

Has Fiscal Decentralization Influenced the Quality of Life in Sub-Saharan Africa? Empirical Evidence From Nigeria

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Research

Keywords: Quality of life, impulse response function, decentralization

Posted Date: July 28th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-49027/v1>

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Has Fiscal Decentralization Influenced the Quality of Life in Sub-Saharan Africa?

Empirical Evidence from Nigeria

Abstract

Sub-Sahara Africa countries has the highest proportion of people with the lowest access to basic amenities required to live well. Nigeria contributes significantly to the low quality of life in the region. Many governments particularly in Africa adopted government decentralization as a major policy reform to improve the distribution of public goods and services. The overall outcome of government decentralization is believed to be more dependent on the extent of fiscal decentralization. This study examined the influence of fiscal decentralization on indicators of health, education, household wealth and living environment. The estimation technique used in this study is based on Vector autoregression (VAR) model. Besides, an impulse response function (orf) function and a Granger causality test was also generated as post-estimation to confirm the results. The results revealed that though the growth in the previous revenue of states and local governments had an inverse relationship with improvements in the indicators. The expenditure of sub national governments had a weak effect but it had an increasing influence on all the indicators except child mortality. The results of the Granger causality test revealed that variations in child mortality rates and access to improved water cannot be explained by both revenue and expenditure of the sub national governments in Nigeria. The quality of life people live can be improved if the issue of financial constraints and accountability at the sub national level of governments is addressed.

Keywords: Quality of life, impulse response function, decentralization

1. Introduction

The improved quality of life of citizens and sustainable productivity in all sectors are dependent on their access to economic resources (Palei, 2015; Azam et al., 2019; Chakamera and Alagidede, 2018; Olagunju et al., 2019; Wu et al., 2019). The availability of these resources however depends on the extent to which governments invest in them (Cigu et al., 2019; Onifade et al., 2020). Globally, economic policies are often made not only to improve the people's access to resources but also to promote their contribution to the growth and development of their nations (Chakamera and Alagidede, 2018; Ogunniyi et al., 2020). Meanwhile, Africa suffers from multidimensional deprivation of access to productivity enhancing resources (Cleeve et al., 2015; Ogundari and Awokuse, 2018). Generally, the proportion of world's poor is highest in Sub-Saharan Africa (Anyanwu and Erhijakpor, 2010; World Bank 2015; Akobeng, 2016). The rising population in the region increases the demand for economic resources thus raising the levels of deprivation. With growth in the population the proportion of people living in poverty has increased steadily in some countries like Nigeria over the years while it fluctuated in others (see Table 1).

The continent has the highest proportion of people with the lowest access to basic amenities such as electricity, clean water and good roads (Ajakaiye and Ncube, 2010; Alves, 2013; Kodongo and Ojah, 2016). A significant proportion of diseases in the world are also found in Sub-Saharan Africa (International Finance Corporation, 2016; Ogunniyi et al., 2020) as the region still has the highest rates of mortality and malnutrition across the world (Ogunniyi et al., 2020). According to the World Health Organization (2012), about 67.8% of deaths in the region is as a result of diseases that are preventable and treatable given adequate health care systems and resources. The dearth of access to economic resources also leads to shortage and poor development of human capital (Ajakaiye and Ncube, 2010; Danquah and Ouattara, 2014; Cleeve et al., 2015; Ogundari and Awokuse, 2018). The extent of human capital available in any economy is often dependent on factors such as the number of people who have access to health care, access to education and several other economic resources which in turn influences their productivity (Cleeve et al., 2015; Ogundari and Awokuse, 2018). Sub Saharan Africa suffers from a shortage of about 2.4 million health workers who often due to better employment and training opportunities leave the region for developing countries (Naicker *et al*, 2010; Danquah and Ouattara, 2014; Cleeve et al., 2015). In terms of education, none of the countries in the region met the global education target despite the fact that the region had countries that allocated the largest share of government expenditure on education (UNESCO, 2015).

One of the fundamental barriers to people's access to economic resources in SSA is the poor level of investment by governments in the region (Danquah and Ouattara, 2014; Cleeve et al., 2015; Ogundari and Awokuse, 2018; Ogunniyi et al., 2020). The system of governance adopted by any country has great influence on how economic resources are distributed (Ogunniyi et al., 2020). Many governments particularly in Africa and around the world are adopting government decentralization as a major policy reform to improve the quality of governance and improving wellbeing of citizens. Decentralization involves the creation and empowerment of other tiers of government apart from the central government (Faguet, 2004; Ribot, 2006; Larson, 2012; Lund and Treue, 2008; Riedl and Dickovick, 2014). Ribot (2002) explains that it is the formal transfer of power by the central government of a country to lower actors or

institutions in a political – administration and territorial hierarchy. Government decentralization could be administrative¹, political and/or fiscal (Ribot, 2002; Ribot, 2006).

Fiscal decentralization involves the allocation of predictable amount of funds to lower actors while also giving them autonomy on fund utilization (UNDP, 1999). The outcome of government decentralization is believed to be more dependent on the extent of fiscal decentralization. Cabral (2011) explained that for decentralization to be effective, fiscal decentralization remains important as it determines what other tiers of government can do with the powers transferred to them. However, comparing the implementation of the three components of decentralization, Ndegwa (2002) revealed that fiscal decentralization remains the least widespread component of the decentralization process while the other two components even though more widespread remain shallow. Nigeria contributes significantly to the low quality of life in Sub Saharan Africa. There is dearth of knowledge on the role of fiscal decentralization on the quality of lives of the most populous Africa countries perhaps biggest economy in the region. Understanding how changes in the public finances of the lower tiers of government in the country influences the distribution of public goods would be of importance to the policy revolution to improve governance in the region. Against this background, this study used a nationally representative data from World Development Indicators and Nigerian Central Bank Statistical Bulletin to estimate the fiscal decentralization on quality of life using health (child mortality), environment (access to improve water, income (household consumption expenditure) and education (school enrollment) as a measure.

Table 1: Population and poverty headcount of some countries in Sub Saharan Africa

Nigeria	1992	1996	2003	2009
Population (000)	100,592	111,164	132,581	155,207
Population in poverty (000)	57,397	70,589	70,877	82,989
Ghana	1987	1991	1998	2005
Population (000)	13,480	15,043	17,969	21,389
Population in poverty(000)	3,387	2,467	6,091	5,379
Kenya	1992	1994	1997	2005
Population (000)	25,029	26,608	28,842	35,349
Population in poverty (000)	5,526	5,012	6,201	11,877
Senegal	1994	2001	2005	2012
Population (000)	8,475	10,118	11,269	13,357
Population in poverty (000)	1,779	1,628	1,401	1,708

Population in poverty calculated using poverty headcount

Source: WDI (2016)

2.0 Review of literature

2.1 Barriers to effective distribution of economic resources through government decentralization

¹ Administrative decentralization is where lower actors are given powers to implement policies made by the Central government while political decentralization involves the transfer of power and resources to representatives of the local population (Ribot, 2002; Ribot, 2006).

