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HIV/AIDS, HUMAN CAPITAL AND ECONOMIC GROWTH IN NIGERIA

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Abstract

This study examined HIV/AIDS, human capital and economic growth in Nigeria. Specifically the study analyzed the impact of HIV/AIDS on human capital development, the extent to which government expenditure on HIV/AIDS has impacted the prevalence of HIV/AIDS, and the impact of HIV/AIDS on economic growth of Nigeria. This study covered the period of 31 years spanning from 1987 to 2017 and data used were sourced from WDI and NACA. The study used Co-integration and ECM as estimation techniques. Results revealed; the effect of prevalence of HIV/AIDS on human capital is negative in the short and long run, in the short run, government expenditure exerts insignificant positive impact on the prevalence of HIV/AIDS while in the long run, government expenditure on HIV/AIDs exerts negative insignificant impact, prevalence of HIV/AIDS exerts significant negative impact on economic growth measured in terms of real GDP. The study concluded that prevalence of HIV/AIDS is detrimental to the development of human capital; that government expenditure on HIV/AIDS in Nigeria only culminates into decline in the prevalence of HIV/AIDS on the long run and that increase in the prevalence of HIV/AIDS can significantly impede the level of economic growth of the country.

Keywords: HIV, AIDS; Human Capital; Economic Growth, Nigeria

INTRODUCTION

HIV/AIDS (Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome) become a major threat to stock of human capital in most developing nations, especially in Africa (Tijani 2016). In some countries it has affected their economies negatively as those infected are becoming less economically productive and are turning into economic burden for the healthy ones. It is no longer only an health issue but a substantial threat to economic growth and development, imposing a heavy burden first on families, then on communities and eventually economies (Maijama'a 2013). The most productive age group is most affected by HIV/AIDS and this has implications for families and economies in terms of income, employment and labour market changes (Sunday 2017).

The economic impact of AIDS is much is very clear because unlike most diseases, AIDS predominantly affects adults rather than children and the elderly; hence, its economic effects may be particularly severe, especially with regards to decreasing human capital and impeding economic growth (Dixon, 2002).It has been estimated that the AIDS epidemic caused a "growth drag" on GDP per capita in Africa of 0.5 - 1.2 percentage points per year (UNAIDS, 2005). Also, on the basis of growth in aggregate output it has been estimated that GDP growth declined by 1.1 percentage points per year for the continent as a whole in the last two decades (ILO, 2004).

Nigeria, the most populous country in Africa with a population estimate of about 198 million in 2016 (NPC, 2017), is fast becoming one of the epicenters of the HIV/AIDS scourge in Africa. Nigeria has the highest prevalence rate in West African Sub-region and the third highest prevalence of any country in the world with a five percent population prevalence rate, that is, over 3.2 million people (UNAIDS/WHO, 2016). The widespread and rising prevalent rates of HIV/AIDS is a problem that obviously affects the growth of the Nigerian economy, increases poverty, and reduces standard of living, level of productivity, and rate of employment.. In addition, catering for the people living with HIV/AIDS could take away a lot of investible funds from both individual (the infected person, relations and friends) and government for subsidizing and providing drugs for the infected citizens(Sunday 2017). A country could lose productivity, manpower, agricultural output, in both the infected person and their care-givers. Reducing the prevalence would help enhance the productivity of the country.

In specific terms, it has been estimated that eleven persons become infected every minute globally representing some 15,000 new infections every day or more than 5.4 million for the entire year (WHO, 2000). Globally 33.2 million affected persons are from Africa among which 3.2millions people are estimated to be living with HIV and AIDS in Nigeria and the country was second worst nation in terms of HIV infection in the world after South Africa (FMOH, 2010). In 2004, over 200,000 Nigerian children were made orphans due to the epidemic (WHO, 2010).

Deductively HIV/AIDS takes a big toll on human lives in Nigeria and even the economy at large. This could have consequences on the human capital stock in Nigeria as well as potential labour force or manpower of the nation.

