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Impact of HIV/AIDS on Economic Growth in Nigeria: 1990-2016

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Abstract

This study was conducted with the objective of investigating the impact of HIV/AIDS on economic growth in Nigeria for the period 1990 – 2016. It adopts a vector error correction mechanism (VECM) to analyse relationship between the spread of HIV/AIDS and economic growth in Nigeria. The task was to estimate how the economy would have performed in terms of real GDP in the absence of HIV/AIDS prevalence and contrast that result with an estimate of economic performance in real GDP term, given the prevalence of HIV/AIDS. Findings revealed that economic growth in Nigeria would decline by about 30 per cent annually for every one unit change in the spread of HIV/AIDS holding all other variables constant. The study included some control variables that were found to be statistically significant in explaining the relationship between HIV/AIDS and economic growth in Nigeria with human capital development having the highest impact among the control variables. It recommends among other things, the need to speed up more efforts to track down the rising incidence of HIV/AIDS by promoting awareness on the risk of contracting the diseases, increasing budgetary allocation to the health sector for massive investment in HIV/AIDS related programmes of intervention, an expanded health insurance cover to include HIV/AIDS, adequate collaboration with external bodies for exchange programmes such as transfer of expertise, sharing information on the best practices to combat or halt the spread of HIV/AIDS and retraining Nigerian Doctors in the field of community health for rapid treatment of those affected.

INTRODUCTION

Globally, the economic and social effects of HIV/AIDS epidemic have attracted much attention. Households that have been affected by the scourge of the disease may resort to cutting back on non-health-related expenditures such as reduction in nutritional status and educational attainment. There is also the danger of reallocating their efforts away from income-earnings

activity to care-giving. Equivalently, IMF (2001) had remarked that when large expenditures go toward treatment and funeral activities, care-giving responsibilities increase and income is lost as a result of premature mortality and morbidity among the younger adult wage earners so much so that households may be unable to cope with the financial shocks. These effects are exacerbated if the Anti-Retroviral Drugs (ARDs) are expensive to procure, and if public subsidies for care are limited, or if health insurance is unavailable. Related to these are the psychic costs that are associated with the death and illness of the family members or the stigma that linked up with HIV/AIDS.

Conceptually, HIV (Human Immune Virus)/ AIDS (Acquired Immune Deficiency Syndrome) is a highly dreaded disease which is contacted through a variety of means and manifest itself in the form of weak immune system that results to death. One major difference between HIV/AIDS and other health problems as argued by NACA (2001) is that HIV/AIDS is mostly contacted through sex. Being HIV positive is not random, but may correlate with confounding characteristics which would themselves affect health expenditures and economic outcomes. The combined effects of HIV and AIDS on households, healthcare, education and productivity in the work place has stagnated, and in some instances, even reversed economic and social development of countries. This is because economic and social developments of such countries depend much upon the ability of these countries to export and attract foreign direct investment to generate income. Consequently, by increasing labour costs and reducing profits, the epidemic limits the ability of countries to attract industry and investment.

Historically, the precise origin of HIV/AIDS remains an unresolved issue. However, the theoretical debate on the origin of HIV/AIDS has been wide-ranging, starting with the "Hunter" theory which believed that HIV/AIDS was transferred to humans as a result of Chimpanzees being killed and eaten by human beings. This debate was followed by the "Oral Polio Vaccine" (OPV) hypothesis which believed that HIV/AIDS was transferred to humans exogenously via medical intervention. The "Conspiracy" theory version of the debate opined that HIV/AIDS was a conspiracy or man-made phenomenon- that is, manufactured as part of a biological warfare programme, designed to wipe out large numbers of blacks and homosexual people. At the heart of the debate, came the "Contaminated needle" theorists, who pointed out that HIV/AIDS was spread through the use of disposable plastic syringes. The last was the "Colonialism" school which is premised on the "Hunter theory" that believed that during the late 19th Century and early 20th Century, much of the African Continent was ruled by the colonial masters and were forced into harsh labour camps with poor hygiene conditions through which Simian Immunodeficiency Virus (SIV) could easily be contracted to weaken the human immune system. From which angle of thought one views the origin of HIV/AIDS, the reality is that the precise origin of HIV/AIDS is yet unknown, and the true effect and cost of HIV and AIDS on the economies of the affected countries is difficult to measure particularly in Sub-Saharan African