Apart from reducing the pressure on the central government, one of the major expected benefits of decentralization is that it would allow for a proper and more effective response to the demands of the rapidly growing population especially in rural areas (Appiah *et al.*, 2000; Dincer *et al.*, 2010; Bjedov *et al.*, 2010; Birney, 2014; Fatile *et al.*, 2015; Agyemang-Duah, *et al.*, 2018; Ponce-Rodríguez *et al.*, 2020). However, governments particularly in developing countries are finding it difficult to adjust to the differences that exist in the institutional framework of decentralization and the conventional centralized system of managing public affairs (AFD and World Bank, 2013; Birney, 2014). The lack of clear specification of the responsibilities of the different actors in government and the low precision in the execution of tasks affect the effective discharge of responsibilities of each tier of government (Okojie, 2009; Birney, 2014; Fatile *et al.*, 2015; Agyemang-Duah, *et al.*, 2018). Divas (2005) opined that the low institutional capacity could be associated with the lack of financial resources to employ well trained and qualified staff. The salary of government employees is usually lower when compared to those employed in the private sector (Okojie, 2009). The Institutional problems are often compounded by economic problems such as recessions, fall in oil prices and natural disasters which affects the financial capacity of both central and local governments (Okojie, 2009; Birney, 2014; Fatile *et al.*, 2015; Agyemang-Duah, *et al.*, 2018) and as such they fail to deliver public goods and services to citizens (Ahmad *et al.*, 2008; Cabral, 2011; Ponce-Rodríguez *et al.*, 2020). Iseolorunkanmi (2014) opined that apart from reducing the financial allocations to local governments, such economic problems could lead to or promote undemocratic sharing process and excessive politicization of service provision.

The transfer of resources with considerable levels of autonomy also makes corruption easier (Arikan, 2004; Fan *et al.*, 2009; Dincer *et al.*, 2010; Bjedov *et al.*, 2010). The delivery of public goods and services by the lower tiers of government are often frustrated as there are usually no structure of accountability in place and as such the local governments are left at the mercy of local power elites (Bardhan and Mookherjee, 2005; Fan *et al.*, 2009; Dincer *et al.*, 2010; Bjedov *et al.*, 2010). The heavy dependence of local governments on the central governments for funds also affects their accountability to the citizens as the funds are often unpredictable as they are allocated in inequitable ways. (Divas, 2005; Fan *et al.*, 2009; Dincer *et al.*, 2010). The diversity of ethnic groups across different regions remains a major barrier to having stable decentralized governments in most African countries (Spaeder, 2005; Bratton, 2012; Smoke, 2015). The transfer of power to lower tiers of governments could be a source of strength to political rivals as such effective policy reforms to improve the decentralization process are underutilized or boycotted thus making it less effective (Appiah *et al.*, 2000; Dincer *et al.*, 2010; Bjedov *et al.*, 2010; Birney, 2014; Fatile *et al.*, 2015).

2.2 Economic growth as an indicator of quality of life.

Despite the barriers to the utilization of government decentralization to promote the effective distribution of economic resources particularly in Africa, there has been considerable economic growth in Sub Saharan Africa. Many studies such as Ewetan *et al.* (2016) and Rodriguez-pose and Kroijer (2009) examined the relationship between fiscal decentralization and economic growth and revealed that the indicators of fiscal decentralization had a positive relationship with economic growth. However, the variations in the direction of growth of national income and other economic indicators particularly in Sub Saharan Africa makes it necessary to relate fiscal decentralization to other indicators of wellbeing. Carr (2017) explains that over the past decade, numerous studies conducted using other

indicators of wellbeing revealed results which vary from the information given by the rising GDP per capita. Despite the economic growth in Sub Saharan Africa, the rise in life expectancy at birth in the region has been related mostly to reductions in child mortality and the HIV/AIDS rather than economic growth while health and social problems such as malnutrition, hunger and poverty remain in the region.

Income is an important part of development, however there are also social and personal elements of development which combine to make opportunities available for people to live the life they want to live and consider worth living (Ivkovic, 2016). While it remains a simple and universal measure of productivity, GDP per capita does not capture the inequality and variations in wealth and resource distribution between the rich and the poor and social progress (Fatile et al., 2015; Agyemang-Duah, et al., 2018). Rockika (2014) explains that not all groups of people and regions of a country may benefit from GDP growth as social inequalities may grow and poverty may rise or remain at the same level despite the rise in income.

Economic growth is often different from what people perceive is true for their daily lives (Cleeve et al., 2015; Ogundari and Awokuse, 2018). GDP captures the changes that occur in the money economy and its aggregates are based on market value of all goods and services (Williams, 2009). However, activities such as the ability to feed and attend school occur both within and outside the money economy. Rojas (2009) explains that the livability (i.e. quality of life) an individual derives from an environment goes beyond what can be captured with the GDP. The GDP measures the sum of a nation's financial transaction but does not consider whether such transactions improve or worsen the living conditions of citizens especially the poor (Moore, 2015). Economic growth occurs as a result of negative occurrences such as natural disasters, conflicts and wars as it includes among others amounts spent on arms, replacement of destroyed infrastructures and aid for displaced people. It also includes cost of pollution, urbanization and other burdens of life which reduce its quality (Wozniack, 2004).

3.0 Data and descriptive statistics

The data for this study were sourced from the Nigerian Central Bank of Nigeria (CBN) Statistical Bulletin and the World Development indicator (WDI). The CBN statistical bulletin is produced quarterly and yearly. The bulletin contains statistical information about the financial statistics of government finance, real sector, external sector, banks and capital markets and other sectors of the Nigerian Economy. The information about the revenue and expenditure of the central, state and local government in Nigeria was obtained from the bulletin. The World Development Indicators (WDI) data is collected by the World Bank from officially recognized sources. The data contains yearly information on sectors of the economy such as employment, life expectancy, literacy rate Co₂ emission and so on and is collected across countries, regions and the world as a whole. The indicators of quality of life for Nigeria were selected from the data. Data covering the period between 1981 and 2014 was used.

The trend of state and local government expenditure as a proportion of national expenditure is shown in Figure 1. State expenditure declined considerably in 1993 and remained low for several years. There were however sharp

increases in the expenditure of both sub national governments from 1999. Udoh *et al.*, (2015) explains that the period of decline coincides with the military era while it rose with the return of democratic governance in the country.

