implying that improved government efficiency also improved health outcome during the study period.

The IRF tracing the impact of the shock to health expenditure on health outcome (life expectancy) shows that the impact was negative from the first to the tenth periods, implying that an increased health expenditure did not improve the health outcome, particularly as regards life expectancy during the study period. The rate of dampening started increasing from the first period, and was getting worse every period until the worst impact was had in the last period.

The IRF tracing the impact of the shock to labour productivity on health outcome (life expectancy) shows that the impact from the first till the seventh period was positive. It however, became negative from the eighth to tenth period. The shock quickly disappeared as the impact converges back to zero. This, by implication shows that increased labour productivity improved health outcome at the short run to medium period but worsened the health outcome in the long run.

Forecast Error Variance Decomposition (FEVD) measures the contribution of shock to each variable on the forecast error variance. It indicates the amount of information each variable contributes to the other variables in the auto regression, thereby determining how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables. The value demonstrates how important a shock is in explaining the variations of the variables in the model and shows how that importance changes over time.

Table 3a: Variance Decomposition of LPROD

Period	S.E.	LPROD	HEEXP	GEFF	LEXP
1	0.082506	100.0000	0.000000	0.000000	0.000000
2	0.086200	91.61935	2.040600	1.480021	4.860030
3	0.092028	80.42372	3.862957	10.63785	5.075477
4	0.096453	73.24396	4.434975	9.881324	12.43975
5	0.100740	67.68771	8.409553	9.847169	14.05556
6	0.102259	67.41806	8.218890	10.20592	14.15714
7	0.102874	66.62865	8.127897	11.11439	14.12906
8	0.103215	66.21302	8.078429	11.16139	14.54716
9	0.103660	65.64653	8.509068	11.11981	14.72459
10	0.104037	65.20021	8.448055	11.29070	15.06103

Table 3a shows that the exogenous shocks to life expectancy (LEXP) produced the largest proportional contribution to labour productivity (0.00 to 15.06%) aside from the contribution of the exogenous shocks to labour productivity to itself (65.2% to 100%),, while this was followed by the proportional contribution of exogenous shocks to government

efficiency (GEFF) (0.00 to 11.29%), and exogenous shocks to health expenditure (HEEXP) was the variable having the least proportional contribution (0.00 to 8.5%). They were all shown to be significant.

Table 3b shows that exogenous shocks to labour productivity produced the lowest of 7.27% variance contribution in the first period to highest of 39.23% in the second period to health expenditure, while the exogenous shocks to government efficiency produced the lowest of 3.56% in the second period and highest of 21.04 in the third period.

Table 3(b): Variance Decomposition of HEEXP

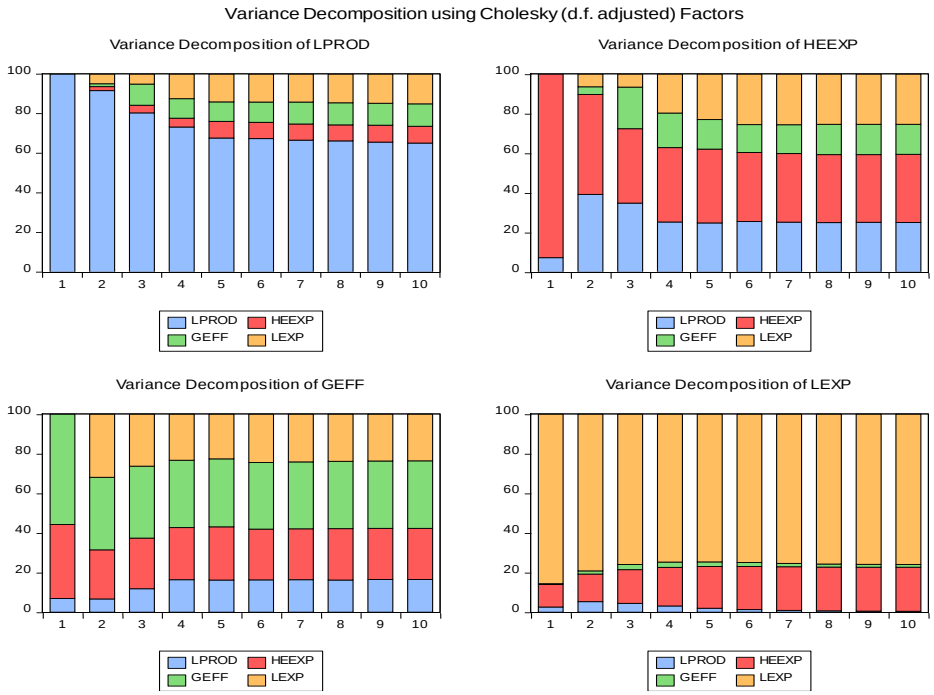
Period	S.E.	LPROD	HEEXP	GEFF	LEXP
1	0.291557	7.273875	92.72612	0.000000	0.000000
2	0.402645	39.23381	50.47027	3.896668	6.399251
3	0.469869	34.80714	37.59048	21.04989	6.552496
4	0.556595	25.30925	37.52414	17.47901	19.68760
5	0.603827	24.81951	37.27129	14.93427	22.97492
6	0.624223	25.49079	34.87541	14.10152	25.53228
7	0.628627	25.22954	34.59122	14.55009	25.62914
8	0.632049	24.95914	34.33291	15.34917	25.35879
9	0.633670	25.16191	34.16169	15.27631	25.40009
10	0.635625	25.03447	34.41670	15.20439	25.34444