Financing for the HIV/AIDS response in Nigeria is still heavily donor dependent because out of the 1,066,223 PLHIV on treatment as at December 2017 foreign donations through PEPFA (President's Emergency Plan for AIDS Relief) accounted for 69 %(735,694) while foreign donations directly through government accounted for 19% (202,582) (NACA, 2018). Thus together international donors are responsible for keeping 88% of PLHIV on treatment PEPFAR funding has dropped by 27% from USD488,614,278 in 2012 to USD358,614,280 in 2016 (NACA, 2018).This indicates how dominant foreign donors have become in financing the government response to HIV/AIDS in Nigeria.

HIV/AIDS has been a concern since the beginning of the pandemic, it is believe that the HIV/AIDS epidemic is responsible for the slow rate of growth of the gross national product of many heavily affected/infected countries and that the epidemic will slow or re-verse growth in the labour supply. Savings and investments of families may be reduced owing to the increase in HIV/AIDS-related health expenditures. The HIV/AIDS epidemic may also divert public spending from investments in physical and human capital to health expenditures, The HIV/AIDS epidemic may also deepen the poverty of the most affected countries by decreasing the growth rate of per capita income, more children and elderly people may have to be supported by a smaller active labour force. This study therefore, investigated the relationships among HIV/AIDS, human capital and economic growth in Nigeria. The study is unique for different reasons. First, it specified three different equations to investigation the relationship among the variables. Two, it used recent data on human capital index, prevalent of HIV/AIDS and government expenditures on HIV/AIDS among others.

The remainder of the paper is structured as follows. Section two of this paper discusses both the empirical and theoretical literature. Section three presents the methodology, while section four discusses the results. Section five concludes and makes recommendations.

LITERATURE REVIEW

Empirical Literature

According to Togbe and Weinberger(2016) on the social and economic implications of HIV/AIDS in United Nations - New York (USA) using a computable general equilibrium (CGE) model, shows that HIV/AIDS has been taking a devastating toll on human lives. Life expectancy has already fallen by more than 10 years in the most affected countries. Households are feeling the impact of AIDS in terms of loss of earnings and increased expenditure for medical care. As a

result of HIV/AIDS, food consumption is decreasing in many AIDS-affected households, leading to malnutrition, especially among young children. The HIV/AIDS epidemic is also imposing serious costs on the private sector in the most affected countries. AIDS deaths reduce the number of available workers, since the deaths occur predominantly among workers in their most productive years.

Bloom(1995), examined if AIDS epidemic really threaten economic growth in New York and they were able to establish that AIDS epidemic has had an insignificant effect on the growth rate of per capita income, with no evidence of reverse causality and that there is insignificant effect of AIDS on income per capital as is qualitatively similar to an insignificant effect on wages of the Black Death in England and France during the Middle Ages and an insignificant effect on output per capita of influenza in India during 1918-19.

Cuddington and Hancock (1995), also studies HIV/AID and economic growth in Tanzania and Malawi, using simple regression and they found that over the period 1985-2010, average annual G.D.P. growth would be reduced by 1.1 percentage points in Tanzania and 1.5 percentage points in Malawi. Also, should AIDS treatment costs be entirely financed from savings, the AIDS epidemic would reduce per capita G.D.P. growth by 0.3 percentage points and 0.1 percentage points in Malawi and Tanzania respectively.

Kambou (1992) investigate the impact of AIDS in Cameroon using an eleven-sector computable general equilibrium (CGE) model for the period 1986-1991 and conclude that over the period, the loss of an urban worker had seven times the negative impact on production as would the loss of a rural worker, and GDP growth rate was reduced by 1.9 percent per yearand Sunday, and Uchechukwu (2017) assessment of the impact of HIV/AIDS on the Nigerian Economy Performance through Co-integration (long run) analysis was able to establish that HIV/AIDS had a significant negative impact on productivity and by implication economic growth of Nigeria. The study also showed that the effect of HIV/ AIDS infection has tremendously hindered growth in output/productivity implying that in the long run, productivity may decline and that a high budgetary implication of taking care of those infected.