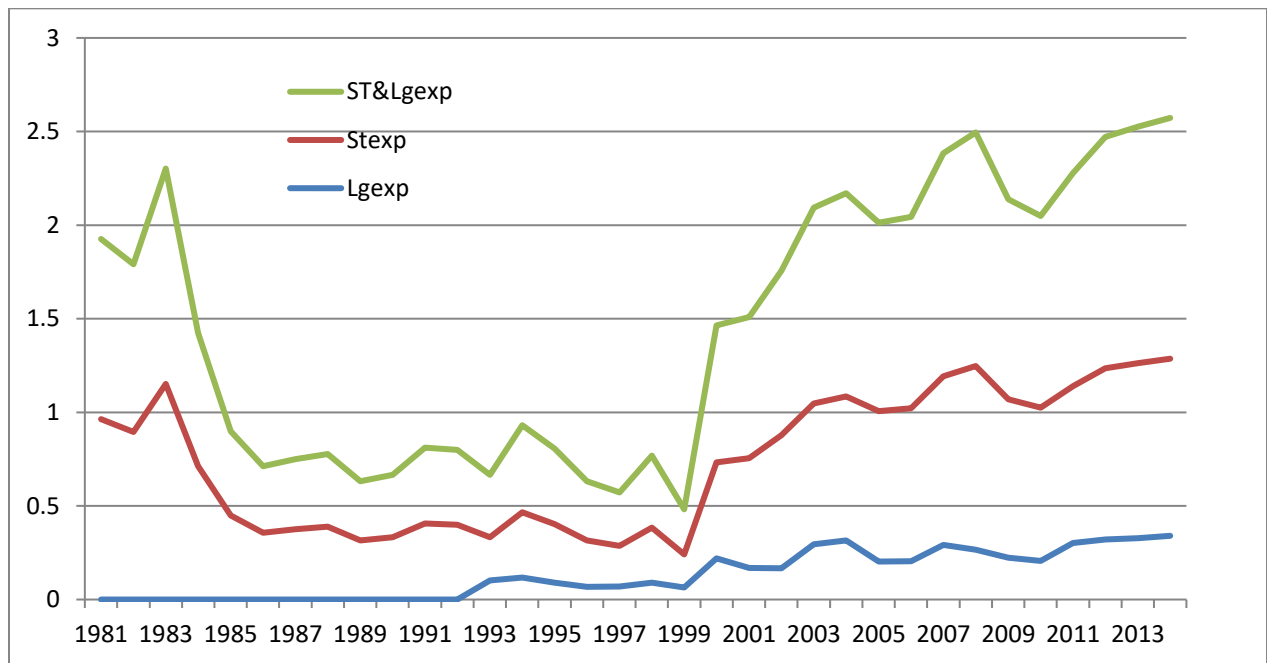


Fig 1: Trend of expenditure of sub national governments in Nigeria

The expenditure of both state and local governments was less than that of federal government until 2003, when the index rose above 1. The trend of transfers from the national government to the state and local government shows that despite the existence of a revenue sharing formula, the amount of fund that were transferred to the sub national governments in the country remain unstable. Akeem (2011) revealed that over the years there has been several revenue allocation formulae used in Nigeria however, sub national governments are still under-funded as government is still highly centralized. Basically, the poor allocation of funds was associated with the discovery of oil and military rule.

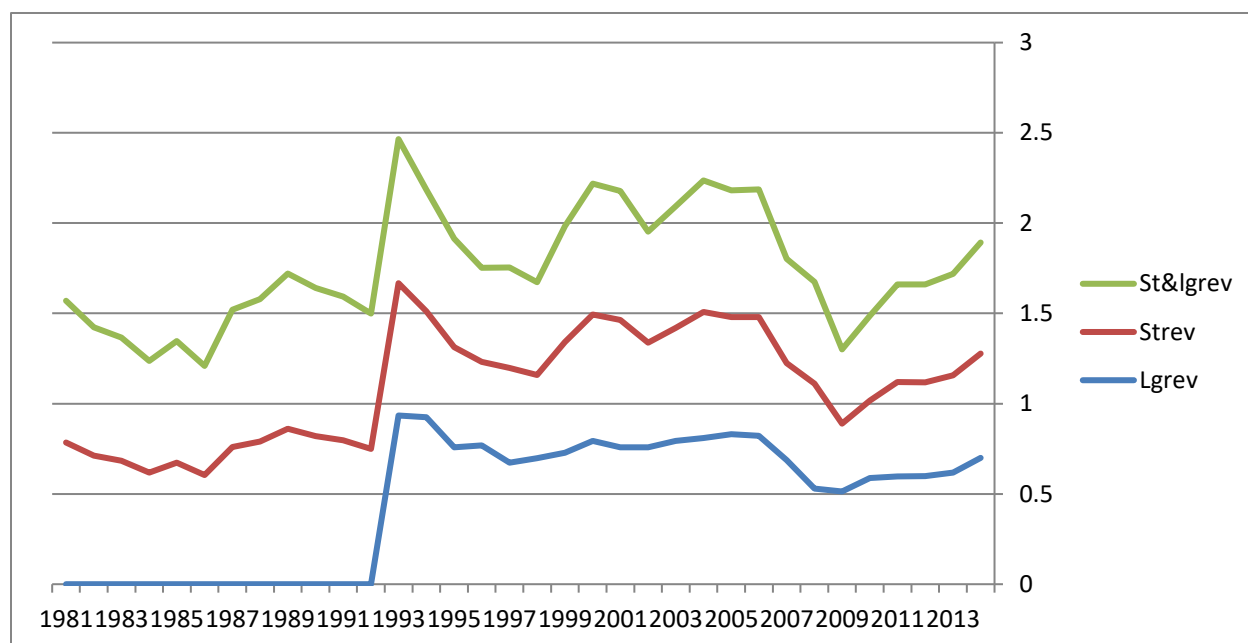


Fig2: Trend of revenue of sub national governments in Nigeria

There revenue share of both sub national government dropped significantly around 2007 and continued to drop until 2010 when it picked up again. The decline was related to global financial crises which occurred around that period. Akani (2013) explained that Nigeria experienced fiscal constraints due to the fall in oil prices which reduced the country's foreign exchange earnings. Both state and local government revenue remains low compared to the period prior to the fall as oil prices remain low.

4.0 Empirical estimation

Descriptive statistics and the Vector Auto- correlation model were used to assess the relationship between fiscal decentralization and the indicators of quality of life. The model for the relationship between the indicators of decentralization and the indicators of quality of life is specified as

$$Q = \beta_1 + \beta_y M_y + \mu_i \dots\dots\dots (1)$$

Where

Q= Quality of life indicator

M = Vector of fiscal decentralization variables

μ = error term

All the variables in the model were assumed to be endogenous. The VAR system is based on the assumption that all economic variables move together and as such are endogenous. The VAR includes specified lag of all the variables in the model. To create a VAR model, equation (1) is adjusted by including a lagged dependent variable

$$ind = \beta_0 + \beta_1 \Delta x_{y-1} + \beta_2 \Delta x_{y-2} \dots \dots + \beta_k x_{y-k} + \mu_i$$

Where: X = lag of Quality of life indicators (Q) and Vector of fiscal decentralization variables (m)

k = lag specification for model

The estimate the VAR model, there is the need for selection of the lag length for the model. This can be specified using the lag order statistics such as the Akaike information criterion, Schwarz's Bayesian Information criterion. The lag order statistics help to minimize the prediction error of the given model.

Post estimation tests after VAR

An impulse response function (IRF) function and a Granger causality test was also generated as post estimation after the VAR to confirm the results. The *orf* describes how the variables in the VAR model react over time to a shock. Causality describes a situation where the lagged values of a variable x can explain a variable y and its lags. Causality can also be bi-directional (i.e. x can explain y and y can also explain x). The null hypothesis set is that the independent variable x does not granger cause the dependent y.

