

# The Mediating Effect of Money Growth And General Public Consumption In The Fiscal Deficit-Inflation-Growth Nexus of The West African Monetary Zone: A Multilevel Structural Model Approach

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## Research

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**The mediating effect of money growth and general public consumption in the fiscal deficit-inflation-growth nexus of the West African Monetary Zone: A Multilevel Structural Model Approach**

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## **Abstract**

The effect of fiscal deficit on inflation and growth, has been a highly contested issue in economics. Studies on the issue generally have sought to ascertain whether deficit in the fiscal balance has positive or negative effect on inflation and/or growth, neglecting the question of mediating variables in the process. In this study, we consider the consequences of selected mediating variables, money growth and general public consumption, in the context of the relationship among fiscal deficit, inflation and growth in the case of the West African Monetary Zone. The study is based on Multilevel Structural Model (1, 1, 1) within the framework of dynamic structural equation model. We found that when the relationship between inflation and fiscal deficit is mediated by growth of money, it does not show any statistical credibility, thus, member-countries are not prone to finance deficits by expanding growth of money. On the other hand, general public consumption is a statistically credible mediator between fiscal deficit and growth, but its effect is negative on growth. This implies that increased general public consumption occasioned by increased fiscal deficit is counter-productive to growth outcomes in the sub-region.

**Key Terms:** Money growth, general public consumption, mediating effect, fiscal deficit, inflation, growth, West African Monetary Zone.

## 1. Introduction

Fiscal deficit is a big policy conversation in West Africa. Basically, countries in the sub-region have recurring budget overruns because resources generated internally are inadequate to meet the needs of growing populations. As a result, yearly fiscal expenditures exceeds incomes creating deficits in their respective fiscal balances (Mesagan and Yusuf 2019). There have been disagreements on the effects of these deficits emanating from the fiscal accounts on core macroeconomic variables like growth and inflation. These disagreements are firmly rooted in ideological as well as empirical positions that are largely opposed to one another. The question of fiscal deficit and its effect on inflation and other key macroeconomic variables has thus become a highly contested issue in economics. Whilst some studies argue that fiscal deficit will negatively affect inflation, others are of the view that it will have no significant effect. For example, empirical studies on Nigeria have established that fiscal deficit is inflationary (Anayochukwu 2012; Bakare 2014; Wosowei 2013), whilst Keho (2016) argues that in the context of the West African Economic and Monetary Union (WAEMU) the effect of fiscal deficit on inflation is mix.

When we look at the effect of fiscal deficit on growth, (Odhiambo et al. 2013) established (based on annual data spanning 1970-2008 on Kenya) that fiscal deficit and growth are negatively related. This result confirmed an earlier study on Nigeria (Ezeabasili and Tsegba 2012). However, on the same economy of Nigeria, Solawon and Adekunle (2018), based on Autoregressive Distributed Lag Model with time series data spanning 1986-2016, established that fiscal deficit has no significant effect on growth. Also in the case of Ghana, Alagidede et al. (2018) argue based on time series data spanning 1967-2013 that fiscal deficit is adverse to growth and is statistically significant when it surges above the optimal deficit threshold of 7.6 percent. In a similar vein, Bangura et al. (2016) explained that in the case of Sierra Leone, fiscal deficit only have long run effect on growth but the relationship is negative.

Consensus on the problem of fiscal deficit and its effect on key economic fundamentals like inflation and growth appears to be a distant reality. Whilst much attention has been given to the magnitude and direction of the relationship between fiscal deficit and selected economic fundamentals, the question of interaction variables mediating the relationship has virtually been neglected (Eita et al. 2021; Kaur 2018; Olubiyi and Bolarinwa 2018). In this study, we consider the effect of money growth and general public consumption as selected mediators in the relationship among fiscal deficit, inflation and growth within the context of the West African Monetary Zone. We seek to examine whether countries in the WAMZ sub-region resort to money growth to off-set imbalances in the fiscal account? Secondly, whether fiscal deficit is growth-invariant when expanded expenditure is used to finance general public consumption? Lastly, whether fiscal deficit is inflationary because it leads to increase in money growth? These are critical questions that require urgent attention to shape fiscal policy decisions as West African countries commit themselves to sustainable growth paths within the framework of policy the West African Monetary Zone (WAMZ).

The WAMZ policy is intended to drive the creation of a single monetary zone for the whole of the Economic Community of West African States (ECOWAS) (Oshikoya and Tarawalie 2010). The WAMZ member countries are Ghana, Nigeria, Sierra Leone, Liberia, The Republic of Guinea and The Gambia. The policy trajectory is to create the WAMZ as a second monetary zone in West Africa for the largely Anglophone countries to parallel the existing WAEMU monetary zone (WAMI 2000). The WAMZ therefore was intended to grow and merge with the WAEMU to consolidate into a single currency area in line with ECOWAS policy goals. The

macroeconomic situation of the WAMZ is the overarching determinant for the single currency implementation. The WAMZ member-countries have shown some resilience in sustaining gains on some of the requisite macroeconomic indicators, however, there are others yet to be met notably on the issue of fiscal deficit-GDP ratio and sustainable inflationary regime.

### *Theoretical literature*

The theoretical literature dwells on the conflicting positions of some selected ideologies that have shaped the literature on fiscal deficit. For the purposes of the study we looked at the Classical, Keynesian, Ricardian hypothesis and Fiscal Theory of the Price Level (FTPL).

The Classical school posits that fiscal deficit is inflationary because persistent deficit over time will lead to money creation by the government (Barro 1989; Tiwari et al. 2012). This can be explained by the government budget constraint which equates expenditure to the volume of government taxes (revenue) such that an increase in government expenditure beyond the budget limit implies that taxes should be increased to accommodate the excess expenditure or excess expenditure will increase the net present value of future taxes. If government is unable to raise the required taxes to offset the rise in expenditure, it will resort to creating money to fund the expenditure gap. This excess money created will affect the general price level, thus creating inflation (Friedman 2017; Johnson 2017).

The Keynesian paradigm departed remarkably from the classical theory on the fundamental assumption of full employment economy embedded in the Classical viewpoint (Braun 2018). The Keynesian model postulates two fundamental viewpoints, firstly, the possibility that some resources will lie idle in the economy and secondly, the existence of a large number of liquidity constrained individual economic actors. From the Keynesian viewpoint, increasing the budget deficit will expand the growth of the economy by the inverse of the marginal propensity to save (Ball et al. 1988). It follows that this expansion in output will increase demand for money and therefore if money supply is fixed, such that the deficit is financed by issuance of bonds, interest rate will rise and thus private investment will fall (Ball et al. 1988).