There are two types of HIV namely: HIV-1 and HIV-2.According to Reeves and Doms,(2002), the HIV-1 is more virulent disease and is more easily transmitted and is the cause of the vast majority of HIV infections globally. The pandemic strain of HIV-1 is closely related to a virus found in the Chimpanzees of the sub-species "Pan Troglodytes" which lives in the forest of the Central African nations of Cameroon, Equatorial Guinea, Gabon, Republic of Congo and Central African Republic. On the other hand, HIV-2 is less transmittable and is largely confined to West Africa, along with its closest relative, a virus of the "sooty mangabey", an old world monkey inhabiting Southern Senegal, Guinea-Bissau, Guinea, Sierra Leone, Liberia and Western Cote D'ivoire.

LITERATURE REVIEW

The human consequences of HIV/AIDS tend to become worst, at an accelerating pace, over the next few years. Inevitably, while there are some uncertainties about how much wider the pandemic will spread and how quickly it will pass, the future of those currently infected with HIV is tragically predictable and unavoidable. Current treatment options- those either available or affordable (or both) may help reduce new infections, thus provide greater comfort for the sick, and delay death in some cases. But premature death, generally within 10-12 years of initial infection, is nevertheless almost certain for those currently afflicted in the absence of advanced treatment.

There is a substantial uncertainty about the impact of HIV/AIDS on household income in Nigeria. The economic implications are the subject of growing literature of country-specific and more general studies. Many of which draw on demographic projections and a range of other assumptions to model the long-term impact of HIV/AIDS on income and income per capita and other related variables. This study paid particular attention to the sensitivity of model results to variations in the underlying assumptions with a key concern, reflecting on model simulations regarding what might happen if the approaching acceleration in AIDS-related deaths leads to profound changes in social and economic conditions-including a collapse of domestic savings, worsening living standards among other issues.

Theodore (2001) developed a four channel model which was applied to many Caribbean countries in analysing the way HIV/AIDs affect the economy. They include: production channel; allocation channel; distribution channel; and regeneration channel. He argued that the production channel refers to the mechanisms through which HIV/AIDS affects the main factors of production which are labour and capital. The resultant effect is reduction in production capacity and subsequently, aggregate output. Secondly, HIV/AIDS can affect the economy through allocation channel. The economic system is believed to efficiently allocate resources among the sectors of the economy. But with various efforts by both government and private sectors in tackling HIV/AIDS, there is a diversion of resources meant for productive ventures to medical expenses.

The third point has to do with the distribution channel, precisely, income. Theodore (2001) opined that HIV/AIDs increases health expenditures and weakens the income base, particularly of the lowest income groups who are worst hit. While the rich may have other assets savings, land or capital often the only productive asset of the poor is their own labour, which HIV/AIDS attacks. The regeneration channel is the fourth channel. This means that investments in human capital, physical capital and new technology would fall due to funds redirected to health thereby undermining the growth of the economy. As Bell et al (2003) remarked, HIV and AIDS affect economic growth by reducing the availability of human capital. People living with HIV/AIDS are not only unable to work, they require significant medical care. Marisa (2005) argued that although there may not be agreement about the precise mode and dimensions of its effects, the increasing impact of HIV/AIDS on the socio-economic activities cannot be denied. The disease is shattering households, communities and broader society, taking us back decades in terms of human development and intensifying existing inequality.

Early forecast about HIV/AIDS- economic growth relationships as reported by Geener (2002), is such that the prevalence of the disease will probably cause a collapse of economic and social systems in countries with significant AIDS population. This is because, in most affected societies, the epidemic has left behind many orphans cared for, by elderly grandparents. Consequently, Greener (2002), opined that, increased mortality rate in regions affected with HIV/AIDS has

resulted in smaller skilled population and labour force that is predominantly characterised by younger people with reduced knowledge and work experience leading to reduced productivity. As Risley, Drake and Bundy (2012) remarked HIV disproportionately infects and impact on women; so those sectors employing large numbers of women (education) may be disproportionately economically impacted by HIV.

Numerous cross-country studies had used various models to estimate the micro-level impact of the pandemic. In South Africa, for instance, Arndt and Lewis (2001) assessed the broader implication of HIV/AIDS for economic growth and employment. Unfortunately, these studies were conducted at the time when detailed micro level data on prevalence rates for different sectors and occupations were not yet available. The impact of HIV/AIDs on human capacity is traceable in all human endeavours. Since most of the people affected by HIV/AIDS epidemics are from the developing countries and majority of them engage in agricultural activities, recent literature focused on the impact of HIV/AIDS on food security and the rural household economy. The ILO Economic Security Report (2004) stated that the world is seeing a systematic erosion of the productive capacity of whole communities due to HIV/AIDS pandemic..