Stationarity test

Traditionally VARs are used on variables that stationary. Economic variables are often not stationary and their inclusion into an economic model would produce biased inconsistent results (Sede and Ohemeng, 2015). The Augmented Dickey-Fuller test for stationarity was used to check for the stationarity of the variables in used in the study.

Measurement of quality of life (Indicators)

The indicators for quality of life used in the study are:

- Health: Child mortality
- Environment: Access to improved water (water)
- Income: Household consumption expenditure (*hexp*)
- Education: School enrollment (school)

Measure of fiscal decentralization

The indicators of fiscal decentralization were used are:

- A combination of state and local government expenditure as proportion of national expenditure (*st&lgexp*)

- A combination of transfers to from federal government to state and local government as a proportion of state and local government revenue (*st&lrev*).

Two models were specified based on the indicators of fiscal decentralization. The individual transfers to local and state governments and their individual expenditures were used in model 1 while the combinations of their expenditures and transfers received were used in model 2.

5. Results and discussion

Preliminary findings

5.1 Stationarity test

The lag of both the indicators of quality of life and fiscal decentralization was used so as to have growth model. The stationarity test in table 2 shows that all the variables except child mortality were stationary at first difference.

Table 2: Results of Augmented Dickey Fuller test

	level	1 st difference	2 nd difference	3 rd difference
<i>Indicators of fiscal decentralization</i>				
<i>LSt&lrev</i>	-2.614	-5.889***	-	-
<i>LSt&lgexp</i>	-2.485	-6.764***	-	-
<i>Indicators of quality of life</i>				
<i>Lhexp</i>	-1.937	-5.351***	-	-
<i>Lwater</i>	-0.921	-5.703***	-	-
<i>Lschool</i>	-2.178	-5.044***	-	-
<i>Lmortality</i>	-0.879	-1.946	-2.208	-7.888***

Source: Authors computation

5.2 Optimal lag length selection: In table3, the Akaike information criterion (AIC) and Hannan-Quin (HQIC) specify that the lag order of the VAR should be 3 while the Schwarz's Bayesian Information criterion (SBIC) gives a specification of a single lag. The result of the Akaike information criterion was adopted in the study.

Table 3: Lag selection –order criteria

Lag order	LR	AIC	HQIC	SBIC
0	-	-14.352	-14.266	-14.063
1	83.711	-14.785	-14.186	-12.769*
2	83.413	-15.208	-14.095	-11.465
3	118.23*	-16.921*	-15.294*	-11.449

*indicates lag order selected

Source: Authors computation

5.3 Collinearity test: The variables were subjected to a variance inflation factor (VIF) test to check for multicollinearity among the variables in Table 4. A mean VIF of 1.12 which is less than 10 indicates there is no significant multicollinearity between the variables.

Table 4: Variance inflation factor (VIF) test

VIF	Tolerance	R-squared
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Indicators of fiscal decentralization			
LSt&lrev	1.05	0.957	0.043
LSt&lgexp	1.21	0.826	0.174
Indicators of quality of life			
Lhexp	1.05	0.950	0.049
Lwater	1.10	0.908	0.908
Lschool	1.16	0.861	0.139
Lmortality	1.15	0.868	0.868

Source: Authors computation

Main findings

5.4 Fiscal decentralization and Quality of life Indicators (Vector Auto regression)

The summary statistics for each of the equation in the VAR revealed the extent to which the variables used in selecting lag order of the VAR model explained each of the variables. The results on Table 5 shows that 63%, 66%, 87% and 64% of the variations of in household expenditure, school enrollment, access to improved water and child mortality were explained by the variables. The significant Chi- square results also reveal that were significant differences among the variables.

Table 5: Summary statistics for VAR model

Indicators of quality of life	R-Square	Chi2
Lhexp	0.634	48.581***
Lwater	0.874	194.96***
Lschool	0.657	53.648***
Lmortality	0.638	49.37***

Source: Authors computation

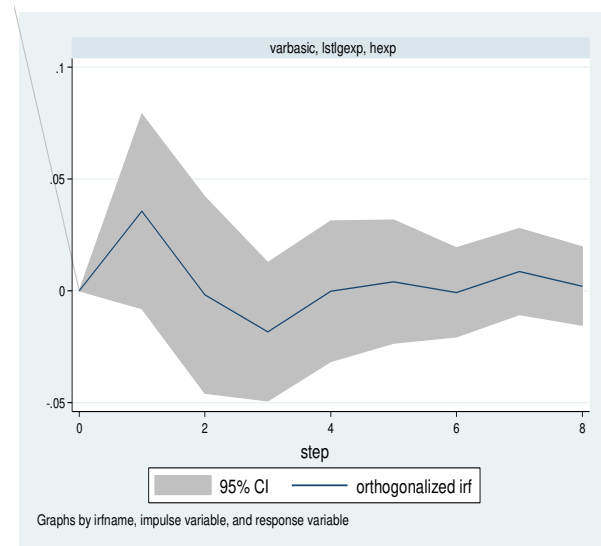
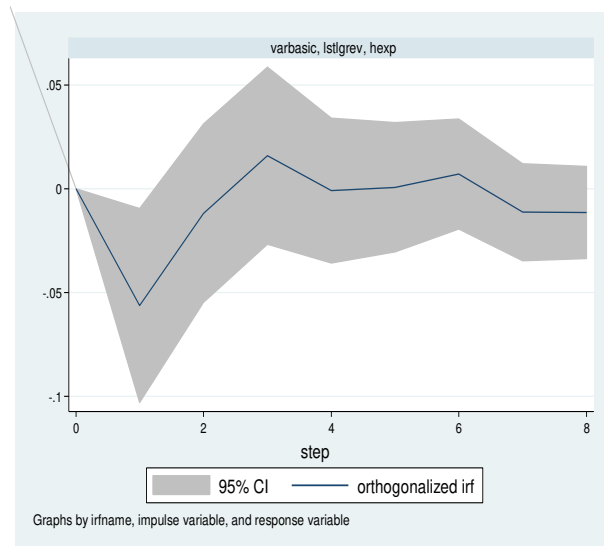
Fiscal decentralization and household consumption expenditure (*hexp*): The results on table 6 reveal that the growth of the past revenue of both state and local governments in Nigeria had a negative relationship with the growth of household expenditure in Nigeria. However, the growth of the expenditure of both sub national governments had significant increasing effects on household expenditure. Adelowokan and Osoba (2015) revealed that even though the country's revenue has the potentials of improving the welfare of the people, the gross domestic product and the country's revenue from oil exert a negative effect on the poverty rate in Nigeria. This was associated with the misappropriation of government investments and the ineffective use of revenue to improve the welfare of the people. The inverse relationship between the revenue of sub national governments and expenditure is also related to the transfer of public funds to private use and the resulting high levels of inequality Nigeria. Rabnawaz (2014) and Ogunniyi et al., (2020) explained that high levels of corruption in government lead to inequality in the monetary system and it in turn has negative effects on economic growth. The impulse response function in Figures 3 and 4 shows that the trend of household expenditure rebounds after the shock between period 2 and 4, after which the response of household expenditure to changes in revenue and expenditure of state and local governments in Nigeria becomes minimal.