One of the defining moments in the theoretical disagreements was the emergence of the Ricardian doctrine on fiscal policy. The Ricardian fiscal policy established on an assumption that consumers are forward-looking and are aware of government's inter-temporal budget constraint. In effect, consumers anticipate that an increase in government spending will lead to issuing government debt or increasing future taxes, which will affect future liquidity of households (Ofori-Abebrese and Pickson 2018). When government introduce a tax cut, it will lead to increased private savings and therefore aggregate demand will not be affected. Within the framework of the theory, demand-side fiscal policy instrument will not have any meaningful effect on output because multiplier effect is assumed to have no effect (Forte and Magazzino 2015).

In recent years, new explanations on the question of fiscal deficit and how it affects inflation have been posited by the FTPL (Christiano and Fitzgerald 2000). The crux of the theory is that a strong and independent monetary authority cannot singularly guarantee price stability but will require a close and complimentary fiscal policy to achieve and sustain desired price level for economic growth. In effect when fiscal and monetary authorities of the economy have mutually exclusive objectives the realization of the desired price level will not be achieved. This is at variance to previous ideology espoused by the monetarist doctrine, which has stated

that price stability could be attained under a strong and independent central bank driving technically robust and assertive monetary policy regardless of prevailing fiscal interests (Živković and Ristić 2019). The Monetarists have argued that inflation is fundamentally a monetary phenomenon and they have posited that budget deficit could be inflationary to the extent that it would be monetized (Hamburger and Zwick 1981). The relevance of fiscal policy to the process of managing inflation has been brought to the fore more strongly under the FTPL and it states clearly that money creation may not be the only way through which budget deficit becomes inflationary (Buiter and Sibert 2018; Leeper 1991; Sims 1994; Woodford 1994). The theory postulated further that a fiscal dominance may arise in a situation where fiscal deficit become unsustainable and the fiscal authority resort to the net wealth of government bonds and that may affect the general price level (Tiwari et al. 2012).

### *Empirical literature*

The growing interest in the literature on the question of fiscal deficit and its effect on macroeconomic flow variables is driven by the desire to ascertain the phenomenon in the context of developing countries. The socio-political situation of developing countries has created an environment where government expenditure on essential services put excessive pressure on government budget (Tiwari and Tiwari 2011). With low volumes of tax receipts, the critical question is whether governments can realize the same fiscal policy outcomes if expenditure on critical social services like education, health and infrastructure are kept within the constraints of budgets. These major concerns border on whether increasing expenditure on social services and infrastructure such as education, health and infectious diseases as well as road infrastructure beyond the constraints of the limited budget can induce growth and sustain inflationary targets (Tiwari et al. 2012). These questions are very critical in the context of West African economies, which are predominantly agrarian and raw material based. Increasing human population coupled with worsening external trade receipts due to fluctuations in international commodity prices have put a lot of pressure on governments, in terms of providing legitimate social and infrastructural facilities for the people. Poverty has created displacements in the economies and has as well ignited social and ethnic conflicts in pockets of the sub-region (Bamfo 2013).

Past studies have established significant relationship between fiscal deficit and inflation, however in some cases, the relationship has been seen to be influenced by other related variables like mode of deficit financing, uncertainties associated with demand for money and inflationary exchange depreciation (Easterly and Schmidt-Hebbel 1993). The debate has further intensified as empirical findings from different countries presented divergent conclusions. Whilst some studies established direct relationship between fiscal deficit and macroeconomic fundamentals (Choudhary and Parai 1991; Hondroyannis and Papapetrou 1994; Metin 1998), others established weak or no relationship (Farajova 2011; Velnampy and Achchuthan 2013). Also, despite the practical implications of the relationship between fiscal deficit and macroeconomic fundamentals on fiscal policy formulation, the wealth of studies on this theme is skewed to experiences of advance countries (Velnampy and Achchuthan 2013). Some of the lessons from advance countries indicate that reducing fiscal deficit can be a good precursor for economic growth and can narrow government's penchant to borrowing from the domestic economy.

In developing countries, though the throughput of studies on the issue is low, consensus has neither emerged. Quite recently, a study was conducted to establish the link between fiscal

deficit and inflation in Sub-Saharan Africa (SSA) (Bleaney and Francisco 2016). The study adopted multivariate regression involving previous and future years of fiscal deficit and inflation. The study concluded that fiscal deficit correlated significantly with inflation, however the correlation was unable to explain the variations among the countries as well as the evolution of the process with time. The lag effect of fiscal deficit predicted inflation better than was the case with contemporaneous factors, which implies that fiscal deficit has lagged influence on future inflationary experiences. Some studies have also used Granger Causality test to analyze fiscal deficit and inflation within the context of West Africa with considerable variations in conclusions. For instance, a study on Nigeria used pairwise Granger causality framework and it concluded that there was bidirectional flow of causality between the two variables (Oseni and Sanni 2016). However, in the case of Ghana, causality was unidirectional flowing from fiscal deficit to inflation (Johnson 2015).

Further to these, Abu and Karim (2015) conducted a study based on a sample of 51 African countries on the effect of fiscal deficit on inflation and money growth. The study adopted a non-linear fixed-effect Generalized Method of Moment (GMM) framework and it concluded in favour of non-linear effect of fiscal deficit on inflation. However, the between-country effects exhibited considerable variations as a result of differences in national outputs and inflationary experiences. Further to this, the sample was re-categorized into low and high inflationary sub-groups and the non-linearity effect of fiscal deficit on inflation emerged as significant.

When we explore empirical studies from outside Africa, there is no clear-cut consensus on the issue of the effect of fiscal deficit on inflation. Earlier study by Catao and Terrones (2003) involving 107 countries, which were categorized into developing and developed sub-samples established a direct effect of fiscal deficit on inflation only with regards to the developing countries sub-sample. Among the developed countries, the relationship between the two factors proved to be statistically insignificant. Prior to this, a panel study by Terrones and Catão (2001) using 23 emerging economies established similar conclusions in terms of inflation and fiscal deficit having positive long-run relationship, which was consistent with the findings of (Catao and Terrones 2003). Terrones and Catão (2001) however argues that the lack of consensus on the issue is as a result of apparent non-linearity of the relationship between the two key variables, that existing studies have not taken into account. They contended that because of monetary policy antecedents that mediate the effects of fiscal deficit on inflation, absolute recourse to linear modelling masked actual relationship between the variables.