The impact of HIV/AIDS on households and families has been devastating because it affects the households' income, increases health expenditure and the indirect cost resulting from the absenteeism of the members of the households from school or workplace. Haworth in (1991) conducted a survey of HIV/AIDS affected families and concluded that the shift into poverty was more in situation where the deceased father was both the breadwinner and a house owner. The preponderance of such a family was found to be compelled to move after the death of the father, with a majority of those families experiencing economic hardship.

In some other studies that applied the impact of HIV/AIDS on a one-sector neo-classical growth model such as Haacker (2000) found that although the impact of HIV/AIDS on GDP growth is substantial, the impact on per capita GDP may well be small. Later studies refined this approach by considering a larger number of sectors, including some demand-side effects, or allowing for an impact of changes in life expectancy on individuals' decisions. However, these studies provide little information about how changes in income are distributed among the population. Empirical studies and more casual evidence show that HIV/AIDS does have a serious adverse effect on the households it strikes, though the costs of care (both financial costs and opportunity costs) of otherwise productive time reallocated to care and loss of income. As Greener (2002) remarked, other households may provide support to households affected directly or may take care of children whose parents have fallen ill or died. More generally, HIV/AIDS affects all households through its macroeconomic repercussions, for example, through changes in wages, and these macroeconomic effects may also differ among households

THEORETICAL FRAMEWORKS AND MODEL SPECIFICATION

The theoretical framework is based on the work of Becker (1993) According to Becker's human capital theory, investments in human capital raise an individual's productivity (both in market and non-market activities). Consequently, people tend to invest on education, training and health in order to increase their future earnings. These investments however have costs associated with the direct outlays on market goods and the opportunity costs of the time that must be diverted from competing uses. . Based on a Solow growth model that has been modified to allow for two labour skill categories (skilled and unskilled), these enhancement allows for model to take into account key features of the Nigeria's economy, namely, the shortage of skilled labour and a high capital intensity in the formal sector.

The two sectors are characterised by Cobb-Douglas production function of inputs (labour and capital) and productivity. Being a supply-side oriented model, the framework relies solely on the factors of production and is used to calculate potential output-the level of aggregate output that can be sustained in the long run with stable inflation. The essence of this model is that the estimate of the long run growth rate of real GDP is represented as the sum of the growth rates of the labour force, capital and technology. Burger (2001) extends the simple Cobb-Douglas Production Function to incorporate the key macroeconomic variables affected by HIV/AIDS. Equivalently, the model of BER (2001) stresses the "macroeconomic sensitivity analysis" instead of a forecasting model with the baseline scenario that reflects the "worst case demographic scenario" that does not allow for behavioural changes or large scale government intervention.

In a health production function proposed by Grossman (1972) inspired by Becker (1964), individuals are assumed to derive utility from health due to both its "production" and "consumption" benefits. An empirical formulation of Grossman's (1972) pure investment version of the demand for health results in a reduced form equation that relates log of health status ($\ln H_{it}$) to individual log wages ($\ln w_{it}$), the log price of medical inputs ($\ln P^{k}_{it}$), the log rate of depreciation of health ($\ln \delta_{it}$) and one's education (EC_{it}) where subscripts refer to individuals (i) and time (t). The Grossman's (2000) reduced form pure investment health equation is given as $lnH_{it} = \alpha_1 + \alpha_2 lnw_{it} + \alpha_3 lnP^{m}_{it} + \alpha_4 lnd_{it} + \alpha_5 EC_{it}$. Where, α_1, α_2, α_3, α_4, and α_5 are positive coefficients. To switch to country level analysis, Maclaine (2015) made the simplifying assumption of equal distribution of health and simply restate the variables in the model in per capita terms. As a result, W_{it} was replaced with income per capita (y_{it}), H_{it} with health capital per capita (h_{it}), and EC_{it} with per capita education capital (ec_{it}). According to Grossman (1972), depreciation is an increasing function of an individual's age. Thus, the log of per capita depreciation rate is given as $\ln d_{it} = \ln d_{io} + C.X_{it}$. Where X_{it} is a vector of per capita environmental variables is introduced by Cropper (1981) and C is a vertical vector of parameters.