Maijama'a1 and Mohammed(2013) while examining the impact of HIV/AIDS on Economic Growth and development in Nigeria using Co-integration and error correction modeling techniques, finds out that HIV/AIDS prevalence is widely spreading and rapidly rising and has a negative impact on real GDP growth in Nigeria. Also, recurrent health expenditure does not appear to be growth augmenting during the period HIV/AIDS was also found to adversely affect savings and standard of living of infected persons.

Daudu et al. (2003) examined the effect of HIV/AIDS on Farm Families in Makurdi local government using frequency distribution, percentages and Chi-square and he concluded that

HIV/AIDS has serious adverse effect on the productivity, farm income and standard of living of the affected farm families. Tijani (2016) using chi-square (X)2 statistic while investigating the impact of HIV/AIDS on human capital and economic growth in Nigeria concluded that the effect of HIV/AIDS on human capital and economic development are multifaceted and that what is required is a re-examination of many of the channels through which changes in the stock of human capital affect production and livelihoods.

Zakari and Abdullahi(2016) examined the impact of HIV/AIDS and stigmatization on women in Nigeria as a challenge for the actualization of Millennium Development Goals (MDGs) using simple percentage method, the results of the study revealed that negative presentation by some medical personnel and the sensational captions by the Nigerian mass media on the so-called dead sentence nature of HIV/AIDS epidemic made it so scary that people found it difficult to accept its presence and so stigmatize people especially women with the disease

Theoretical Literature

The Augmented Solow Model shows that the aggregate production function is a Cobb–Douglas function which assumes constant returns to scale and labour augmenting technological progress, and is express in the following form:

$Y_t=(A_t L_t)^{1-\alpha-\beta-\partial} K_t^{\alpha} E_t^{\beta} H_t^{\partial}$ (1)

Where Y is output, A the level of technology, L labour, K physical capital, E educational capital, H health capital, α, β, and ∂ are the output elasticity with respect to the various capital inputs. The subscripts denote country i = 1, 2. . . . N, and time t= 1, 2. . . . T. Equation 1 can be condensed as

$$y_t = k_t^{\alpha} e_t^{\beta} h_t^{\lambda} \lambda \quad (2)$$

Where y_{it} is output per unit of effective labour ($A_t L_t$) in country I at time t, and k_{it}, h_{it} and e_{it} are the respective quantities of capitals per effective worker.

Based on Mankiw, (1992), McDonald & Roberts (2006) derived the steady – state output per capita y_t^* in terms of the parameters of the production function with the assumption that labour grows at country specific rates, technology grows at period specific rates gt, and physical, educational and health capital stocks depreciate at the same rate δt and there are country specific initial states of technology A_0, then

$$k_t = 1_{j-1}^{k} + (1-\delta)k_{j-1}$$

$$E_t = 1_{j-1}^{E} + (1-\delta)E_{j-1}$$

$$H_t = 1_{j-1}^{H} + (1-\delta)H_{j-1} \quad (3)$$

Where savings are divided among physical, education and health capital accumulation, and treating education and health capital as investment activity, so that

$$s_t = s_t^k + s_t^E + s_t^H = \frac{S_t}{Y_t} = \frac{I_t}{Y_t} = \frac{I_t^k + I_t^E + I_t^H}{Y_t} \quad (4)$$