However Viyyuri and Seshaiyah (2004) established that there is no significant relationship between fiscal deficit and inflation based on secondary data on India's economy from 1970-2002. The study findings affirmed the Ricardian Equivalence Hypothesis. Also, Tiwari and Tiwari (2011) argued based on log linear multiple regression model that inflation is not the cause of fiscal deficit in India but fiscal deficit is caused by government expenditure and money supply. Another study on India further concluded that fiscal deficit does not significantly affect inflation instantaneously but, lagged variable of fiscal deficit significantly affect inflation based on Autoregressive Distributed Lagged model (Chakraborty and Varma 2018). Lastly, a study on six Asian countries, Korea, China, Japan, Taiwan, India and Singapore on inflation, fiscal deficit and supply of money established that fiscal deficit has significant relationship with inflation (Hossein-Ali Fakher 2016). By using annual data between 1993-2013, the study is

based on pooled mean group estimation-based error correction model and panel differenced General Method of Moment Arellano-Bond estimator.

On the relationship between fiscal deficit and growth, a study on India spanning 1980-2017 based on non-linear ARDL established that fiscal deficit negatively affects economic growth concluding in favour of Neo-classical viewpoint (Sharma and Mittal 2019). The study however established that gross domestic capital formation is rather positively related with growth and thus government expenditure should be biased towards gross domestic capital formation to achieve long run favourable economic indicators. Within the context of the Association of South East Asian Nations (ASEAN) economic bloc, Wee-Yeap and Tien-Ming (2019) established based on panel data spanning 2001-2015 that fiscal deficit has negative effect on growth in the period preceding the 2009 recession. However, the effect is positive -in the period after the recession. The results further established that the effect of fiscal deficit on growth before and after the recession exhibited robustness with different levels of growth.

Rana and Wahid (2017) used a time series model to establish the relationship between fiscal deficit and growth in Bangladesh. The study is based on vector error correction and Granger causality models and it concluded that fiscal deficit is inimical to economic growth. However, the literature also presented contrasting conclusions in some emerging countries with regards to the association between fiscal deficit and inflation. For instance, Buscemi (2012) established a positive correlation between fiscal deficit and economic growth using a dynamic Generalized Method of Moment panel analysis of three developing countries, that is, China, India and South Africa.

Lastly, a study conducted on West Africa to investigate the effect of fiscal deficit and debt on economic growth facilitated through the financial sector concluded that the marginal effect on financial development become negative when debt and financial deficit exceed threshold values of 48.6% and 13.5% of GDP respectively. That is, financial development is one of the critical sectors that suffered under high financial deficits in the West African sub-region (Ehigiamusoe and Lean 2019).

## **2.0 Methodology**

### *Data*

We adopted a quantitative study based on annual data spanning 30 years (from 1990-2019) for the WAMZ member countries. We obtained the data from the [www.opendataforafrica.org](http://www.opendataforafrica.org), an open data portal sponsored by the African Development Bank. The study is based on Multilevel Structural Model (1 1 1). The model is adopted to examine how money growth and general public consumption play out as mediating factors in the effect of fiscal deficit on inflation and growth respectively. The mediating effect of money growth and general public consumption are premised on the assumption that some relationships amongst variables are facilitated by others directly or indirectly to enhance the true relationship.

The fiscal balance variable (*Fbal*) is measured as the difference between government total revenue and grants, less total expenditure and net lending, expressed as a percentage of GDP. Where the data is negative for a particular year for a given subject, then it means that the subject

recorded a deficit. Similarly, where it indicated positive, then it means surplus balance. This is the reason why it is an appropriate proxy to measure fiscal deficit.

The *GDP* variable is Real GDP growth rate and it is used to proxy growth of the subjects' economies. Real GDP growth rate measures the changes in gross domestic product that have been deflated, over a given time. It is a better measurement of economic growth as compared to nominal GDP.

Inflation (*Inf*), which measures the percentage increase in the general price levels of goods and services was measured using the Consumer Price Index (CPI) of each participating country. It is based on the cost of a large number of goods and services collected on the market and averaged by use of weighted average. The annualized increases in the prices of the basket of goods and services used to compute the CPI measured inflation.

Money growth (*Mgrowth*) is measured as changes in money and quasi money (M2) in current local currency. The difference between current and previous year's end-line total was used to measure the change in money supply.

General public consumption (*Gcons*) is measured as all current expenditure for the purchase of goods and services by all levels of government including security and defense expenditure, measured as a percentage of GDP.

### *Model estimation*

The model estimation is based on the dynamic structural equation model (DSEM) framework, which is estimated using Markov Chain Monte Carlo methods (MCMC) and the Gibbs Sampler of the Bayesian methods (Asparouhov et al. 2018). The foundations of DSEM involves partitioning a longitudinal variable of interest into three components. That is, if it is assumed that the longitudinal variable of interest is  $y_{it}$ , then this could be partitioned into:

$$y_{it} = y_{1,it} + y_{2,i} + y_{3,t}$$

for the  $i$ th subject at a time  $t$ , where  $t$  is  $1, 2, \dots, T$ . This general equation defines the cross-classified model, where  $y_{1,it}$ ,  $y_{2,i}$  and  $y_{3,t}$  define the deviation of subject  $i$  at time  $t$ , that is, subject specific and time specific factors respectively. When  $y_{3,t}$  is omitted from the cross-classified model, then we arrive at the two-level DSEM model, which is going to be the emphasis of this paper. The DSEM model is analyzed on two levels, the between and within levels. The between level analyses look at the relationship among the subjects and produce subject-specific effects. Whereas the within-level measures the temporal relationship based on a specific locational deviation for the observations (Hamaker et al. 2018).

The credible interval metric for the parameters defined by the Bayesian analysis formed a good basis to judge the fitness of the parameters. The model fitness estimation for this study is based on the Deviance Information Criteria (DIC), a concept commonly used in Bayesian analysis. Under the DIC, the estimation requirement is based on the fact that all variables in the model, both dependent and independent should be continuous (Asparouhov et al. 2018).