The age structure of a country is assumed to remain constant over time, thereby excluding the role of age in determining the depreciation rate. Substituting the log of per capita depreciation into the reduced form health investment equation gives $lnh_{it} = \alpha_1 + \alpha_2 lny_{it} - \alpha_3 lnP^{m}_{it} - \alpha_4 lnd_{io} - \alpha_5 C.X + \alpha_6 EC_{it}$. And the health equation is estimated using $\theta lnLE_{it} = \theta lnLE_{t-1} + \theta_2 lnyC_{it} + \theta_3 lnURB_{it} + \theta_4 lnCPC_{it} + \theta_5 MAL_{it} + \theta_6 HIV_{it} + \theta_7 eC_{it} + \eta^{4}_{it} + \mu^{4}_{it} + v^{4}_{it}$. Whre $\ln LE_{it}$ is the log of per capita health capital (as proxied by average life expectancy at birth; LE_{t-1} is the lagged log of average life expectancy at birth; HIV_{it} is the adult HIV prevalence rate' MAL_{it} is the proportion of the population at risk of malaria. CPC_{it} is the national log of caloric intake per capita ec_{it} is per capita education capital while $\ln URB_{it}$ is a higher degree of urbanization. Higher average income ($\ln YC_{it}$) raise the productive benefit of good health. The μ^{4}_{it} is the country specific fixed effect and η^{4}_{it} is time specific fixed effect which were included to capture unobserved heterogeneity in health capital across countries and time.

In the empirical growth model, a Cobb-Douglas form of production function is proposed and is defined by $Y_{it} = K^{\alpha}_{it} (A_{it} L_{it} (eC^{\beta}_{it} h^{1-\beta}_{it}))^{1-\alpha}$. Where, Y_{it} represents output, K^{α}_{it} is the physical capital and L_{it} is labour. the inner bracketed term $eC^{\beta}_{it} h^{1-\beta}_{it}$) represents a production function for total human capital exhibiting constant returns to scale which comprise education capital (eC_{it}) and health capital (h_{it}) per worker. β is the partial elasticity of human capital with respect to education capital. Multiplication of L_{it} and ($eC^{\beta}_{it} h^{1-\beta}_{it}$) can be interpreted as "productive labour" input. A_{it} is the level of productive labour augmenting technology and α is the partial elasticity of output with respect to physical capital. Technology is assumed to encompass not just technology in the typical sense, but also national resource endowments and institutions amongst others,

initial technology takes the form$\ln A_{it} = \alpha + \varepsilon_i$. Here α represents constant and ε_i is a country-specific shock term. The evolution of physical capital per technology augmented worker (where $K = \frac{K}{A.L}$) can be expressed as (temporarily dropping country (i) and time (t) subscripts) such that $K = w^K(K^*(ec^{\beta}h^{1-\beta})^{1-\alpha}) - (n + g + \delta)K$. setting the equation in motion equal to zero, the steady state value for K, denoted with asterick is defined by $K^* = \left[\frac{w^K}{n+g+\delta}\right]^{\frac{1}{1-\alpha}} ec^{\beta}h^{1-\beta}$. The steady state output per worker is given by $y_{it}^* = A_{it}\left[\frac{w_{it}^*}{n_i+g_i+\delta_i}\right]^{\frac{\alpha}{1-\alpha}} (ec_{it}^{\beta}h_{it}^{1-\beta})$. As the initial technology is directed by A_0 and that it is assumed to grow at α period – specific rate g_{it} then an expression for A_{it} is given by $A_{it} = A_{10}e^{gi}$. The substitution of the last two equation yield $y_{it}^* = A_{10} + g_i + \frac{\alpha}{1-\alpha}lnw_{it}^* + \beta lnec_{it} + (1-\beta)lnh_{it} - \frac{\alpha}{1-\alpha}\ln(n_i + g_1 + \delta_1)$ and linearizing around the steady state level of income gives $lny_{it}^* = ZlnA_{it} + g_{it} + \left(\frac{Z\alpha}{1-\alpha}\right)lnw_i^* - \left(\frac{Z\alpha}{1-\alpha}\right)\ln(n_i + g_i + \delta_i) + \beta Zec_{it} + (1-\beta)Zlnh_{it} - (Z-1)lny_{it}^*$ where y_{it} is the initial output per worker in country i; $z = (1 - \alpha^{-\lambda})$ and λ which represents the speed of convergence to the steady-state output level defined by $\lambda = (n_i + g_i + \delta_i)(1 - \alpha)$.