Table 6: Parameter estimates of the VAR model (household consumption expenditure)

	1 st lag		2 nd lag		3 rd lag	
	Coefficient	Standard error	Coefficient	Standard Error	Coefficient	Standard error
<i>Indicators of fiscal decentralization</i>						
LSt&lrev	-0.745***	0.239	-0.994***	0.373	-0.807*	0.441
LSt&lgexp	0.362*	0.189	0.608***	0.225	0.112	0.155
<i>Indicators of quality of life</i>						
Lhexp	-0.232	0.177	-0.274	0.197	0.313*	0.172
Lwater	-0.262	0.167	-0.418***	0.112	0.050	0.117
Lschool	0.455	0.624	1.315**	0.591	2.110***	0.790
Lmortality	-6.410**	3.147	-8.427**	3.765	-2.018	2.758

*** P < 0.01 ** P < 0.05 *P < 0.1

Source: Authors computation

**Fig 3: IRF graph (LSt&lgrev & Lhexp)****Fig 4: IRF graph (LSt&lgrev & Lhexp)**

Fiscal decentralization and school enrollment (*school*): The immediate past revenue of sub national government in Nigeria had a significant positive relationship with the growth of school enrollments in the country while the revenue in the second and third years had negative and insignificant effects as shown on Table 7. The relationship between the expenditure of sub national government in the past years and the current growth in school enrollment was positive but insignificant. The results reveal that though sub national governments have been investing in education, their level of investment was low. While there was growth in sub national revenue in the immediate past year, the effect of the expenditure of sub national governments on education remained insignificant.

Table 7: Parameter estimates of the VAR model (School enrollment)

	1 st lag		2 nd lag		3 rd lag	
	Coefficient	Standard error	Coefficient	Standard Error	Coefficient	Standard error
<i>Indicators of fiscal decentralization</i>						

LSt&lrev	0.159**	0.069	-0.156	0.108	-0.069	0.128
LSt&lgexp	0.004	0.069	0.069	0.065	0.051	0.045
Indicators of quality of life						
Lhexp	-0.186***	0.513	0.0018	0.057	0.106*	0.049
Lwater	0.043	0.049	-0.016	-0.016	-0.091***	0.339
Lschool	-0.115	0.181	-0.079	0.172	-0.236	0.229
Lmortality	1.233	1.079	-1.356	1.121	0.154	0.150

*** P < 0.01 ** P < 0.05 *P < 0.1

Source: Authors computation

The poor educational development in Nigeria is related primarily to poor government funding (Kpoliva and Obilova, 2013). Expenditure on education in Nigeria remains below the UNESCO recommendation of 26% (Adelakun, 2011; Edame and Eturoma, 2014). Studies (Adelakun, 2011; Ogundari and Abdulai, 2014; Edame and Eturoma, 2014; Ahmad, 2015; Ogundari and Awokuse, 2018) have shown that expenditure on education in Nigeria is very unstable and does not accommodate the population growth of the country thus preventing the expansion of school enrollment. The impulse response function in Figures 5 and 6 shows that the trend of household expenditure rebounds after the shock in period 4, after which the response of school enrollment to changes in revenue and expenditure of state and local governments in Nigeria becomes minimal.

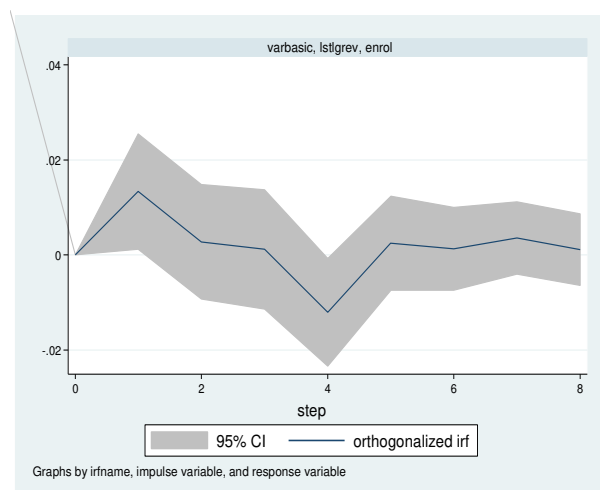


Fig:5: IRF graph (LSt&lgrev& enrol)

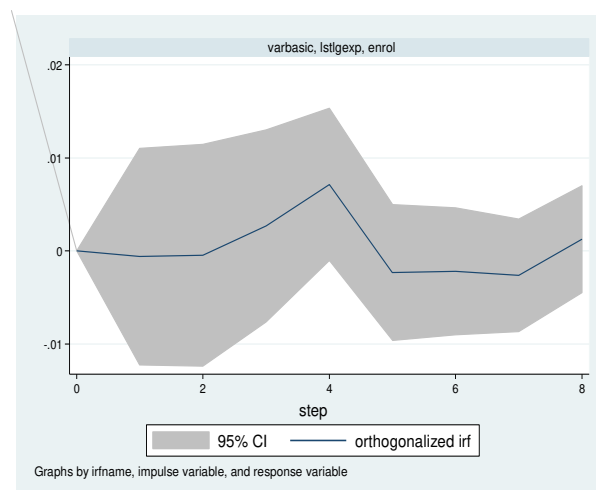


Fig:6: IRF graph (LSt&lgexp& enrol)

Fiscal decentralization and access to improved water (water): The results on Table 8 reveals that the growth of past revenues of sub national governments in Nigeria had significant negative relationship with the growth in the proportion of people with access to improved water source. Growth in government expenditure at the sub national level in two immediate past periods however had positive relationships with access to water. The expenditure in the second period was significant. The relationship between access to water and expenditure in the two previous years indicates that the government investments were low. Nigeria has been identified to have adequate surface and ground water resources (Nwankwoala, 2011; Emenike et al., 2017), however, there is the need for infrastructure to distribute it especially to areas where rainfall is unstable. In an interim strategy note for the water supply and sanitation by the

Federal government of Nigeria (in year 2000), it was explained that the financial constraints of states affect the purchase and maintenance of infrastructure in the state water corporations.

Table 8: Parameter estimates of the VAR model (Access to water)

	1 st lag		2 nd lag		3 rd lag	
	Coefficient	Standard error	Coefficient	Standard Error	Coefficient	Standard error
Indicators of fiscal decentralization						
LSt&lrev	-0.798***	0.210	-0.723**	0.327	-0.681*	0.387
LSt&lgexp	0.267	0.166	0.358*	0.358	-0.073	0.387
Indicators of quality of life						
Lhexp	-0.295*	0.155	0.222	0.173	0.155	0.151
Lwater	-0.139	0.147	0.349	0.099	-0.193	0.193
Lschool	0.534	0.548	1.519***	0.518	0.928	0.694
Lmortality	5.877**	2.763	-3.097	3.122	4.731**	2.422

*** P < 0.01 ** P < 0.05 *P < 0.1

Source: Authors computation

The distribution of water is primarily the role of state and local governments, yet due to the drive to meet the development goals and inadequacy of funds the at the sub national levels, the Federal government and donors intervene to increase access to water (WHO/UNICEF, 2014; Abubakar, 2019). The impulse response function in figure 7 and 8 shows that the trend of access to water respond to shocks which result as a disturbance in the amount of state and local government revenue and expenditure respectively. However, the response to variations in revenue becomes insignificant after period 6.