The DIC is computed as the product of minus 2 and the log-likelihood of the model parameters, that is,

$$D(\theta) = -2\log(y(P(Y|\theta)))$$

where  $\theta$  represent all model parameters and  $Y$  represents observed dependent variables. The effective number of model parameters are estimated as

$$P_D = \bar{D} - D(\bar{\theta})$$

where  $\bar{D}$  represent the average deviance across the MCMC iterations and  $\bar{\theta}$  represents the average model parameters across the MCMC iterations (Hamaker et al. 2018). The DIC criterion is thus computed as

$$DIC = P_D + \bar{D}$$

### *Data analysis*

The data is analyzed with Mplus<sup>®</sup> version 8.2 and 8.5. In handling missing data, the software is able to analyze model with missing data to produce results close with missing at random (MAR) with large datasets (Muthen and Muthen 2017). By Bayesian procedures for handling missing data, each iteration of the MCMC algorithm sampled missing data from their conditional posterior (Hamaker et al. 2018). For example, under a basic dynamic model where there is a missing data of subject  $i$  at time  $t$ , the conditional posterior of the missing value will depend on neighboring observations of the missing data, the value of the individual's autoregressive parameter at the current iteration of the MCMC and the uncertainty that was expressed by the individual's residual variance (Hamaker et al. 2018).

### *Case1:*

#### *Effect of fiscal deficit on inflation mediated by money growth*

Mathematically, if variations in money growth is assumed to influence the effect of fiscal deficit on inflation, then we can say that money growth plays an indirect role in the relationship. This relationship may be total or partial, depending on the statistical credibility of the parameters between money growth and fiscal deficit or money growth and inflation. If both parameters are statistically credible, then money growth has a total indirect effect. However, if one is significant, then the indirect effect is partial.

In formulating the mathematical model, there are two levels of relationship: a direct effect of fiscal deficit on inflation and an indirect effect of fiscal deficit through money growth to inflation. This forms a triangular relationship with the direct relationship been the base.

$$Mgrowth = a_{10} + a_1 Fbal$$

$$inf = a_{20} + a_2 Mgrowth + c' Fbal$$

$$inf = a_{20} + a_2 (a_{10} + a_1 Fbal) + c' Fbal$$

$$inf = a_{20} + a_{10} a_2 + (a_1 a_2 + c') Fbal$$

The indirect relationship between inflation and fiscal deficit through variations in money growth is measured by  $a_1 a_2$  whilst the direct relationship between inflation and fiscal deficit is measured by  $c'$ .

Statistically,

the within model is:

$$Mgrowth_{it} = \alpha_{10i} + \alpha_{1i}Fbal_{it} + \epsilon_{1,it}$$

$$inf_{it} = \alpha_{20i} + \alpha_{2i}Mgrowth_{it} + \epsilon_{2,it}$$

$$inf_{it} = \alpha_{20i} + c'Fbal_{it} + \epsilon_{2,it}$$

Between model is:

$$\mu_{Mgrowth,i} = \gamma_1 + \tau_{1,i}$$

$$\mu_{Fbal,i} = \gamma_2 + \tau_{2,i}$$

$$\mu_{inf,i} = \gamma_3 + \tau_{3,i}$$

$$\sigma_{Mgrowth,i} = \sigma_1 + \nu_{1,i}$$

$$\sigma_{Fbal,i} = \sigma_2 + \nu_{2,i}$$

$$\sigma_{inf,i} = \sigma_3 + \nu_{3,i}$$

$$Mgrowth_i = \alpha_{10,i} + \alpha_{11,i}Fbal_i + \nu_{1,i}$$

$$inf_i = \alpha_{20,i} + \alpha_{22,i}Mgrowth_i + \nu_{2,i}$$

$$inf_i = \alpha_{30,i} + \alpha_{33,i}Fbal_i + \nu_{3,i}$$

The within indirect effect is estimated by

$$indw = \alpha_1 * \alpha_2$$

The between indirect effect is also estimated as

$$indb = \alpha_{11} * \alpha_{22}$$

Where  $\sigma_i$  are variances and  $\mu_i$  are the means of the variables *Mgrowth*, *Fbal* and *inf*. The errors,  $\epsilon$ ,  $\tau$ ,  $\nu$ , and  $v$  are all assumed to be normal with zero means and covariance  $\Omega_\epsilon$ ,  $\Omega_\tau$ ,  $\Omega_\nu$ , and  $\Omega_v$  respectively.

## Case 2

### *Effect of fiscal deficit on growth mediated by general public consumption*

In a similar manner, general public consumption can mediate the effect of fiscal deficit on growth. This is to examine the Keynesian view that fiscal deficit may trigger increased consumption that will facilitate rise in growth levels.

$$Gcons = a_{10} + a_1Fbal$$

$$GDP = a_{20} + a_2 Gcons + c' Fbal$$

$$GDP = a_{20} + a_2(a_{10} + a_1 Fbal) + c' Fbal$$

$$GDP = a_{20} + a_{10} a_2 + (a_1 a_2 + c') Fbal$$

Statistically,

the within model is:

$$Gcons_{it} = \beta_{10,1} + \beta_{1,i} Fbal_{it} + \epsilon_{1,it}$$

$$GDP_{it} = \beta_{20,1} + \beta_{2,i} Gcons_{it} + \epsilon_{2,it}$$

$$GDP_{it} = \beta_{20,1} + c' Fbal_{it} + \epsilon_{2,it}$$

Between model is:

$$\mu_{Gcons,i} = \gamma_1 + \tau_{1,i}$$

$$\mu_{Fbal,i} = \gamma_2 + \tau_{2,i}$$

$$\mu_{GDP,i} = \gamma_3 + \tau_{3,i}$$

$$\sigma_{Gcons,i} = \sigma_1 + \nu_{1,i}$$

$$\sigma_{Fbal,i} = \sigma_2 + \nu_{2,i}$$

$$\sigma_{GDP,i} = \sigma_3 + \nu_{3,i}$$

$$Gcons_i = \beta_{10,i} + \beta_{11,i} Fbal_i + \epsilon_{1,i}$$

$$GDP_i = \beta_{20,i} + \beta_{22,i} Gcons_i + \epsilon_{2,i}$$

$$GDP_i = \beta_{30,i} + \beta_{33,i} Fbal_i + \epsilon_{3,i}$$

The within indirect effect is estimated by

$$indw = \beta_1 + \beta_2$$

The between indirect effect is also estimated as

$$indb = \beta_{11} + \beta_{22}$$

Where  $\sigma_i$  are variances and  $\mu_i$  are the means of the variables Gcons, Fbal and GDP . The errors;  $\epsilon$  ,  $\tau$  ,  $\nu$  and  $\epsilon$  are all assumed to be normal with zero means and covariances  $\Omega_\epsilon$  ,  $\Omega_\tau$ ,  $\Omega_\nu$ , and  $\Omega_\epsilon$  respectively.