The dynamic version of this equation can be represented by $lny_{it}^* = \varphi_1 lny_{it}^* + \varphi_2 lnw_{it}^* + \varphi_3 lnx_{it}^* + \varphi_4 lnec_{it}^* + \varphi_5 lnh_{it}^* + n_{it}^5 + \mu_{it}^5 + v_{it}^5$ with $lnec_{it} = b.Q_i.Sch_{it}$. finally the growth equation can be estimated by $lnyC_{it} = \theta_1 lnyc_{t-1} + \theta_2\ln(n + g + \delta) + \theta_3 lnIMV_{it} + \theta_4 lnLE_{it} + \theta_{it}(0.097.Sch_{it}.Q_t) + \eta_t^6 + \mu_t^6 + V_{it}^6$.

A model to assess the impact of HIV/AIDS on real GDP was developed by this study in line with Solow's (1956) neoclassical growth model. This model holds the view that economic growth results from accumulation of capital (human and physical) and the expansion of the labour force in line with "exogenous" factor technological progress that explained long- term growth. In the Solow (1956) model, the standard aggregate production function is given as:

$$Y_t = A_t f(K_t^{\beta} L_t^{1-\beta}) \quad \ldots\ldots 1$$

Where; Y_t is the Gross Domestic Product (GDP); K is the Stock of Capital; L is Labour force; A is Efficiency factor and t is Time dimension.

In Cuddington (1993), the Solow growth model was extended to incorporate key macroeconomic consequences of HIV/AIDS in which aggregate output (Y_t) is assumed to be produced using the Cobb-Douglas Production function with constant return to scale. Consequently:

$$Y_t = \alpha A_t L_t^{\beta} K_t^{1-\beta} \quad \ldots\ldots\ldots\ldots 2$$

Where; α is a constant scale factor; A is rate of technological change over time; β is labour share of national output and 1-β is the capital share of output; other variables are as previously defined. Thus, to estimate the impact of HIV/AIDS on economic growth in Nigeria, this study considers the modelling framework following Mankiw, Romer and Weil (1992), Levine and Renelt (1992), Barro (1991) in which the long-run relationship between economic growth and the explanatory variables are specified to enter linearly and independently into the growth equation as follows:

$$RGDP = \beta_0 + \beta_1 HIV/AIDS + X_1\lambda + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

$$HIV/AIDS = \delta_0 + \delta_1 RGDP + Z_t(RGDP_t)\delta_2 + R_t\delta_3 + \mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Where: RGDP is the real gross domestic product; HIV/AIDS is the prevalence of Human Immune Virus/Acquired Immune Deficiency Syndrome. X is a set of control variables that influence economic growth. Z's and R's are vectors of instrumental variables and cofactors that may influence HIV/AIDS transmission at the country level, some of which may depend on the rate of growth of real GDP.

As a result, the equation of the determinant of economic growth via HIV/AIDS transmission is specified as:

$$RGDP = \beta_0 + \beta_1 NCHA + \beta_2\ control\ variables + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

Specifically, the growth equation is

$$LogRGDP = \beta_0 + \beta_1 logNCHA + \beta_2\ logTEHA + \beta_3\ logGEXP\beta_3 + \beta_4\ logDOE + \beta_5\ logHCD + \mu_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6$$

Since these variables (as estimated) were integrated of order one – that is, I(1), their actual specification of the equation entered into the model in their first difference as specified as follows:

$$LogRGDP_t - logRGDP_{t-1} = \beta_0 + \beta_1 logNCHA_t - NCHA_{t-1} + \beta_2\ logTEHA_t - TEHA_{t-1} + \beta_3\ logGEXP_t - GEXP_{t-1} + \beta_4\ logDOE_t - DOE_{t-1} + \beta_5\ logHCD_t - HCD_{t-1} + V_t \ldots 7$$

The first-difference specification of equation 3.12 follows that:

$$\Delta logRGDP = \beta_0 + \beta_1 \Delta logNCHA + \beta_2 \Delta logTEHA + \beta_3 \Delta logGEXP + \beta_4 \Delta logDOE + \beta_5 \Delta logHCD + V_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8$$

The mechanism of first-differencing allows the study to address the problems of omitted variables in a model with panel data and to avoid estimation bias due to time invariant omitted variables.

