Oduyemi, Gabriel; Owoeye, Taiwo

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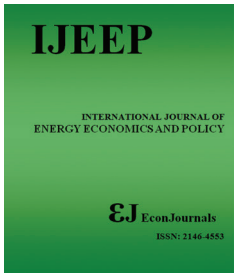

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Oil Price Fluctuation and Health Outcomes in an Oil Exporting Country: Evidence from Nigeria

Gabriel Oduyemi[1]*, Taiwo Owoeye[2]

[1]Department of Economics, Tai Solarin University of Education, Ijagun, Nigeria, [2]Department of Economics, Ekiti State University, Ado-Ekiti, Nigeria.*Email: oduyemigo@tasued.edu.ng

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ABSTRACT

In oil exporting countries, government finance is heavily dependent on oil revenue and this tends to be highly volatile. This creates instability in output, terms of trade and fiscal balances, and lowers long-run growth rates and ultimately, social spending resulting into poor human development indicators. In Nigeria, indices of human capital development are among the worst globally despite its position as the largest oil producer in Africa. Using time series data from 1980 to 2017, and the Vector Autoregressive Model (VAR) estimates, this paper investigated how fluctuations in oil price affect health outcomes in Nigeria. The main results indicate that oil price shocks are not detrimental to health outcomes. This reinforces the fact that oil price shocks are neither necessary nor sufficient to explain changes that happen in health outcomes in this country. It is the way the government spends its resource windfalls, and the way it adjusts spending during a downturn that is accountable for the poor health outcomes in the Nigerian economy. The study therefore suggests strategic policies that supports fiscal prudence, minimizes macroeconomic distortions and improve health outcomes. This should be backed by adequate institutional capacity.

Keywords: Oil Price, Fluctuation, Health Outcomes, Human Capital
JEL Classifications: E32, E62, I15, Q32

1. INTRODUCTION

Education and health are both direct component of human well-being and a form of human capital that increases an individual's capabilities (Bloom and Canning, 2003). Grossman (1972) equally demonstrated that education and health are forms of human capital.

Bloom and Canning (2000; 2003) observed that healthier individuals might affect the economy in four ways; One, they might be more productive at work and so earn higher incomes. Two, they spend more time in the labor force, as less healthy people take sickness absence or retire early. Three, they may invest more in their own education, which will increase their productivity, and four they may save more in expectation of a longer life—for example, for retirement—increasing the funds available for investment in the economy. Health is indeed closely intertwined with economic growth and sustainable development such that investing in it brings substantial benefits for the economy through health outcomes. Increase in health expenditure is expected to lead to better health outcomes (Muysken *et al*., 2003), or as put by Anyanwu *et al*. 2009; total health expenditures are important contributor to health outcomes. Health outcome is the change in the health of an individual, group of people or population attributable to an intervention or series of interventions (Asiedu *et al.*, 2015). They represent how healthy a country is and assesses the quality of health care in the country.

In oil exporting countries, government finance is heavily dependent on the oil sector and this tends to be highly volatile. Such fluctuations often lead to volatile output, terms of trade

and fiscal balances which may lower long-run growth rates and ultimately, social spending, thereby making fiscal management more challenging in such countries with numerous important implications for their social spending and ultimately developmental indices.

The first implication according to El Anshasy (2009), is that the uncertainty about future oil revenues and it's variability would result in changes in spending as the government reassesses its expected revenue stream, generating significant adjustment costs. Therefore, the resulting pro-cyclicality of government spending adversely affects social spending and ultimately lower human development.

Secondly, oil exporting countries tend to have higher borrowing capacity during boom times. The accumulation of debt during times of plenty makes adjustment more costly and more difficult at times of scarcity because it implies larger adjustments (El Anshasy, 2009). Therefore, at times of oil price downturns, some oil economies may face foreign borrowing constraints, which would adversely hinder their development programs. In addition, this leaves the fiscal authorities with fewer options to finance their deficit. Sharp expenditure cuts may become inevitable, potentially harming long-run growth. These may result in a decrease in per capita spending on health and other social sectors. Evidence from previous Latin America economic crises shows that governments tend to decrease social expenditures during times of economic recession (Kirigia *et al*., 2011). Indonesian experience indicates that health budget tends to be especially vulnerable to reductions during times of financial and economic crisis (Kirigia *et al*., 2011).

Nigeria is the biggest African oil producer and the 13th largest producer in the world with oil earnings accounting for more than 90% of its exports, 70% of total revenue and only 8% of its Gross Domestic Product (GDP) (CBN, 2018).