### 3. Results

#### *Descriptive analysis*

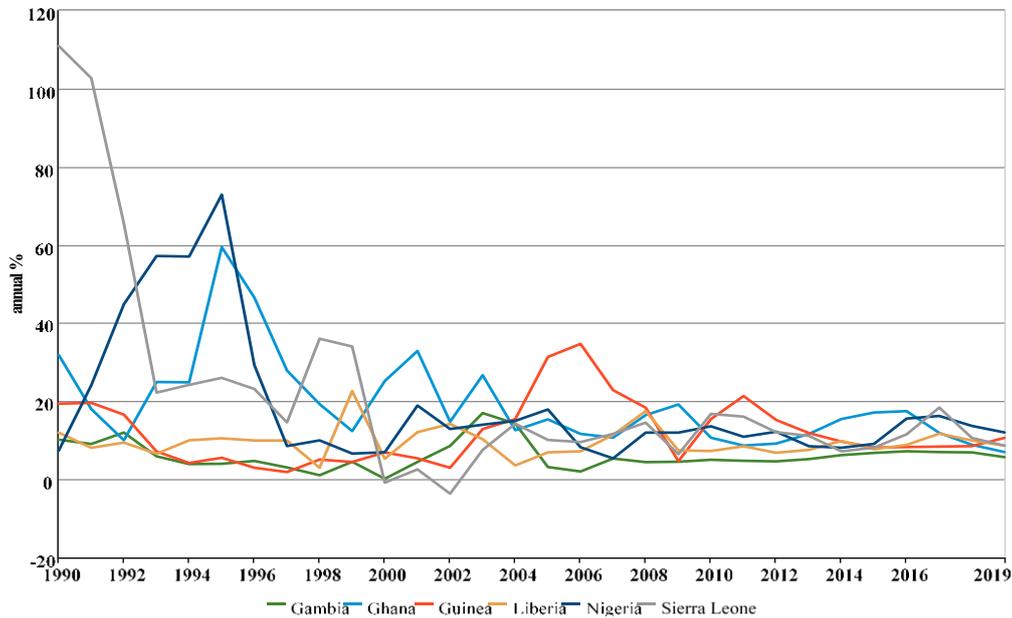


Figure 1: Outlook for the inflation, 1990-2019  
Source: Open data for Africa

Figure 1 presents a graphical outlook for inflation. The period between 1990-2000 saw high inflationary episodes, which settled gradually into the post year-2000 period. The high inflationary episodes in the 1990s could be due to the structural shocks in the initial periods of structural adjustment facilitated by the IMF and the World Bank. Adjustment introduced significant policy changes such as trade liberalization, flexible exchange rate, reduced subsidization and retrenchment from public service employment. This affected inflationary experiences of most of the countries before the system began stabilizing. These were aimed at improving the macro-economic fundamentals of the economies and realign growth and stability indices. The second explanation may be due to civil unrest in the sub-region that started in the late 1980s through the 1990s even to post year 2000. The Mano region countries, that is, Liberia, Sierra Leone and Guinea experienced simultaneous rebel activities that disrupted the political and economic systems of these countries. Sierra Leone for instance recorded over 100% inflation in the 1990s before receding over the years.

Ghana and Nigeria have shown seasonal inflationary trends along election years. Ghana embraced constitutional governance in the year 1992 whilst Nigeria had their first election in 1999. It was evident that inflation increased around four year election cycles that characterized high incumbency exploitation as posited by (Bob-Milliar and Paller 2018). The political system operated by these two countries were similar and elections fraught with the use of money to induce voters interest leading to abuse of incumbency by sitting governments (Kuenzi et al. 2017).

A large portion of the inflationary pattern has been within 20% band especially post year 2000. The inflationary band appeared narrowing over the period, gravitating towards single digits. The Gambia had witnessed relatively sturdy inflationary patterns over the years. The Gambia

had over the years managed inflationary experiences within single digits, a situation that positioned her well on the inflationary convergence criteria. Regardless of the political turmoil in Liberia over a long period from the 1990s to the middle of the 2000s, the country's inflationary experience had not hiked up as would have been expected. The country at certain periods had no legitimate governments whilst a large proportion of its citizens had left as refugees in other neighboring countries. There was high inflation in the period of intense battle like between 1998-2000, and 2000-2004. After the war had subsided and legitimate governments had been established in 2006, inflation stabilized significantly.

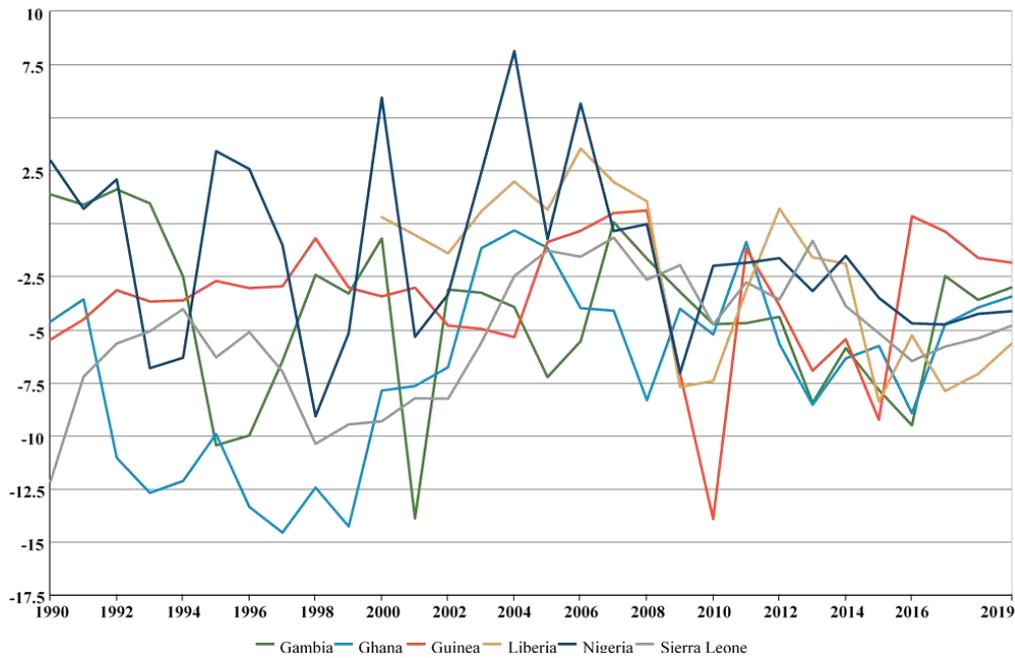


Figure 2: Outlook for fiscal deficit of member-countries, 1990-2019  
Source: Open data for Africa