Then, the rates of physical, educational and health capital growth per unit of effective labour becomes

$$\hat{k}_t = s^k \hat{y}_t - (n + g_t + \delta_t)\hat{k}_t \quad (5)$$

$$\hat{e}_t = s^E \hat{y}_t - (n + g_t + \delta_t)\hat{e}_t \quad (6)$$

$$\hat{h}_t = s^H \hat{y}_t - (n + g_t + \delta_t)\hat{h}_t \quad (7)$$

Where s^K, s^E and s^H are the portion of income devoted to investment in physical, educational and health capitals, respectively, and δ represents the common depreciation rate, assumed constant over time and incorporating the three capitals – physical, educational and health the augmented steady state output per capita becomes

$$\ln y_t^* = \ln A_{(0)} + g_t t - \frac{\alpha+\beta+\lambda}{(1-\alpha-\beta-\lambda)}\ln(n + g_t + \delta_t) + \frac{\alpha}{(1-\alpha-\beta-\lambda)}\ln s^K$$

$$+ \frac{\beta}{(1-\alpha-\beta-\lambda)}\ln s^E + \frac{\lambda}{(1-\alpha-\beta-\lambda)}\ln s^H \quad (8)$$

Linearising (7) around the steady state level of income per unit of effective worker, yit*, following Mankiw et al., gives

$$\ln y_t - \ln y_0 = (1-\exp^{\lambda})\ln A_{(0)} + g_t t - \frac{(1-\exp^{\lambda})\alpha}{(1-\alpha)}\ln(n + g_t + \delta_t) + \frac{(1-\exp^{\lambda t})\alpha}{(1-\alpha)}\ln s^K$$

$$+ \frac{(1-\exp^{\lambda t})\beta}{(1-\alpha)}\ln s^E + \frac{(1-\exp^{\lambda t})\varphi}{(1-\alpha)}\ln h_t - (1-\exp^{\lambda t})\ln y_0 \quad (9)$$

An empirical advantage of the Mankiw et al. method is that it allows for the mixing of stock and saving/investment data for the capital components of the estimating equation.

Solving (9) for lny*it and applying standard panel data notation, yields the general specification of the econometric growth model which we estimate.

$$y_t^* = \theta\gamma_{0^*} + \sum_{j=1}^{n}\phi_j x_t^j + \mu_t + \nu_i + \varepsilon_t \quad (10)$$

Where y_t^* is per capita GDP growth rate, y_0^* is the initial level of per capita GDP of country i, x_t^j are vectors of variables that may influence the growth rate, ϕ_j are vector of parameters, μ_t is a

time specific effect, v_t are the unobserved individual specific time invariant effects and ε_t is the stochastic term.

METHODOLOGY

Model Specification

The theoretical foundation of this study is based on Augmented Solow Growth Model,

$$y_t^* = \theta\gamma_{0^*} + \sum_{j=1}^{n}\phi_j x_t^j + \mu_t + v_i + \varepsilon_t \quad (11)$$

Where y_t^* is per capita GDP growth rate, y_0^* is the initial level of per capita GDP of country i, x_t^j are vectors of variables that may influence the growth rate, ϕ_j are vector of parameters, μ_t is a time specific effect, v_t are the unobserved individual specific time invariant effects and ε_t is the stochastic term.

This study adopts the above model with modification to meet specific objectives as follows

Model 1

To examine the impact of HIV/ AIDS on human capital development in Nigeria

HC =f(PAID, PCI,GEH) (12)

$hc_t = \alpha + \beta_1 paid_t + \beta_2 lnpci_{t+} \beta_3 lngeh_t + \varepsilon_t$ (13)

where

hc_t is the of Human Capital Index, $paid_t$ is Prevalence of HIV/AIDS, lnpci is the log of Per Capita Income, lngeh is the log of Government Expenditure on HIV/AIDS, α_i is the constant term, β_1, β_2, β_3 is the long run coefficient of dependent, ε_t is the error term.