Yet, human development indicators for Nigeria have been one of the worse among its peers (UNDP Human Development Report, 2015). Specifically, Nigeria average life expectancy at 53 years, infant mortality rate at 115/1000 and child (under five) mortality rate at 205/1000 are worse than the average for Sub-Saharan Africa (WHO, 2000; FMOH, 2001). WHO (2013) reports that one million Nigerian children die at birth out of the nine million infant deaths recorded globally. The Economist Intelligence Unit (2014) reports an outcome index of 35/100 for Nigeria ranking it in the 14th position from the rear among 166 countries while its 2016 Human development index is 0.527 ranking 151st among 188 nations.

This study intends to contribute to the natural resource-human capital nexus of the resource curse discussion in development economics literature by exploring the transmission mechanism through which oil price fluctuation affects health outcomes in an oil exporting African country.

The dynamic behaviors of Oil price and revenue have received considerable attention in empirical literature. Most of these studies however focused on industrialised countries. More importantly, limited efforts have been made with reference to the human capital explanations of this discourse. Put differently, research on the impact of oil price shocks on sectorial performance of the economy, especially the health sector is limited. There is therefore the need to examine the subject of oil price dynamics from the health sector performance indicators perspective for an oil exporting African country.

This study is important and unique for a number of reasons. Firstly, it is the first attempt at addressing non-monetary welfare measures (health outcomes) effects of fiscal disequilibrium due to external shocks using datasets from Nigeria. Previous works on this subject have concentrated on money metric measures, particularly GDP, exchange rates and balance of payments position. (Olomola and Adejumo, 2006; Shehu, 2009). Secondly, this study improves on the previous study by covering period of major global oil shocks, low oil price, in recent times. Specifically, it covers the period 1980-2017. This period is selected as it covers the era in which oil price witnessed major global shocks (1982-1999, 2007-2008 and 2014-2017) (Andreas, 2016).

The remaining part of this paper is structured as follows. Section two presents some stylized facts on oil price and revenue fluctuation and health outcomes in Nigeria comparing them to those of its selected peers as well as empirical and theoretical literature. Section three discusses the methodology and presents the model, while section four discusses the results. Section five concludes and suggests policy recommendations.

2. LITERATURE REVIEW

2.1. Stylized Facts on Oil Price Fluctuation, Oil Revenue and Health Outcomes in Nigeria

According to Chuku (2012), Oil price shocks are unexpected and unpredictable changes in global oil prices, caused by exogenous factors, which are likely to impact on endogenously determined economic variables. Crude oil price behaviour is determined by global supply and demand, activities of Organization of the Petroleum Exporting Countries (OPEC), geopolitical events and weather.

Five major episodes of oil price shocks could be identified during the study period. The first and most remarkable is traceable to the war between Iran and Iraq in September 1980 which drove oil prices up and lasted until October 1981 when OPEC officially set a benchmark price of $34 per barrel. According to Hamilton (2003), this was followed by an increase in the WTI price of oil from $36 per barrel in September to $38 in January 1981.

The second shock in this period was a negative one that occurred in 1985-6 due to remarkable reductions in world aggregate. World oil market witnessed another shock in 1990 (Zahra *et al*., 2011). This spike in price was as a direct result of the Persian Gulf War and Iraq attack to Kuwait as well as the higher demand for oil inventories in anticipation of a possible attack on Saudi oil fields (Kilian and Murphy, 2014).

In the late 1990s, the price of oil weakened further to an all-time low in recent history of $11, when only 2 years earlier oil had

been trading at $25. This slide was largely associated with reduced demand for crude oil, arguably caused by the Asian financial crisis of mid-1997. The recovery of the global economy leading to higher demand for oil, some cuts in oil production, and increased inventory demand in anticipation of tightening oil markets all combined and kick-started the recovery in the price of oil in 1999. This trend was maintained till late 2002.

According to Hamilton (2008), between mid-2003 and mid-2008 the WTI price climbed from $28 to $134/barrel. The widespread agreement is that this price surge was caused by a series of individually small increases in demand over the course of several years. As orders for industrial commodities worldwide were sharply curtailed in the second half of 2008 in anticipation of a major global recession, price of oil fell from $134/barrel in June 2008 to $39 in February 2009. When it became clear in 2009 that the collapse of the global financial system was not imminent, the demand for oil recovered to levels prevailing in 2007, and the price of oil stabilized near $100/barrel.

Finally, the period, 2010 through early 2015 also witnessed a number of smaller demand and supply shocks in the oil market. For example, events such as the Libyan uprising in 2011 were associated with an increase in the price of oil. Kilian and Lee (2014) estimate that the Libyan crisis caused an oil price increase of around $3 and $13/barrel. Likewise, tensions with Iran in 2012 account for an increase of between $1 and $9/barrel. Following a long period of relative price stability, between June 2014 and January 2015 the Brent price of oil fell from $112 to $47/barrel, providing yet another example of a sharp decline in the price of oil.