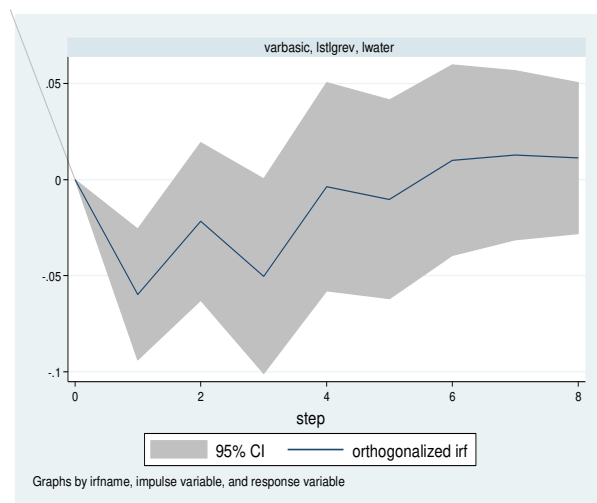


Fig7: IRF graph (LSt&lgrev & water)

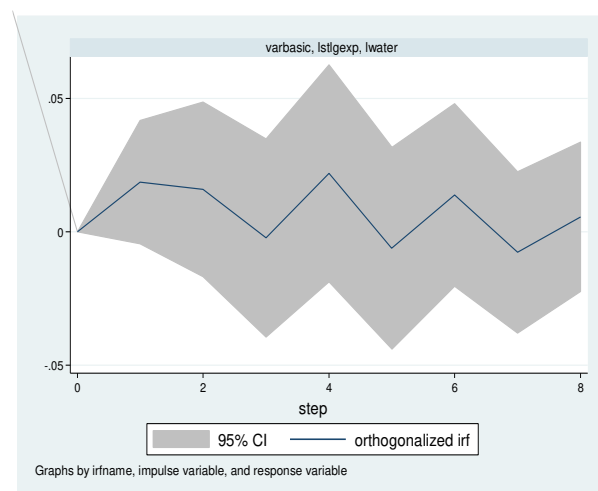


Fig 8: IRF graph (LSt&lgexp & water)

Fiscal decentralization and child mortality: The result on table 9 reveals that the growth of sub national government revenue in the previous years and the growth of child mortality had a negative relationship. However, child mortality

shows a positive relationship with the growth of state and local government expenditure in the previous years. This implies that despite low expenditure at the sub national level, child mortality continued to reduce in the country. This is consistent with the findings of Mathew *et al.* (2015) which found that government expenditure in Nigeria had a negative relationship with health outcomes in Nigeria. This implies that the achieved improvements in health outcomes in country are less related to government spending.

Table 9: Parameter estimates of the VAR model (Child mortality)

	1 st lag		2 nd lag		3 rd lag	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Indicators of fiscal decentralization						
LSt&lrev	-4.17e-04	0.002	-4.92e-04	0.002	-7.13e-06	0.002
LSt&lexp	1.96e-04	0.001	6.02e-04	0.001	0.002**	9.84e-04
Indicators of quality of life						
Lhexp	-0.003**	0.001	-0.003**	0.001	0.001	0.001
Lwater	0.002	0.001	0.008	0.007	-0.003*	0.002
Lschool	-0.001	0.004	0.004	0.004	0.006	0.005
Lmortality	-0.558***	0.199	-0.298	0.238	-0.055	0.175

*** P < 0.01 ** P < 0.05 *P < 0.1

Source: Authors computation

The impulse response function in Figures 9 and 10 shows that the trend of access to water respond to shocks which result as a disturbance in the amount of state and local government revenue and expenditure respectively.

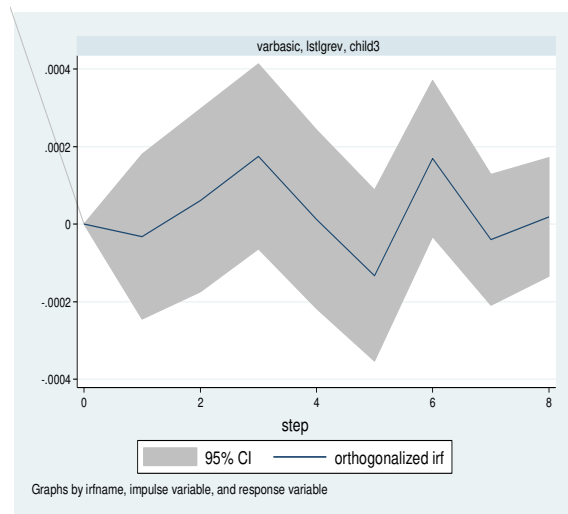


Fig 9: IRF graph (LSt&lrev & mortality)

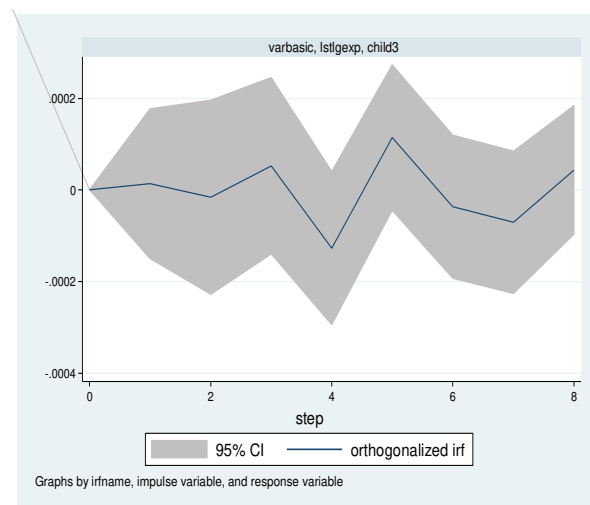


Fig 10: IRF graph (LSt&lexp & mortality)

5.5 Granger Causality test

The Granger causality investigates whether the past values of one variable are useful in predicting the dependent variable. The lag order specified by the Akaike information criterion (AIC) in Table 4 was used. The results on Table

10 reveal that the null hypothesis that the both the revenue and expenditure of state and local governments in Nigeria does not granger cause household consumption expenditure and school enrolment in Nigeria would be rejected. However, it appeared not to granger cause access to improved water and child mortality.