Figure 2 presents a graphical outlook for fiscal deficit. The entire countries within the WAMZ run deficit budgets over the 30-year study period except Nigeria, which had episodes of fiscal surpluses. This is consistent with (Saka et al. 2015), who argue that governments recurrent expenditures within the proposed monetary zone are thorny issues driving deficit spending with one of the leading underlying items been the problem of public sector wages. For instance, Nigeria has swings of fiscal surpluses and deficits in cycles from the beginnings of the 1990s to 2010 and the phenomenon tailed into deficits between 2.5-5.0 percent from 2010 - 2018. It is likely that the surpluses are recorded in times of favourable oil prices on the international markets and the deficits are recorded when oil prices eased. It is worthy of note that from the year 2010 - 2019, oil prices have eased quite significantly and this may account for the steady deficits experienced within the period.

Ghana's fiscal balance has been in deficits since the 1990s. The country experienced the lowest troughs in its fiscal deficits between 1996-1998. There was a relatively better fiscal deficits outlook from 2000-2005 when it started easing downwards again to a low in 2008. The election expenditure of the year 2008 and perhaps the global economic slowdown in that year may also account for the slip of fiscal deficit. The discovery of oil in commercial quantities in the year 2008/9 brought additional sources of revenue generation into the economy, improving deficit experiences in 2010-11. The country could not sustain the gains made in 2010-11 and as usual

increased expenditure in the election year of 2012 to hype fiscal deficits again consistent with the position of (Bob-Milliar and Paller 2018).

Post year 2012 election witnessed period of low oil prices and energy crisis that exacerbated expenditure and revenue misalignment, which in effect weakened the fiscal balance situation. The year 2016, which was also an election year saw the highest deficit experience since 2008 about 8%. The situation begun to improve from the year 2017. The Gambia also experienced a period of increased deficits from the 1990s to the year 2000 falling to a low value below 12.5%. After the year 2000, the country's fiscal deficits outlook improved significantly and dipped again in 2016. This may have some relationship with the political crisis experienced around its elections around that time. The situation had seen a significant improvement tailing below 5% after 2016.

The Mano Region countries, that is, Sierra Leone, Guinea and Liberia had experience similar fiscal balance trajectory. Sierra Leone had experience period of high deficits in the 1990s easing pretty well in 2000-2010. After this period, the deficit situation fell again in 2016 below 5% and improving again from 2017, correlating cyclically along its electoral events. Guinea has experienced a stable fiscal deficit within 5% of GDP from the year 1990 - 2005. There were remarkable improvements between 2005 and 2008 and sharp increase in deficit again in the year 2010, with an all-time high deficit rate of about 13% of GDP.

Liberia does not have a complete data on fiscal balance, likely because of the civil war that commenced in the early 1990s. The country also experienced checkered deficit experiences, starting with an enviable performance of fiscal surpluses from the year 2000, it slipped again into significant episodes of deficits from 2010.

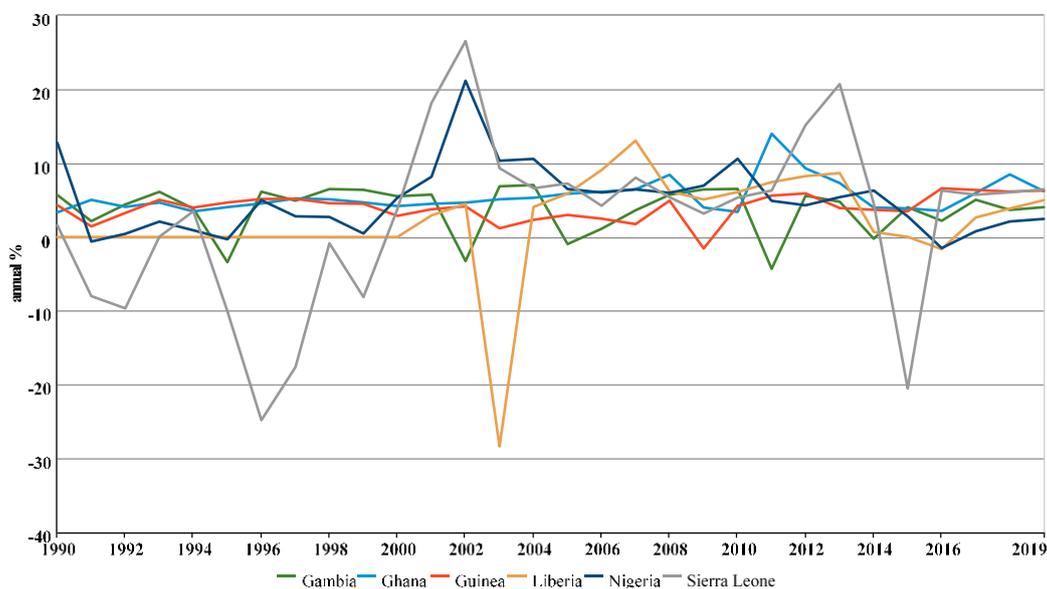


Figure 3: Outlook for economic growth, 1990-2019

Source: Open data for Africa

Figure 3 presents the pattern of growth for the WAMZ countries. There is wide variability in the growth patterns of the countries, although a large proportion of the growth movement is within 5%. It is also observed that some of the countries like Sierra Leone, Liberia and The Gambia have witnessed negative growth at certain periods especially mid 1990s and early 2000s. The civil war in the Mano region has disrupted economic activities and might account

for the negative growth of the economies. It can also be noted that Sierra Leone again witnessed a deep negative growth in the year 2015 quite long after the end of the civil war and this can be as a result of the Ebola pandemic that hit the country and disrupted social and economic activities.