Since the discovery of oil in the late 1950s, oil revenue has become the dominant source of government revenue in Nigeria accounting for about 90% of total exports, and this approximates to 80% of total government revenues (CBN, 2018). Nigeria's vulnerability to oil price shocks stems from the nations over dependence on crude oil export. This is amply evident from the drastic decline in non-oil exports over the past three decades of oil production in Nigeria, thereby forcing the economy to follow the boom/bust cycles of the world oil market. For example, crude oil exports increased from 139.5 million barrels in 1966 to 807.7 million barrels in 1979. The volume of crude oil exports dropped to 390.5 million barrels in 1987 but increased to 675.3 million barrels in 1998. The trend continued for most years after 2000. In the same way, oil revenue increased from N166.6 million in 1970 to ₦8.35 billion in 1980 and then N 1,591,675.00 million and N6, 530,430.00 million in 2000 and 2008, oil revenue in 2012 was N8025.971 billion and in 2013 and 2014 were N6809.231 billion and N5403.51 billion respectively (NNPC Statistical Bulletin, 2014).

This economic decline, especially during the last 20 years is illustrated by the fact that Nigeria had declined from being a low middle income country and amongst the fifty richest countries in the world to one of the 30 poorest. As a result therefore, the Nigeria health sector continues to experience persistently low funding below the World Health Organization (WHO) stipulated levels and is reported to devote the least percentage of her total expenditure to health when compared with other selected African countries (WHO, 2004). Consequently, health facilities and services in Nigeria deteriorated further and as such, health indicators are reported to be very low when compared with other poor and non-oil producing developing countries. Among 191 member states of the United Nations (UN), whose overall health systems performance was assessed by the World Health Organization (WHO, 2000), Nigeria was ranked in the 187th position.

The term "Health Outcomes" refers to the impact healthcare activities have on people, on their symptoms and ultimately on whether they live or die. it includes whether a given disease process gets better or worse, what the costs of care are, and how satisfied patients are with the care they receive. It focuses not on what is done for patients but what results from what is done. The aspects considered by this study include among others, Life Expectancy and Child/Infant mortality. Life expectancy at birth reflects the overall mortality level of a population. It summarizes the mortality pattern that prevails across all age groups - children and adolescents, adults and the elderly and is defined as the number of years of life a person born today is expected to live or a measure of overall quality of life. It can also be thought of as indicating the potential return on investment in human capital (Olowookere, 2015). It is the most commonly used measure to describe population health. Child Mortality Rate (CMR) is the number of deaths of children under 5 years of age per 1000 live births in a given year. This is often distinguished from Infant Mortality Rate (IMR) which indicates the number of children, per 1000 live births, who die before they reach their first birthday. It may be very high in communities where health and social services are poorly developed. Included in the child mortality (infant mortality inclusive) rate are the neonatal mortality rate (calculated from deaths occurring in the first 4 weeks of life), and post neonatal mortality rate (from deaths in the remainder of the 1st year). These indices are widely accepted as the most useful single measure of health status and important indicators of human development since they reveal both short-term and long-term outcomes of health spending and interventions.

2.2. Theoretical Literature

The resource curse thesis has gained importance within the theoretical debate on natural resource. The theory claims that resource wealth is linked to poor economic growth (Auty, 1993; Sachs and Warner 2001). The first and most compelling identified model explaining the resource curse theory is the Dutch disease hypothesis, where exporting of primary commodities lead to appreciation in exchange rate and this in turn leads to a contraction of the tradable sector, Krugman (1987). Moreover, the natural resource-based industries in resource abundance countries usually pay higher wages than other manufacturing and agro-based industries and thus make it difficult for the latter to make profit leading to reallocation of factors of production from the manufacturing and agricultural sectors toward the booming sector, Corden and Neary (1982). Since it is the manufacturing sector that is important in increasing return to scale while the agricultural sector exhibit positive externalities, this shifting away from competitive manufacturing sector would reduce the productivity and profitability of investment and therefore, affects economic growth negatively, Wijnbergen (1984).

The literature identifies three conduits by which the Dutch disease affects an economy, namely, Resource movement effect, Spending effect and Residual components and argues that resource-abundance may reduce the incentives to accumulate skills and investment in human resources. According to Papyrakis (2006), Natural resources reduce investment in skill-labor and high-quality education. Gylfason (2001) found that natural resources crowd out human capital, therefore slowing the economic performance of natural resource-abundant countries. This hypothesis supports the human capital explanation for natural resource curse.

2.3. Empirical Literature

Oil price fluctuations have received considerable attention in empirical literature. Among pioneer researchers is Hamilton (1983), who studied oil prices and macro-economic variables for the US. Other studies that supported and extended Hamilton's earlier work on the relationships between oil price increase and different macro-economic variables include Burbidge and Harrison (1984); Gisser and Goodwin (1986); Mork (1989); Hoover and Perez (1994); Federer (1996); Lee *et al*. (1995); Jimenez-Rodriguez and Sanchez (2005). They analysed oil price impact on real economic activities.