Table 3c shows that the exogenous shocks to health expenditure produced the value ranging from the lowest of 11.46% from the first period to the highest of 22.24% in the tenth and last period to the variance decomposition of life expectancy, while the exogenous shocks to government efficiency produced minimally and the least proportion to life expectancy.

Table 3c: Variance Decomposition of LEXP

Period	S.E.	LPROD	HEEXP	GEFF	LEXP
1	0.048948	2.540947	11.46495	0.379207	85.61490
2	0.109080	5.251030	13.99039	1.552985	79.20559
3	0.186947	4.455943	17.00140	2.637209	75.90545
4	0.281313	3.133638	19.46953	2.708887	74.68795
5	0.385975	1.971366	21.09853	2.293884	74.63622
6	0.492956	1.243820	21.84793	1.941590	74.96666
7	0.597050	0.848170	22.07172	1.699435	75.38067
8	0.696252	0.625065	22.14521	1.555788	75.67394
9	0.790540	0.487262	22.18358	1.482111	75.84704
10	0.880475	0.396266	22.24227	1.431561	75.92991

Figure 3: Variance Decomposition



In summary, the results suggest that an increased health expenditure did not enhance health outcome, particularly as regards to life expectancy, but it did increase labour productivity through some other channels in the long run of the study period. Furthermore, an improvement in health outcome increased labour productivity only in the immediate and intermediate period but not in the long run of the study period. Also, increased labour productivity was shown to improve health outcome at the immediate and intermediate period but not in the long run. The study further showed the impact of government efficiency not to be stable in its impact on health expenditure, but health outcome got improved with strong government effectiveness.

Of all the three exogenous variables that contribute to the variation in labour productivity, shocks to health outcome produced the highest variation and the magnitude increased over time. This was followed by the relative importance of contribution of government efficiency, and then the health expenditure with the two also increasing over time. In the case of health outcome, shocks to health expenditure produced the highest variation, while the relative importance of labour productivity and government efficiency in accounting for variation in health outcome was close and low, with the two diminishing in value over time. In the proportional contributions to variation in health expenditure, shocks to labour productivity have a higher contribution than that of government efficiency.

All the variables were thus shown to be important in their contributions. The results are in line with the human capital theory which hypothesises that an increase in nation's accumulated stock of health is capable of raising the nation's productivity level in both market and non-market activities. The results are consistent with Oni (2014), who established a positive impact of health expenditure on economic growth; Anyanwu (2007), who showed that

health expenditure was a significant determinant of infant mortality and under-five mortality; and Yaqub et al. (2010), who showed how the effectiveness of public health expenditure was determined by governance in Nigeria.

CONCLUSION & IMPLICATIONS

In summary, the results of the analysis show the importance of health expenditure allocation in producing good health outcome and the translation of such good health outcome to producing increased productivity, all within good institutional framework that is capable of efficiently and judiciously applying the allocation to achieve the policy aim. The study consequently recommends transparency and accountability in the appropriation of government health spending so that rising labour productivity can be attained through an improved health outcome of citizens thereby enhancing the national income.

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