On the a priori, it is expected that $\beta_1 < 0$; β_2, β_3, β_4, $\beta_5 > 0$. Least square estimation procedure was used to estimate the parameters of the model. The research depended on secondary data to achieve the objectives of this study. Data on real GDP, Government consumption expenditure and human capital development were obtained from the National Bureau of Statistics while data on new HIV cases were sourced from the National Agency for the Control of AIDS (NACA). The data on total expenditure on health was obtained from the Federal Ministry of Health (FMH). The degree of openness of the economy was derivative using the formula: (X+M)/Y. That is the sum of exports and imports divided by the national income. These data were subjected to diagnostic tests to avoid spurious regressions

RESULTS AND DISCUSSION

The Unit Root Test

In line with the specification of equation (8), the study examines the characteristics of the time series data used for this study. The conventional method of Augmented Dickey-Fuller (ADF) test was employed. The results of this test are presented in the table below:

Table 4.1: Unit Root (Stationary Test)

Variable	Critical Value at 5%	ADF Test value at 5%	Status
RGDP	- 5.291508	-2.9907	I(1)
NCHA	-3.861342	-3.6118	I(1)
TEHA	-3.401019	-2.9907	I(1)
GCE	-3.555106	-2.9907	I(1)
DOE	-3.200496	-2.9907	I(1)
HCD	-3.766147	-2.9907	I(1)

Source: Own Computation, Using E-Views 7.0

The unit root test as presented in table 4.1 shows that all the variables are integrated of order one – that is, I(1). As a result, a co-integration test based on Johansen and Joselius (1991) approach was conducted to determine the number of co-integrating equations. The result shows that the optimal lag length is two while the likelihood ratio statistic which depends on the Maximum Eigen Value and Trace statistic is used. In order to determine the optimal lag length, the Vector Autoregressive (VAR) approach was used. This means that the null hypothesis of zero co-integrating vector is rejected as against the alternative hypothesis that at least one co-integrating vector. The implication here is that there exist, long-run relationships among the variables under investigation. At the long-run, all the variables of interest are statistically significant at both the 1 per cent, 5 per cent and level s since the absolute value of the t-statistic are greater than two.

Co-Integration Test

The Unit root test carried out in table 4.1 above shows that the variables exhibited a I(1) orders of integration before stationarity was achieved. As a result, the Johansen's testing procedures were used to determine the order of integration. The rank condition for co-integration was used based on the Maximum Eigen value test and the Trace statistic. While the Maximum Eigen Value test examines the null hypothesis of ρ^{th} order co-integration vectors against the alternative of r + 1 vector, the trace test provides a test of a more general alternative hypothesis. Results are reported in the table below:

Table 4.2 Co-integration Rank Test with Trace Statistic

Hypothesized No of CE(s)	Eigen Value	Trace statistic	5 Per cent critical value	1 per cent critical value
None**	0.878812	122.9533	94.15	103.18
At most 1*	0.727818	70.19305	68.52	76.07
At most 2	0.500185	37.66091	47.21	54.46
At most 3	0.346988	20.32299	29.68	36.66
At most 4	0.265060	9.703428	15.41	20.04
At most 5	0.077041	2.004262	3.76	6.65

Source: Own Computation, Using E-Views 7.0

1(*) denote rejection of the hypothesis at the 5 per cent (1 per cent) level
Trace test indicate 2 co-integrating equations at the 5 per cent level.
Trace test indicate 1 co-integrating equations at the 1 per cent level.

The trace test shows that there exist, one (1) co-integrating equation at both 5 per cent and 1 per cent level of significance to show that there is a long-run equilibrium relationship between real GDP and the determinants of the model.

Table 4.2 Co -integration Test with Maximum Eigen Value

Hypothesized No of CE(s)	Eigen Value	Trace statistic	5 Per cent critical value	1 per cent critical value
None**	0.878812	52.76025	39.37	45.10
At most 1*	0.727818	32.53215	33.46	36.77
At most 2	0.500185	17.33792	27.07	32.24
At most 3	0.346068	10.61956	20.97	25.52
At most 4	0.265060	7.699165	14.07	18.63
At most 5	0.077041	2.004262	3.76	6.65

Source: Own Computation, Using E-Views 7.0

1(*) denotes rejection of the hypothesis at the 5 per cent (1 per cent) level.
Maximum Eigen Value test indicates 1 co-integrating equation(s) at both 5 per cent and 1 per cent levels.