Most of these earlier works on oil price and revenue volatility and economic activities however, relate to oil importing countries. Others include Gounder and Bartleet (2007), Muhammad (2010), Jawad (2013), Rafiq *et al*. (2009) for Thailand; Cunado and de Gracia (2005) for six Asian countries, including Thailand, Singapore, South Korea, Malaysia, Phillipines and Japan; Jbir *et al*. (2008) for Tunisia.

Existing studies on individual oil exporting economies include Shehu (2009), who worked on Nigeria and assessed the impact of oil price shock and real exchange rate volatility on real economic growth; Olomola and Adejumo (2006), who examined the effects of oil price shocks on output, inflation, real exchange rate and money supply in Nigeria using quarterly data from 1970 to 2003. Others include Eltony and Al-Awadi (2001), who worked on oil price shocks and macroeconomic variables in Kuwait, Raguindin and Reyes (2005) for the Philippine, Anshasy *et al*. (2005) for Venezuela and Sulaiman (2010), who analysed the impact of recent oil prices variability on Pakistan's export earnings.

It should be observed that most of these studies focused on impacts of oil price fluctuations on macro-economic variables in either oil importing economies, industrialised countries or individual oil-exporting economies. This therefore implies that limited efforts have been made on the impact of oil price fluctuation on welfare in Nigeria. Such known efforts include Bakare and Fawehinmi (2010) who evaluated the extent to which oil revenues has affected standard of living in Nigeria. The study used annual data for the period 1975-2008 and per capita income as a surrogate for living standard. The ordinary least square (OLS) estimation technique on a multiple regression model was utilized. Manasseh *et al*. (2018) investigated the impact of oil price fluctuation and oil revenue on well-being in Nigeria using multiple regression techniques and the Johanson cointegration test to analyse annual time series data covering the period 1981-2014. These studies however only concentrated their analysis on money metric measures of welfare and failed to explore the human capital explanations of this discourse on resource curse. Thus, the current study adds to this empirical discourse by studying the subject of oil revenue dynamics using non-monetary welfare measures (health outcomes) for oil exporters and not importers. There are a number of other advantages of using health outcomes instead of income as a measure of welfare (i) individual well-being in the form of life expectancy, maternal and infant health can be directly observed as opposed to country-wide well-being; (ii) money-metric comparisons of welfare over time are hampered by the absence of reliable and verifiable deflators, and information collected in surveys is often inadequate to solve this problem.

3. RESEARCH METHODOLOGY

3.1. Theoretical Framework

3.1.1. The Hausmann and Rigobon model

The theoretical foundation for how booms in resource income would be associated with contractions in manufacturing was laid in the 1980s by two succesive influential studies (Corden and Neary, 1982; Corden and Neary, 1984). This theory would later become one of the basic foundations for the resource curse theory and it has spurned a rich body of empirical and theoretical literature (Sachs and Warner, 2001). For example, Hausmann and Rigobon (2002), argued that contractions in manufacturing cannot explain why a country will grow more slowly just because it has oil, but that the appropriate mechanism arises from an interaction between specialisation and financial market iumperfections.

According to these authors, this result might help explain why countries that specialized in oil production such as Saudi Arabia, Nigeria and Venezuela fared so poorly when oil income declined while countries such as Indonesia, Mexico and Norway were much less affected. The first group specialized in oil and when oil income declined that specialization became much more inefficient, while the lack of a tradable sector created a level of volatility and risk that did not allow for investment.

They drew some interesting inferences from their theory thus: (i) Specialization in the production of non-tradables creates an economy with more volatile relative prices. (ii) Financial frictions interact with this volatility further specializing the economy as the stock of capital will respond to the greater macroeconomic volatility. (iii) This specialization may lead to the complete and inefficient disappearance of tradable production. (iv) This specialization reduces the investment in non-tradables - which will face a larger cost of capital - and lowers welfare. This clearly show, according to the last inference, that revenue fluctuation in resource revenue dependent economy has the tendency to lower the welfare of the citizens.

3.2. Model Specification

Following the theoretical model of Hausmann and Rigobon (2002), some set of variables affect fluctuations in oil price and health outcomes, while some are derivative of such

fluctuation. These include oil revenue, inflation rate which affects the household and the government, real gross domestic product (GDP) per capita, the share of health expenditure, market capitalization, non-oil export and exchange rate. The rationale behind the introduction of non-oil export and market capitalization into the model is to cater for specialization and financial market imperfections based on the argument advanced by Hausmann and Rigobon (2002).