The lead economies of the sub-region, Ghana and Nigeria have shown different patterns of growth. Ghana's growth pattern has been fairly stable around 5%. The discovery of oil in commercial quantities in the year 2008/9 witnessed a remarkable jump in growth rate to about 13% in 2013 and it eased downwards below 5% in 2016. The 2016 poor growth performance may be due to the unexpected dip in global crude oil prices and fall in gold prices around the same year ultimately culminating in poor revenue generation in agreement with (Mensah 2016). From the year 2017, it has picked again above 5%, which is good for an emerging middle income country.

Nigeria's growth has seen more variability and it reflects fluctuation in global oil price cycles. Crude oil exports account for more than half of the country's exports and as such any disruption in crude oil prices globally affects the fortunes of the economy significantly. The growth patterns have stagnated in the early 1990s and peaking in the early 2000 when oil prices were favourable. The easing of global oil prices in 2008 as well as in 2015 and 2016 had seen a deep slip of growth rates. There is an upward recovery post 2016 albeit not so high.

Lastly, Liberia and Guinea have seen checkered growth patterns. At some point growth has been stable and it would recess briefly and recover again. Guinea's economy is largely driven by mineral exploitation as stipulated by the World Bank (World Bank Group 2018). The country has large bauxite and iron ore deposits but because of unfavourable political environment as well as endemic poverty, production capacity has been low. The country's growth rate dipped to almost 0% close to the year 2010 when it went through intense political upheaval that grounded economic and social activities. There were civil and political unrest leading to a *Coup d'Etat* before democracy was finally restored in 2010 (Bah 2015). Stable political environment after 2010 had seen a slight increase in growth peaking in the neighborhood of 6% between 2016-2019. Guinea's economic growth dipped slightly again in 2014/15, during the period of Ebola crisis that hit the Mano region. Economic and social activities were negatively affected because of the highly infectious nature of the disease. This is consistent with the study of the Africa Development Outlook over the same period (AfDB 2018).

Liberia's war exacerbated between 2002-2004, when there was intense local and international agitation for regime change. This intense social unrest affected the production capacity of the country reflected in the negative growth rate of over 25%. When democracy was restored again after 2004, growth rate improved, peaking above 10% in 2008 and later easing downwards to negative growth in the Ebola period of 2014/2015. From the year 2016, growth had started recovering and the rate is improving as we headed towards the year 2019.

#### *Case 1: Mediating effect of money growth*

In Table 1, we present the results of how money growth mediates the effect of fiscal deficit on inflation. The model fit information indicated DIC value of 4215.316 and estimated number of parameters of 16.793. The relationship among the variables at the within level shows that, the only non-null credible relationship is between fiscal balance and inflation and the relationship is negative. This means that unfavourable fiscal balance is inflationary (-0.531;  $p < 0.010$ ). The results further show that the within indirect interaction parameter (*Indw*) is not statistically

credible, however the total effect recorded non-null credibility (-0.541;  $p < 0.010$ ). This implies that the effect of money growth as a mediating variable between fiscal deficit and inflation is not complete, but partial. The between level relationship shows that the parameters of the model are not statistically significant. This implies that the within relationship effect is similar among the countries and there are no statistical differences in the way the within level variables related in the case of the various countries in the model.

Table 1: Fiscal balance and inflation relationship mediated by money growth

Number of Free Parameters	15					
Posterior Predictive P-Value	0.333					
Information Criteria						
Deviance (DIC)	4215.316					
Estimated Number of Parameters ( $P_D$ )	16.793					
<b>Model Result</b>						
<u>Within</u>	Estimate	S.D.	P-Value	Lower 2.5%	Upper 2.5%	Sig
Mgrowth on Fbal	1.917	3.034	0.19	-3.307	8.585	
Inf on Mgrowth	0	0.011	0.48	-0.022	0.019	
Inf on Fbal	-0.531	0.264	0.01	-1.122	-0.086	*
<u>Variances</u>						
Fbal	13.286	1.383	0	11.111	16.056	*
<u>Residual Variances</u>						
Mgrowth	20868.654	2179.938	0	16731.938	25290.141	*
Inf	206.253	22.897	0	162.833	252.916	*
<u>Between Level</u>						
Mgrowth on Fbal	1.058	12.591	0.49	-24.906	27.746	
Inf on Mgrowth	0.051	2.229	0.43	-2.698	4.073	
Inf on Fbal	-1.168	17.735	0.4	-50.526	51.737	
<u>Means</u>						
Fbal	-3.803	1.199	0	-5.689	-1.206	*
<u>Intercepts</u>						
Mgrowth	41.985	56.989	0.14	-48.559	145.575	
Inf	5.9	117.539	0.42	-331.23	317.867	
<u>Variances</u>						
Fbal	5.305	33.603	0	1.122	116.942	*
<u>Residual Variances</u>						
Mgrowth	598.119	2788.665	0	12.306	9333.146	*
inf	174.461	4317.647	0	19.14	16592.285	*
<u>New/Additional Parameters</u>						
Indw	0	0.039	0.49	-0.089	0.106	
Total	-0.541	0.265	0.01	-1.082	-0.083	*

Source: Computation

### *Case 2: Mediating effect of general public consumption*

Table 2 shows results of the relationship between fiscal balance and growth mediated by general public consumption. The model looks at the mediating role played by general public consumption in the relationship between fiscal balance and growth. The model fit information revealed that the DIC score is 2978.153 with estimated number of parameters been 22.425. It is also realized that all the within level parameters shows non-null credibility, that is, there is no zero in their credibility intervals.

The results further show a positive relationship between fiscal balance and growth as well as general public consumption and growth. The estimated parameter for the relationship between fiscal balance and growth is (0.346;  $p < 0.010$ ) and that for the relationship between general public consumption and growth is (0.459;  $p < 0.000$ ). The results thus mean favourable fiscal balance impinges positively on growth and similarly, increased general public consumption directly enhanced growth, all other factors remaining the same.

With regards to the between level case, all the parameters exhibit null credibility except the fixed effect of fiscal balance. This means that the relationship between growth and fiscal balance as well as between general public consumption and growth did not show between-country differences. That is, all the countries exhibited similar characteristics on the issues of the relationship between fiscal deficit and growth mediated by general public consumption. However, the average fiscal balance is in deficit and it shows non null credibility (-4.153;  $p < 0.010$ ). That is, fiscal balance performance differed from country to country in the WAMZ though the average country had its fiscal balance in deficit.

On the whole, the results show a negative mediating role of general public consumption with regards to the relationship between fiscal balance and growth (INDW=-0.097;  $p < 0.005$ ). That is, a rise in general public consumption induced by fiscal deficit is inimical to growth.