The Maximum Eigen Value test indicates one (1) co-integrating equation at both the 5 per cent and 1 per cent level of significance to confirm that there exist; long-run equilibrium relationship between real gross domestic product and the determinants of the model. The implication is that the null hypothesis of zero co-integration is rejected as against the alternative hypothesis at least one co-integrating vector.

Regression Analysis

In order to determine the impact of HIV.AIDS on economic growth in Nigeria, the study employed the use of the vector error correction (VEC) model to estimate the regressors in line with the specification of the model

Table 4.3 Regression results of the Impact of HIV/AIDS on Economic Growth in Nigeria

Dependent Variable : **R**GDP
Method : Least Squares
Date: 01/25/18, **Time** : 06:52
Sample : 1990 - 2016
Included Observations : 27

Variable	Coefficient	Standard Error	t-Statistic	Prob.
NCHA	- 0.298062	0.074351	- 4.008730	0.0006
TEHA	0.001719	0.006302	0.272812	0.7877
GCE	0.167933	0.029313	5.729043	0.0000
DOE	0.003732	0.001557	2.397025	0.0250
HCD	0.211180	0.070044	3.014960	0.0066
C	6.8228150	0.677910	10.07236	0.0000

R-Squared	0.984277	Mean Dep. Variable	7.522222
Adjusted R^2	0.980533	SD dep. Variable	0.202548
S.E of Regression	0.028260	Akaike Inf. Criterion	- 4.101589
Sum. of Sq. res.	0.016772	Schwarz Criterion	- 3.813625
Log Likelihood	61.37145	F-Statistic	262.9196
Durbin-Watson Stat.	2.418502	Prob. (F-Statistic)	0.0000

Source: Own computation, using E-views 7.0

The regression results as presented in table 4.3 above are carried out in line with the empirical specification of the model. The parameter estimates were done at 5 per cent level of significance to show the impact of HIV/AIDS and the control variables on economic growth in Nigeria. The results are plausible in that the estimated parameters are statistically high. The results show that about 98 per cent of the total variation in real gross product is explained for by the regressors of

the model. The value of the F-statistic which measures the overall significance of the model is equally high at 262.9196, implying that the explanatory powers of the model are high and relevant for analysis while the D-W test of 2.418502 shows that autocorrelation is not a problem.

Overall, the results show that economic growth would decline by about 30 per cent (-0.298062) for every one unit change in the prevalence of HIV/AIDS, holding every other variables constant. It is important to emphasize here that the spread of HIV/AIDS is influenced by a wide range of economic, social and epidemiological factors which are difficult to isolate one from the other, making it easier to generalize that HIV/AIDS transmission definitely have negative impact on economic growth through its concentration among the population of productive age. The result also shows that total expenditure on HIV/AIDS (TEHA) has an insignificant effect in combating the spread of HIV/AIDS. However, it revealed that economic growth would rise only by about 1 per cent for every one unit change in TEHA, holding other variables constant. This means that there is a positive correlation between public expenditure in controlling HIV/AIDS and economic growth.

The result also shows that economic growth would rise by about 17 per cent (0.167933) for every one unit increase in government consumption expenditure (GCE), holding other variables constant. This implies that government would have to stimulate the economy through expansionary fiscal or monetary policy to grow the economy in the face of HIV/AIDS prevalence. This can be achieved through investing in human capital by way of public enlightenment and education on the danger of contracting HIV/AIDS. Although, the degree of openness of the economy (DOE) has a positive correlation with economic growth, its coefficient is insignificant in explaining the relationship between economic growth and the HIV/AIDS. It reveals that real GDP would rise by only about 3 per cent or less for every one unit change in the degree of openness, holding every other variable constant. The DOE act as control variable for economic development of Nigeria.

The result also shows that real GDP would rise by about 21 per cent (0.211180) for every one unit change in human capital development (HCD), holding every other variables constant. The positive correlation between real GDP and HCD shows that human capital is the engine room of economic growth and as such, investing in human capital through education, training among others have the tendency to enhance the real GDP of the economy.

CONCLUSION

This study, have evidently shown that, HIV/AIDS affects economic growth in Nigeria. It's widespread and existence pose a great challenge to the economy in terms of lowering the productivity of the affected work force and consequently, economic growth. Although, there is little agreement among economists about the extent of the effects of HIV/AIDS on economic growth, the most enduring impact of the pandemic involves the loss of human capital which represents the long-run investments. Also, the pandemic destabilizes both the micro and the macro economy through low productivity of the work force, reduced savings, high level of dependence ratio, over stressed government expenditure, exacerbate income inequality and increase poverty among other issues.