Thus, the model for the estimation of the impact of oil price fluctuation on health outcomes can be stated as:

$$LnHO_t = a + bLnGDP_t + cLnOP_t + dLnINF_t + eLnEX_t + fLnMCAP_t + gLnNOEXP_t + \varepsilon_t \quad (1)$$

Equation (1) is the long-run determinants of health outcomes. The scale variable GDP measured by GDP is included to account for the level of economic activity in the oil exporting countries. OP is the oil Price and it is included to account for the shocks that are inherent in the product. Inflation rate proxied by LnINF is included to account for changes in the general price level. The exchange rate is also included to account for currency substitution and is measured by nominal effective value of the domestic currency of the country. LnMCAP is measured by market capitalization and LnNOEXP represents non-oil exports. Two indicators were used as measures of health outcomes because they are the most widely used in the literature. These measures are the infant mortality rate (IMR) and life expectancy rate. All data series are annual data and are sourced from the World Bank's World Development Indicators (WDI).

3.3. Estimation Techniques

The study's analysis begins with prior determination of unvaried properties of the series. Thus, the data set were subjected to the standard Augmented Dickey-Fuller (ADF) and Philip Perron (PP) tests. The Vector Autoregressive Model (VAR) involving impulse response and variance decomposition were used to estimate the study's model. The VAR approach that this study utilizes to examine the interaction of oil prices and health allows an interaction between all the specified variables. The variables included in the VAR are health outcomes (HO), real GDP (GDP), oil price (OP), inflation rate (INF), exchange rate (EX), market capitalization (MCAP), non-oil export (NOEXP). The dynamic interactions of oil price shocks on health outcomes in oil exporting countries was estimated through the use of Impulse response function (IRF), and the effect and statistical significance of each variable's response to one standard deviation increase in health outcomes was reported. The IRF is given as;

$$\Delta Y_t = \alpha + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} + \ldots + \beta_p \Delta Y_{t-p} + \varepsilon_t \quad (2)$$

Also, the relative importance of health outcomes and oil price shocks in the VAR system was traced by using the variance decomposition analysis; this shows the percentage of change in a specific variable in connection with its own shock against the shocks to the remaining variables in the system.

4. PRESENTATION AND DISCUSSION OF EMPIRICAL RESULTS

4.1. Unit Root Result Discussion

4.1.1. Unit root results

From Table 1, the unit root test results show that oil price, inflation rate, market capitalization, non-oil export, gross domestic product, real per capita GDP and exchange were not significant at levels, thus the study could not reject the null hypothesis of unit root. However, the first difference of oil price, inflation rate, public health expenditure, market capitalization, non-oil export, gross domestic product, real per capita GDP and exchange rate were statistically significant at either 1 or 5% level of significance and the null hypothesis of unit root were rejected. The study therefore conclude that oil price, inflation rate, public health expenditure, market capitalization, non-oil export, gross domestic product, real per capita GDP and exchange rate were first difference variables using the Augmented Dickey-Fuller and Phillips-Perron unit root tests.

Conversely, the study found mixed results for health outcomes variables, the Augmented Dickey Fuller and the Phillip-Perron unit root shows that infant mortality and life expectancy were unit root stationary at levels. The results suggest that the variables could be I(0) and I(1) order of integration implying that they have different order of integration and this involves the use of Autoregressive Distributed Lags (ARDL) approach to cointegration where the two variables are involved.

4.2. Vector Autoregressive Model Results

The study used the Vector Autoregressive (VAR) model to examine the magnitude of the impact of oil price fluctuations on health outcomes in Nigeria. Following equation 2, the study specifically employed the impulse response functions and variance decomposition of forecast errors.

To have unbiased estimates, the study examined the appropriate lag length selection, this is followed by checking for the possibility of serial correlation in the chosen lag length. After this is the presentation of the impulse response function and the variance decomposition results.

4.2.1. Lag order selection for VAR and autocorrelation

The determination of appropriate lag length is critical in the analysis of VAR model, this is because a wrong lag length selection can affect substantially the interpretation of VAR estimates.

Table 1: Summary of unit root test results

Variables	At level		First difference		Order of integration
	ADF	PP	ADF	PP	
OILP	−2.100	−2.110	−6.026***	−6.026***	I(1)
INF	−1.274	−0.754	−2.889**	2.768**	I(1)
MCAP	−1.887	−2.121	−6.963***	−6.963***	I(1)
NOEXP	−2.883	−1.494	−4.705***	−8.039***	I(1)
RGDP	−3.154	−3.154	−4.909***	−4.906***	I(1)
LE	−3.534**	−3.819***	−2.592	−1.234	I(O)
IMR	−2.987**	−2.791**	−0.899	−1.002	I(O)
EXR	−1.211	−1.276	−5.179***	−5.179***	I(1)

*, ** and *** indicate level of significance at 10, 5 and 1% respectively

The selection criteria considered in this study are the Akaike Information Criterion (AIC), the Schwarz Information Criterion (SIC) and the Hannan-Quinn Criterion (HQC). The study used lag 3 for the purpose of estimation and in addition, there is absence of serial correlation when lag 3 was selected.