Table 10: Causality test

Direction of causation	F- value	Remark
$LSt\&lrev \rightarrow Lhexp$	19.456***	Reject
$LSt\&lgexp \rightarrow Lhexp$	11.234***	Reject
$LSt\&lrev \rightarrow Lwater$	1.4954	Do not reject
$LSt\&lgexp \rightarrow Lwater$	2.052	Do not reject
$LSt\&lrev \rightarrow Lschool$	6.866*	Reject
$LSt\&lgexp \rightarrow Lschool$	15.446***	Reject
$LSt\&lrev \rightarrow Lmortality$	1.660	Do not reject
$LSt\&lgexp \rightarrow Lmortality$	1.559	Do not reject

*** P < 0.01 ** P < 0.05 *P < 0.1

Source: Authors computation

6.0 Conclusion and Policy implications of findings

The study examined the lagged effect of the combination of state and local government expenditure as a proportion of national expenditure and the combination of transfers from federal the government to state and local government as a proportion of state and local government revenue on health, household wealth, education and access to water. The variables were assumed to be endogenous and were subjected to vector Auto regression analysis. The coefficient of the growth in state and local government revenue was negative in most of the models the models. This implies that despite the improvements in access to water, household expenditure, school enrollment and child mortality, the growth in the revenue of sub national governments in the country has been low or negative. It indicates that sub national governments have financial constraints in playing their roles and made little contributions to the improvement of living standard in Nigeria as a result of a rise in their revenue. The growth in the expenditure of sub national governments had an increasing but insignificant effect on the growth of household wealth, education and access to water. This implies that though sub national governments invested in the public goods their level of investments were considerably low. With effective fiscal decentralization, Nigeria has the capacity to achieve the sustainable development goals (SDGs).

The influence of fiscal decentralization on the indicators of quality of life in Nigeria is low as the investments of sub national governments on public goods are insignificant. The improvements in the peoples' access to public goods especially in terms of health and access to water cannot be attributed to improvements in sub national government revenue or expenditure. In line with the results of our study, the following are recommended:

- The funds transferred to state and local government should be predictable and the revenue sharing formula in the country should be formulated based on the intended roles of sub national governments.

- The expenditure of sub national governments would be more effective in improving the quality of life of the people if measures of accountability are put in place to ensure constructive and effective use of public funds.
- Sub national governments need to be less dependent on transfers from the central government as their main source of revenue.
- Employees of sub national governments should be trained on the effective use of public resources. Public contracts should be allocated to experts to ensure maximization of the use of public funds.

List of Abbreviations

ADF Augmented Dickey-Fuller

AIC Akaike information criterion

CBN Central Bank of Nigeria

GDP Gross Domestic Product

IRF Impulse Response Function

SSA Sub Saharan Africa

VAR Vector Autoregression

VIF Variance Inflation Factor

WDI World Development Indicator

Declarations

Availability of data and materials: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they had no conflict of interest.

Funding: This is an unfunded paper.

Authors' contributions

Rufai Mistura and Ogunniyi Adebayo: Conceptualization, Methodology, Software *Rufai Mistura:* Data curation, Writing- Original draft preparation. *Salman Kabir:* Visualization, Investigation, Supervision; *Rufai Mistura, Ogunniyi Adebayo, Salawu Mutiat;* Writing-Reviewing and Editing: Methodology, Software

Acknowledgements

There is no acknowledgement at the moment.

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Figures

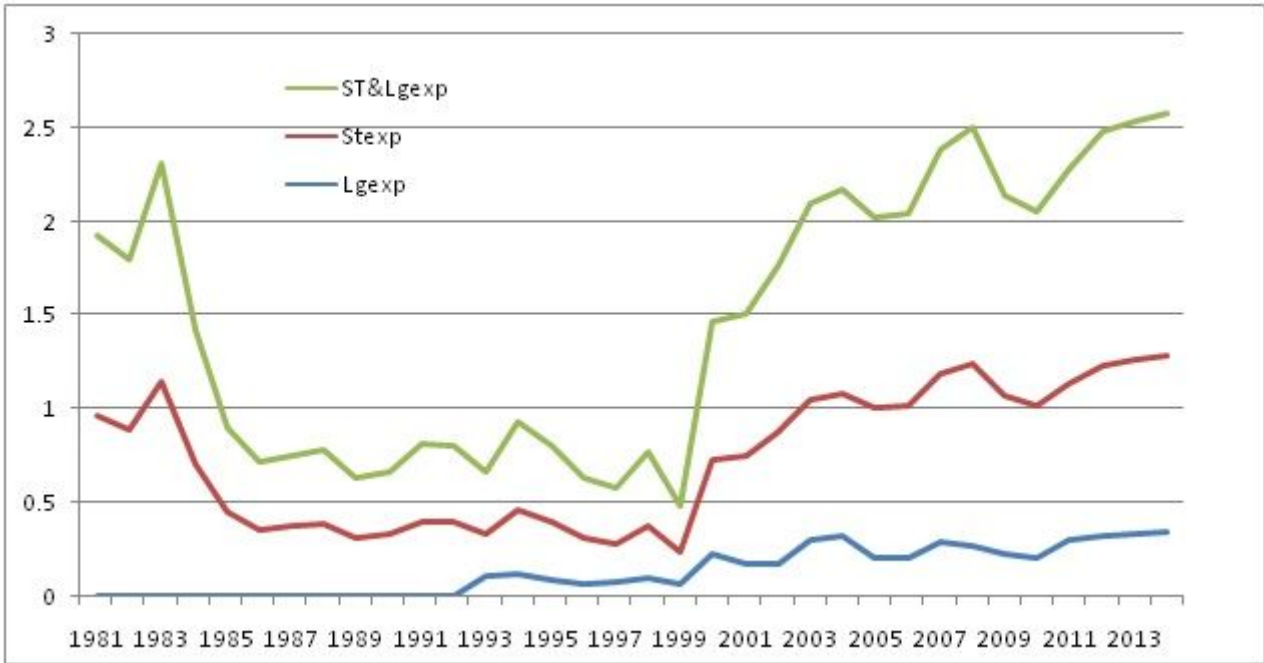


Figure 1

Trend of expenditure of sub national governments in Nigeria



Figure 2

Trend of revenue of sub national governments in Nigeria

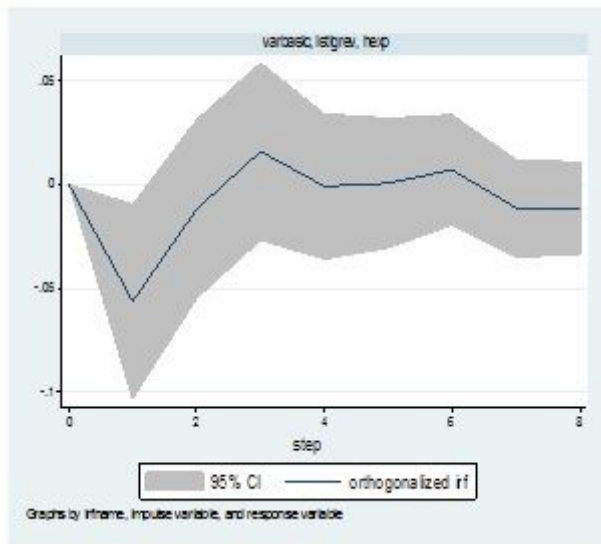


Figure 3

IRF graph (LSt&l1grev&Lhexp)