Model 2

To examine the extent to which government expenditure on HIV/AIDS has reduced the prevalence of HIV/AIDS

PAID=f(GEH, LEX, MRT) (14)

$paid_t = \alpha + \beta 1 lngeht + \beta_2 lex_{t+} \beta_3 mrt_{t+} \varepsilon_t$ (15)

where

$paid_t$ is the of Prevalence of HIV/AIDS, $\beta_1 lngeh_t$ is the log of Government Expenditure on HIV/AIDS, $\beta_l lex_t$ is Life expectancy, $\beta_3 mrt_t$ is Mortality rate, α_i is the constant term, β_1, β_2, β_3 is the long run coefficient of dependent variables, ε_t is the error term

Model 3

To investigate the impact of HIV/ AIDS on economic growth in Nigeria

$$RGDP = f(\text{PCI, GEE, PAID, GEH, LEX}) \quad (16)$$

$$\text{lnrgdp}_t = \alpha + \beta_1 \text{lnpci}_t + \beta_2 \text{gee}_{t+} \beta_3 \text{paid}_t + \beta_4 \text{lngeh}_t + \beta_5 \text{lex}_{t+} \varepsilon_t \quad (17)$$

where

lnrgdp_t is the log of the real Gross Domestic Product, lnpci_t is the log of Per Capita Income, gee_t is Government Expenditure on Education, paid_t is Prevalence of HIV/AIDS, lngeh_t is the log of Government Expenditure on HIV/AIDS, and lex_t is life expectancy, α_i is the constant term, β_1, β_2, β_3, β_4, β_5, is the long run coefficient of dependent, ε_t is the error term.

Sources of Data

The data set for this study consist of annual time series spanning from 1987-2017 for the purpose of investigating the impact of HIV/AIDS, human capital on Economics Growth in Nigeria. All data used were obtained from the World Development Indicators (WDI) and National Agency for the Control of AIDS (NACA). The period was chosen because the outbreak of HIV/AIDS was first reported in Nigeria in 1986 and it was estimated that almost two thirds of HIV/AIDS infections in West and Central Africa in 2016 occurred in Nigeria. (UNAIDS, 2017)

Estimation Technique

The techniques used in this study are Unit Root Test, Co- integration and Error Correction Model (ECM). The unit root test also called stationarity test is undertaken to study the stationarity properties of data of each individual variable. The co-integration is used to establish if there is a correlation between variables in the model of this study, while ECM is used for estimating both long run and short run effect of the time series variables in the model of the study.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 revealed that all the variables used in the study except prevalence of HIV/AIDS and mortality rate are positively skewed. Kurtosis statistics revealed that all the variables used in the study except government expenditure on HIV/AIDS are platykurtic by peakedness with reported statistics of 1.738312, 1.640351, 2.470821, 7.444589, 2.075865, 1.448932, 1.559681, 2.020732 for real gross domestic product, human capital, prevalence of HIV/AIDs, government expenditure on HIV/AIDS, government expenditure on education, per capita income, life

expectancy and mortality rate respectively. Jarque-bera statistics showed no evidence of rejection of normality for all the variables except government expenditure on education.

Table 1 Descriptive statistics

	RGDP	HC	PAID	GEH	GEE	PCI	MRT	LEX
Mean	243830.9	1.535128	3.170968	881.3732	5.229603	1729.430	168.7655	48.28762
Median	170643.3	1.517784	3.200000	820.5200	5.125660	1374.440	175.9000	46.82995
Maximum	464282.2	1.924225	4.100000	2106.140	8.155633	2563.090	212.9000	54.16533
Minimum	101416.0	1.213785	1.600000	615.5500	3.063690	1151.130	104.3000	45.83971
Std. Dev.	127527.6	0.236148	0.695794	332.7146	1.525364	524.3206	39.86593	2.779185
Skewness	0.563703	0.126032	-0.508511	2.146177	0.213015	0.427649	-0.310059	0.725962
Kurtosis	1.738312	1.640351	2.470821	7.444589	2.075865	1.448932	1.559681	2.020732
Jarque-Bera	3.697912	2.469902	1.697723	49.31412	1.337555	4.052404	3.176293	3.961604
Probability	0.157401	0.290849	0.427902	0.000000	0.512334	0.131835	0.204304	0.137959
Observations	31	31	31	31	31	31	31	31