4.2.2. Impulse response function results

The impulse response functions shows the direction, magnitude and the time path of health outcomes emanating from output growth, oil price, inflation rate, exchange rate, market capitalization and non-oil exports. From Figure 1, a positive oil price shock leads to increase in life expectancy though not statistically significant. This implies that increases in oil price improve life expectancy in the country. Life expectancy seems not to be sensitive to output growth and it does not respond positively to output growth shock. The study also discovered that a positive inflation shock results into a positive life expectancy shock for Nigeria. This explains that during general price increases in Nigeria, life expectancy increase. Also exchange rate appreciation in response to macro shocks causes a positive life expectancy. The implication of these results is that life expectancy improves when exchange rate appreciates. The study also discovered that positive changes in stock market operations leads to an improvement in life expectancy whereas life expectancy respond positively to increases in non-oil exports in Nigeria. Thus, when there is an increase in market capitalization and non-oil exports, life expectancy of Nigerians increases.

From the impulse response function depicted by Figure 2, the study discovered that positive oil price shocks leads to a no response changes in infant mortality in Nigeria. Infant mortality shows no significant response, that is, infant mortality seems to be constant in response to a positive output growth in Nigeria. More so, infant mortality responded negatively to positive inflationary shocks. In essence, general price increases in Nigeria improves infant mortality.

Furthermore, exchange rate shocks do not lead to increase or decrease in infant mortality but infant mortality responded negatively leading to a decline in market capitalization. Finally, increase in Nigerian non-oil exports marginally improves infant mortality.

4.2.2.1. Variance decomposition results

From Table 2, the variance decomposition of life expectancy indicates that between 72 and 99% of the forecast error of life expectancy is accounted for by its own innovation in the first 4 years of estimation while the influence from its own shock fell gradually to 47 to 93% after the 20th year. Fluctuations in output growth explained between 1 and 5% for Nigeria. Innovations in oil price 1-30%, while interest rates and exchange rates contributed between 1-7% and 1-3% respectively after a 10 year horizon. In addition, innovations in market capitalization and non-oil export are between 1-6% and 1-13% respectively.

Figure 1: Nigeria impulse response function of life expectancy response to macroeconomic variables

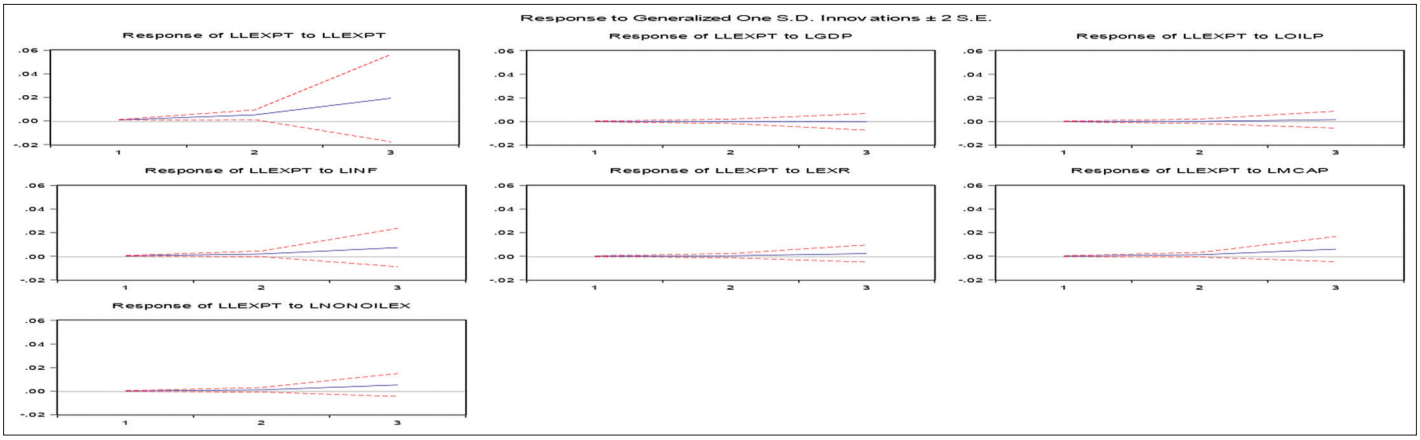

Figure 2: Nigeria impulse response function of infant mortality response to macroeconomic variables