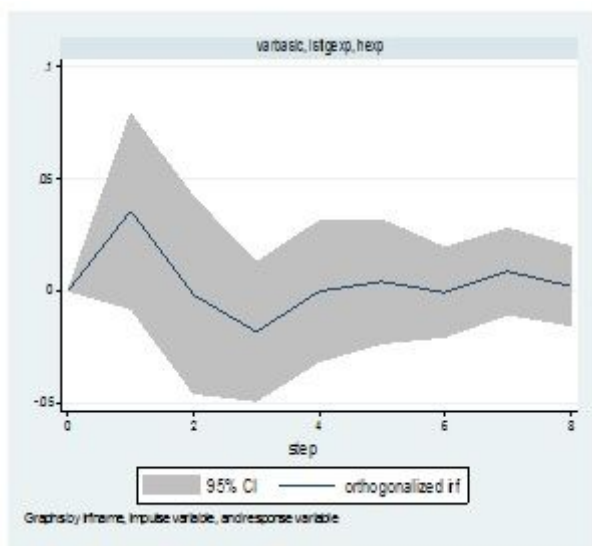


Figure 4

IRF graph (LSt&l1grev&Lhexp)

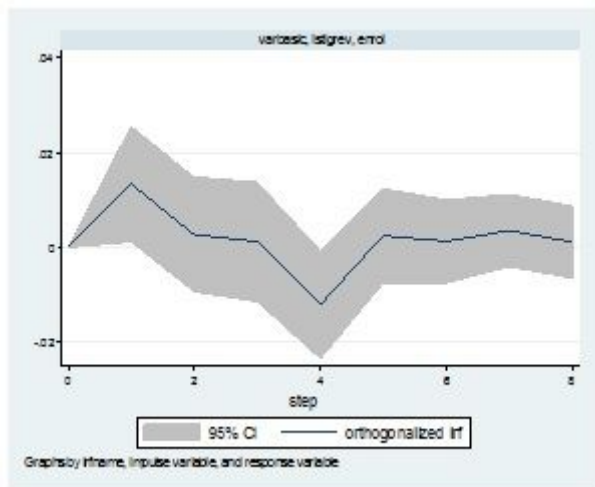


Figure 5

IRF graph (LSt&lsgrev&enrol)

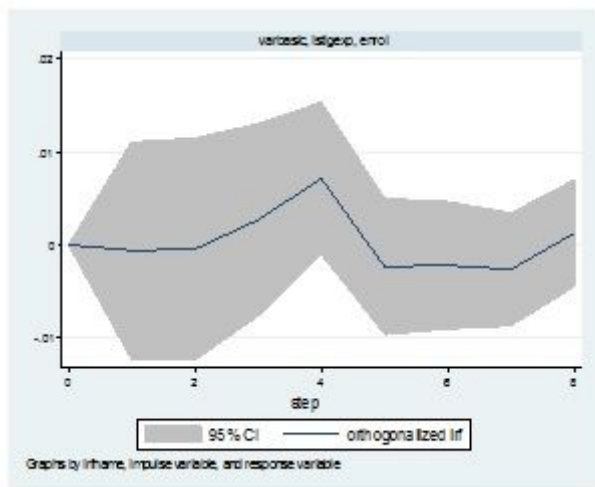


Figure 6

IRF graph (LSt&lsgexp&enrol)

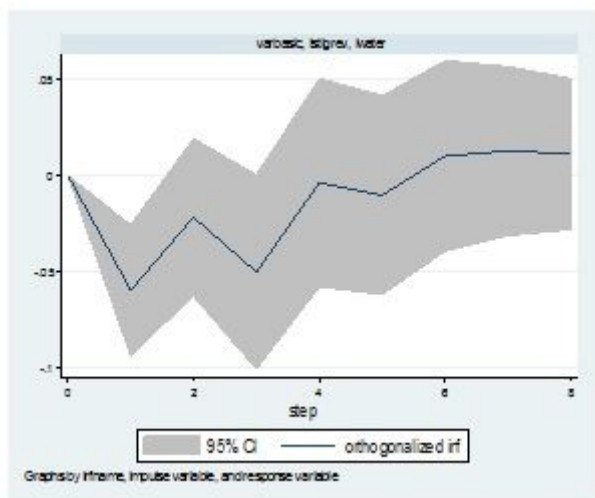


Figure 7

IRF graph (LSt&lgrev&water)

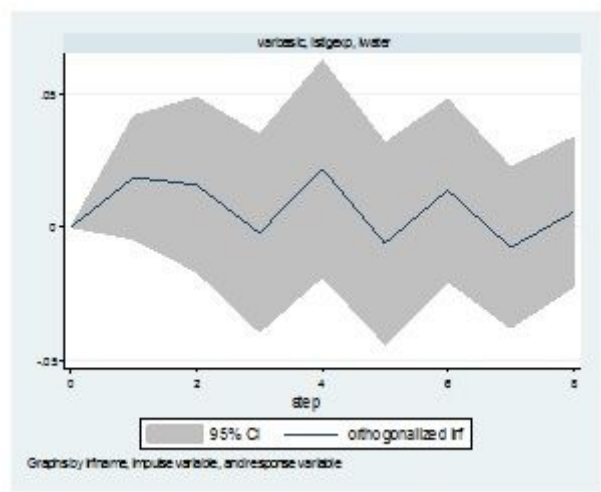


Figure 8

IRF graph (LSt&lgrev& water)

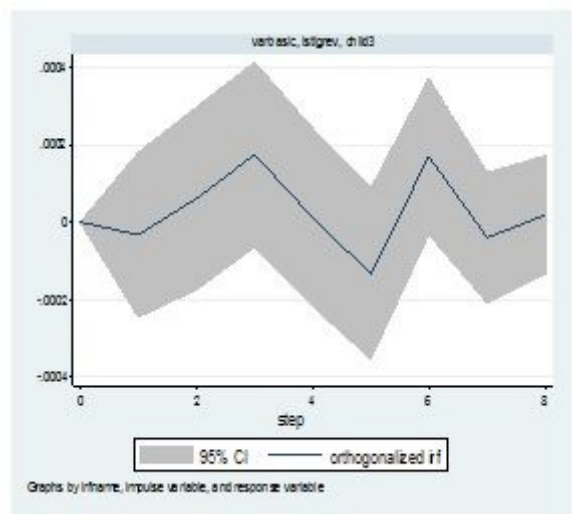


Figure 9

IRF graph (LSt&lgrev&mortality)

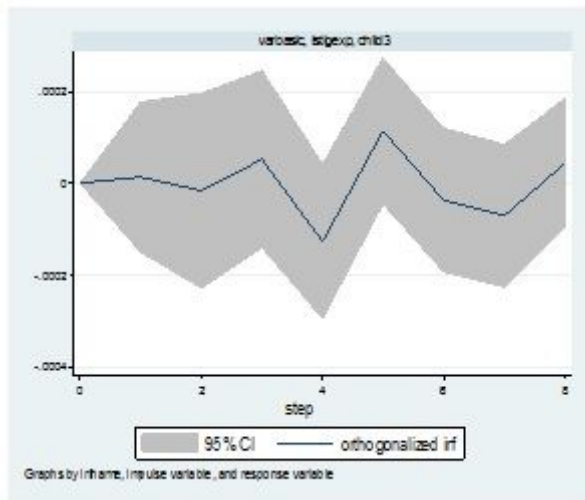


Figure 10

IRF graph (LSt&lgrev& mortality)