Table 2: Fiscal deficit-growth relationship mediated by general public consumption

Model fit information						
Number of Free Parameters	15					
Posterior Predictive P-Value	0.136					
Information Criteria						
Deviance (DIC)	2978.153					
Estimated Number of Parameters (P <sub>D</sub> )	22.425					
<b>Model results</b>	Estimate	S.D.	P-Value	Lower 2.5%	Upper 2.5%	Sig
<u>Within Level</u>						
GCONS on Fbal	-0.217	0.082	0.005	-0.373	-0.059	*
GDP on GCONS	0.459	0.114	0.001	0.232	0.679	*
Fbal	0.346	0.127	0.010	0.067	0.57	*
<u>Variances</u>						
Fbal	14.149	1.676	0.001	10.998	17.792	*
<u>Residual Variances</u>						
GDP	34.967	4.219	0.001	27.149	43.738	*
Gcons	16.464	1.785	0.001	13.324	20.513	*
<u>Between Level</u>						
Gcons on Fbal	0.891	7.791	0.295	-6.575	5.995	
GDP on Gcons	-0.091	9.858	0.390	-19.146	14.963	
GDP on Fbal	0.204	20.7	0.445	-35.42	60.464	
<u>Means</u>						
Fbal	-4.152	1.39	0.010	-6.957	-0.823	*
Intercepts						
GDP	5.994	205.534	0.255	-324.979	263.416	
Gcons	15.2	33.384	0.125	-32.508	41.301	
<u>Variances</u>						
Fbal	6.241	72.37	0.001	1.234	107.593	*
<u>Residual Variances</u>						
GDP	15.987	34079.84	0.001	0.621	63727.492	*
Gcons	56	2535.346	0.001	6.539	4955.415	*
New/Additional Parameters						
Indw	-0.097	0.044	0.005	-0.210	-0.017	*
Total	0.246	0.128	0.04	-0.025	0.457	

Source: Authors own analysis

#### **4. Discussion**

The study does not support the mediated effect of money growth in the relationship between fiscal deficit and inflation. On the face value, the growth in money supply in the sub-region is usually not triggered by movements in the fiscal balance of member-countries, which is consistent with WAMZ annual reports (WAMI 2016). This is also affirmed by the situation in SSA countries, where fiscal authorities borrowed to finance fiscal deficit as against resort to seigniorage (Ezinando and Jeroh 2017). Drama and Yao (2018) also confirmed this finding in the context of the WAEMU and argue further that the implications of this policy choice among member-countries increased their exposure to high risks of public debt and cost of credits. Recent studies on selected Southern African Development Community (SADC) member-countries have also confirmed this position that fiscal deficit leads to increased borrowing, which exacerbates their debt burden (Mbandlwa 2020; Nzimande and Ngalawa 2019). However, this contrasted with Ali and Khalid (2019) who argue that money supply-induced financing of fiscal deficit is inflationary in the long-run in Pakistan. This is similar to the reasoning of Kaur (2018) who also argues that in the case of India, there is a long-run relationship that exist between fiscal deficit, money growth and inflation under the condition where fiscal deficit is financed through the creation of money.

From the past decades, governments of the WAMZ are facing unprecedented growth in their youthful populations, however the level of resources needed to provide requisite employment opportunities and social services are constrained by limited revenue (Odusola et al. 2017). The choice of budget overruns to meet these increasing needs of the people is virtually the phenomenon adopted by many fiscal authorities in the WAMZ. Fiscal authorities are mostly tempted to expand deficits in the fiscal space to accommodate increasing demands from the population by increasing general public expenditure. Expenditures on education, health, sanitation and water occupy central priorities and governments are sometimes pressured to meet the increasing demands especially in election years consistent with the empirical literature (Bob-Milliar and Paller 2018). The results further establish that deteriorating fiscal balance (deepening deficit) are associated with unimpressive growth, a position consistent with the Classical theory that fiscal deficit ultimately leads to crowding out the production sector (Hussain and Haque 2017).

Lastly, the general public consumption variable mediated negatively between fiscal balance and growth and this contrasted traditional Keynesian position that increased expenditure on general public goods can spur growth (Elseoud 2018) . The result rather affirms that improved growth is associated with increased general public consumption, where governments are able to increase consumption of public services during favourable growth periods, which is consistent with the literature (Obeng 2015). Provision of relevant social services like education and health are facilitated with the level of GDP growth and thus countries with improved growth rates are in better positions to spend more on public goods.

#### **5. Conclusions and policy recommendation**

The study concludes that when the relationship between fiscal deficit and inflation is mediated by growth of money, it does not show any statistical credibility, thus, member-countries are not prone to finance deficits by increasing money supply. However, general public consumption is a statistically credible mediator between fiscal deficit and growth but the total effect on growth is negative, which means, using fiscal deficit to finance general public consumption is counter-productive to growth outcomes. Given the excessive demands on governments to provide services to the people beyond the constraints of domestic budgets, we

thus recommend that governments should resist the temptations of spending budget over-runs on public consumption since it creates a loop of deficits in the spaces of fiscal balance and growth. Governments should be bold to channel a large proportions of deficit financing resources into capital expenditure to build the productive capacity of the economies to be able to pay-back the borrowed funds.

## **List of abbreviation**

AfDB: African Development Bank

ARDL: Autoregressive Distributed Lag Model

ASEAN: Association of South East Asian Nations

DIC: Deviance Information Criteria

DSEM: Dynamic Structural Equation Model

ECOWAS: Economic Community of West African States

FTPL: Fiscal Policy of the Price Level

GDP: Gross Domestic Product

GMM: Generalized Method of Moments

MCMC: Markov Chain Monte Carlo Method

SADC: Southern African Development Community

SSA: Sub-Saharan Africa

WAEMU: West African Economic and Monetary Union

WAMI: West African Monetary Institute

WAMZ: West African Monetary Zone

## **Declarations**

### **Availability of data and material**

The dataset generated and analysed during the current study are available at the Open Data for Africa repository, [www.dataportal.opendataforafrica.org](http://www.dataportal.opendataforafrica.org).

### **Competing interests**

The Authors declare that they have no competing interests.

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### **Authors contributions**

EA contributed in the design of the study, data analysis and interpretation whilst JO contributed in the design of the study, discussion of the results and substantive review of the draft. Both authors read and approved the final manuscript before submission.

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