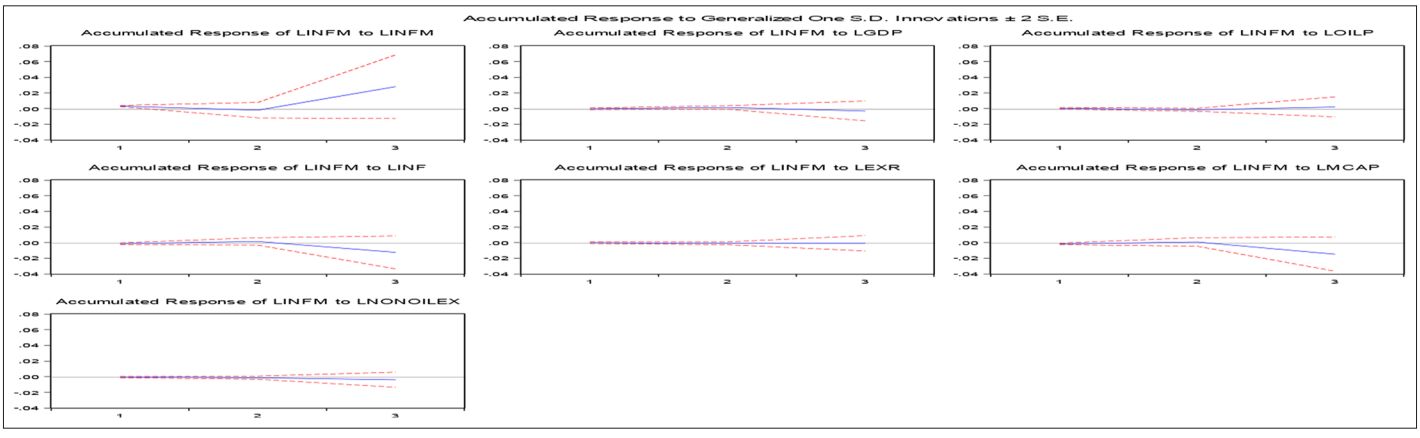

Table 2: Nigeria variance decomposition

	Fraction of life expectancy variance due to						
Years ahead	LLEXPT	LGDP	LOILP	LINF	LEXR	LMCAP	LNONOILEX
1	100.00	0.00	0.00	0.00	0.00	0.00	0.00
2	98.87	0.02	0.42	0.34	0.00	0.23	0.12
3	96.06	0.09	1.60	1.15	0.09	0.64	0.37
4	91.62	0.27	3.52	2.31	0.28	1.23	0.77
5	84.10	0.66	6.92	4.07	0.65	2.14	1.46
6	66.55	1.79	15.15	7.79	1.57	4.05	3.09
7	38.34	4.63	29.52	12.15	3.37	6.26	5.72
8	95.32	0.64	2.36	0.63	0.32	0.32	0.41
9	97.96	0.03	0.62	0.77	0.05	0.41	0.16
10	93.57	0.13	2.46	2.00	0.23	1.05	0.57

Table 3: Nigeria variance decomposition

	Fraction of infant mortality variance due to						
Years ahead	LINFM	LGDP	LOILP	LINF	LEXR	LMCAP	LNONOILEX
1	100.00	0.00	0.00	0.00	0.00	0.00	0.00
2	90.67	3.69	3.56	0.15	0.34	0.11	1.48
3	99.22	0.41	0.18	0.06	0.05	0.02	0.07
4	97.34	1.24	0.90	0.01	0.04	0.07	0.39
5	98.65	0.78	0.39	0.00	0.00	0.04	0.12
6	98.27	0.93	0.55	0.00	0.01	0.05	0.19
7	98.43	0.87	0.48	0.00	0.00	0.05	0.16
8	98.37	0.89	0.51	0.00	0.01	0.05	0.17
9	98.39	0.89	0.50	0.00	0.00	0.05	0.17
10	98.39	0.89	0.50	0.00	0.01	0.05	0.17

Also, the variance decomposition of infant mortality reported in Table 3 indicates that between 32 and 97% of the forecast error of infant mortality is accounted for by its own innovation in the 4 year of estimation while the influence from its own shock fell gradually to 14 to 98% after the 10th year. The fluctuations in output growth explained about 1-27% of the forecast error variance in the infant mortality after the 10th year. Innovations in oil price between 1 and 42% while interest rates and exchange rates contributed between 1-6% and 1-2% after a 10 year horizon. Innovations in market capitalization and non-oil exports are between 1-7% and 1-7% respectively.