Based on the findings of this study, the following recommendations are made:

1 There is the need to speed up more efforts to track down the rising incidence of HIV/AIDS by promoting awareness on the risk of contracting the disease. This could be accompanied by free counselling and testing as well as distribution of preventives such as condoms.

2 There is the need for increased budgetary allocation to the health sector for massive investment in HIV/AIDS related programmes of intervention. Such intervention strategies should also focus on the prevention of new cases and legislating against stigmatization.

3 There is the need for an expanded health insurance cover to include HIV/AIDS. This could help to reduce the cost and burden of treatment on the affected individuals and households and improve the health status of the overall population.

4 There is the need for adequate collaboration with external bodies like the World Health Organization (among others) for exchange programmes such as transfer of expertise, sharing information on the best practices to combat or halt the spread of HIV/AIDS and retraining Nigerian Doctors in the field of community health for rapid treatment of those affected. This would help to boost the level of economic activities for sustainable growth.

REFERENCES

Arndt, C. and J.D. Lewis (2001). The Micro Implications of HIV/AIDs in South Africa: a preliminary assessment paper presented at the IAEM symposium: the Economics of HIV/AIDs in Developing Countries.

Arndt, C. and J. Lewis (2000). "The macro Implications of HIV/AIDs in South Africa: A Preliminary Assessment. World Bank Africa Region Working Paper No. 9 (Washington, World Bank).

Becker, G. S. (1964), Human capital: A theoretical and empirical analysis with special reference to education, third Edition, Chicago and London: The University of Chicago Press.

Bell, D., Devarajan, S. and Gersbach, H (2003): "The Long-run Economic Costs of AIDS: Theory and an Application to South Africa", The World Bank, Washington DC.

Berger, M. C. (1983), 'Labour supply and spouse's health: the effects of illness, disability and mortality', Social Science Quarterly, 64: 494–509.

Ber (Bureau of Economic Research,(2001): HIV/AIDs and the South African Economy, Stellenbush: BER.

Burger, R. (2001). Macroeconomic Impact of HIV/AIDs in South Africa. A Supply side analysis. Department of Economics, University of Stellenbosch.

Greener, R. (2002). "AIDS and macroeconomic Impact" In S. Forsyth (ed.). State of The Art: Aids and Economics. IAEN. Pp 49-55.

Greener, R. (2001): The Impact of HIV/AIDs on Poverty and Inequality. Chapter 5. Pp 167 – 181.

Grossman, M. (2000). The Demand for Health: A Theoretical and Empirical Investigation. Number 119 in Occasional Paper. National Bureau of Economic Research, New York.

Grossman, M. (1972b). On the concept of health capital and the demand for health. *Journal of Political Economy, 80(2):223–255.*

Hacker, M. (2002): "The Impact of HIV/AIDs in Southern Africa". (Unpublished, Washington: Internation Monetary Fund).

Haworth, A., K. Kalumba, P. Kwapa, E. Van Praag and C. Hamavhwa. 1991. The Impact of HIV/AIDS in Zambia: General Socio-Economic Impact. Paper Presented to the VIIth International Conference on AIDS, Florence.

International Labour Organisation (ILO) (2004): HIV/AIDS and Work: Global Estimates, Impact and Response, ILO Programme on HIV/AIDS and the World of Work (Geneva: International Labour Office).

International Labour Organization [ILO], (2000). HIV/AIDS: A threat to decent work,

productivity and development. Document for discussion at the Special High-Level Meeting on HIV/AIDS and the World of Work.

NACA (National Agency for the Central of AIDs) (2001): HIV/AIDs Incidence and prevalence in Nigeria, Newsletter.

NACA (2013), Official Statistics: 3.4 million Nigerians infected with HIV. Been an official statistics announced by Prof. John Idoko on the state of HIV/AIDS in Nigeria.

Reeves, J. D. and R. W. Doms (2002): Human immunodeficiency virus type 2". The Journal of General Virology 83 (P1-6): 1253 - 65.

Risley, CL, LJ Drake and DAP Bundy (2012), "Economic Impact of HIV and Antiretroviral Therapy on Education Supply in High Prevalence Region, PLOS one vol. 7. Issue 11.

UNAIDS (2002a), Report on the Global HIV/AIDS Pandemic, Geneva June.