5. DISCUSSION OF FINDINGS

This study found that Oil price is the most significant variable. In essence, higher oil prices tend to improve life expectancy and infant health in the short as well as in the long run and lower oil price does not retard health status. The implication of this finding is that oil price shocks are not detrimental to health outcomes. Based on this fact, it is obvious that negative oil price shocks do not pose significant threat to health outcomes. This correlates with the findings of El Anshasy (2009) who argued that oil price shocks are not detrimental to long run growth. Therefore, it could be inferred that it is the way the government spends its resource windfalls, and the way it adjusts spending in a downturn that is accountable for the poor health outcomes in the Nigerian economy. However, oil price fluctuation does not seem to trigger significant growth effect in Nigeria. This reinforces the fact that oil price shocks are neither necessary nor sufficient to explain changes that happen in health outcomes in this country. This low response of health outcomes to oil price could be explained by many factors: one, investment share of GDP was low in Nigeria. This implies that Nigeria does not invest much. Second, channeling some of the booming revenues to increase spending on infrastructure and public services tends to stimulate growth while government consumption in general tends to be less productive. In Nigeria, government spending on infrastructures is poor and as such, oil rents have failed to promote development. The implication of this is that weak and poor institutional quality that encourages corruption and entrench autocratic regimes prevailed in Nigeria, thereby exacerbating the problem of the resource curse.

Thirdly, oil price increases can harm countries with abundant oil but low refinery capacity. In such cases, an oil price change will lead to fuel price stabilisation policies such as fossil fuel subsidies, which affect the national budget negatively and generate adverse welfare effects. Some analysts consider refinery capacity a significant factor of adverse effect of high oil prices.

Life expectancy improves when exchange rate appreciates. However, exchange rate shocks do not lead to increase or decrease in infant mortality.

An appreciation can help improve living standards and consequently health outcomes through two possible channels; enabling consumers to buy cheaper imports including health facilities (medical equipment, personnel, and drugs) and therefore generate improved health outcomes. Second is improvement in the current account through improved competitiveness. Currency appreciation makes domestic goods more competitive, leading to stronger exports in the long term. Additionally, with export prices more expensive, manufacturers have greater incentives to cut costs

to try and remain competitive. The joint effect of these could help improve the current account.

Per capita income exerted a strong negative influence on infant mortality for the period. Its effect on life expectancy was also significantly positive. A positive significance of per capita income on health outcomes is plausible, for the simple reason that higher income permits households to have command over more goods and services, including health inputs which in turn improve the health of the household as well as living conditions for the population.

In Nigeria, the high significance of per capita income may be the result of insufficient financial allocation to health sector which compels individuals to spend on health needs from their own income. Nigeria was reported to devote the least percentage of her total expenditure to health when compared with other selected African countries. As a result, health outcomes deteriorated.

6. CONCLUSION AND RECOMMENDATIONS

This study investigates the impact of oil price fluctuation on health outcomes in Nigeria over the period 1980-2017. Using the Vector Autoregressive Model (VAR) involving impulse response and variance decomposition in the estimation, it was found that oil price shocks are not detrimental to health outcomes. Therefore, oil price shocks are neither necessary nor sufficient to explain changes that happen in health outcomes in this country but the way the government spends its resource windfalls, and the way it adjusts spending in a downturn. Thus, fiscal policy does play significant and important role in transmitting oil shocks to the economy. Also, the Nigerian health system is heavily reliant on out-of-pocket payments and government health sector spending in financing her health system both of which are components of government fiscal system which is dependent on oil revenue.

When oil price fluctuation lead to currency appreciation, it can help improve living standards and consequently health outcomes through two possible channels- enabling consumers to buy cheaper imports and improvement in the current account through improved competitiveness. Additionally, in Nigeria, the high significance of per capita income may be the result of insufficient financial allocation to health sector which compels individuals to spend on health needs from their own income.

The following recommendations are submitted in view of the identified issues regarding the transmission mechanism through which oil price fluctuation affects health outcomes among oil exporting African countries.

Aside from the oil stabilization fund, the country should establish and maintain a saving fund. The stabilisation function of oil funds addresses the short-term challenges of fiscal policy and aims to make the conduct of policy less volatile and less pro-cyclical by de-linking public spending from oil prices. The savings function of oil funds addresses the long-term challenges of intergenerational equity and fiscal sustainability that accompany nonrenewable resources. The revenue from accumulated financial assets can replace income from oil once those resources are exhausted. The funds can also be drawn upon for capital spending where there is a high return.

The authority should ensure a supportive and efficient socioeconomic structure for efficient utilization of resources. The delivery of basic health services can be greatly improved even with the current levels of resource commitments only if institutions in place ensure efficient use of resources.

Utilization of allocated resources in the health sector may depend largely on good governance and efficient institutions, and skilled manpower of the country. This therefore underscores the importance of the health system and other non-expenditure factors to facilitate the attainment of the health section of the MDG. This study therefore suggests improvement in human capital.

The Federal Government of Nigeria (FGN) should increase and restructure the public expenditure allocation to the health sector in order to provide more health facilities, drugs, laboratories, equipment, amongst other things.

Increasing government allocation and restructuring public expenditure on health could further spur the reduction of infant mortality and overall improve general health outcomes in the Sub-Saharan African region. It will help expand and enhance access to and use of primary healthcare services, in most rural areas especially for children below 12 months.

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