Note: *RGDP= Real Gross Domestic Product (million constant 2010 USD), HC= Human capital index (index), PAID=Prevalence of HIV/AIDS (% of population ages 15-49); GEH= Government Expenditure on HIV/AIDS(million naira) GEE= Government expenditure on education (% of GDP); PCI=per capital income (Constant 2010 USD); LEX= Life expectancy (years)Mortality rate (per 1000 live birth)*

Unit Root Test

Table 2 Summary of Unit Root Test Result

At Level				**At First Difference**			
Variables	**ADF statistics**	**1% critical value**	**5% critical value**	**ADF statistics**	**1% critical value**	**5% critical value**	**Order of integration**
lnRGDP	1.176446	-3.670170	-2.963972	-3.558269**	-3.679322	-2.967767	I(1)
HC	-0.510358	-3.679322	-2.967767	-3.025832**	-3.679322	-2.967767	I(1)
PAID	-1.216228	-3.679322	-2.967767	-3.936432*	-3.679322	-2.967767	I(1)
LnGEH	-1.949160	-3.670170	-2.963972	-7.357447*	-3.679322	-2.967767	I(1)
GEE	-4.935981*	-3.670170	-2.963972	-5.625540*	-3.711457	-2.981038	I(0)
LnPCI	-0.074584	-3.670170	-2.963972	-4.246129*	-3.679322	-2.967767	I(1)
MRT	-3.907642*	-3.679322	-2.967767	-7.977384*	-3.679322	-2.967767	I(0)
LEX	0.068282	-2.669359	-1.956406	-3.770748*	-2.674290	-1.957204	I(1)

Note: **(**) connote significance at 1% and 5% significant levels respectively*

Test result presented in table 2 showed that all the variables used in the study except government expenditure on education and mortality rate are not stationary at level, but after first differencing they became stationary, which implies that majority of the variables used in the study retain innovative shock passed on them only for a short period of time after which they let go. In a nutshell result showed that real gross domestic product, human capital, prevalence of HIV/AIDS, government expenditure on health, per capita income and life expectancy are integrated of order one, that is I(1), while government expenditure on education and mortality rate are integrated of order zero 1.e I(0).

Model 1: *Analysis of the impact of HIV/AIDS on human capital in Nigeria*

This section presents analysis of the impact of HIV/AIDS on human capital. Results detailed in this section include Johansen co-integration test result, co-integration regression result and error correction model (ECM) estimation result. Johansen co-integration was used for this section because all the variable included in the model estimated in this section are integrated of order one, that is I(1).

Johansen Co-integration Test

Table 3a: Co-integration Rank Test (Trace)

Eigen Value	Trace Statistics	5 Percent Critical Value	Probability	Hypothesized No of CE(s)
None *	0.713096	69.98184	54.07904	0.0010
At most 1	0.413849	33.77221	35.19275	0.0706
At most 2	0.339096	18.28107	20.26184	0.0915
At most 3	0.194454	6.270821	9.164546	0.1708

** denotes rejection of the hypothesis at 1% significance level*

Trace test indicates 1co-integrating eqn(s) at the 0.05 level

Table 3b: Co-integration Rank Test (Maximum Eigenvalue)

Eigen Value	Trace Statistics	5 Percent Critical Value	Probability	Hypothesized No of CE(s)
None *	0.713096	36.20963	28.58808	0.0044
At most 1	0.413849	15.49115	22.29962	0.3359
At most 2	0.339096	12.01025	15.89210	0.1854
At most 3	0.194454	6.270821	9.164546	0.1708

** denotes rejection of the hypothesis at 1% significance level*

Max-eigen value test indicates 1 co-integrating equations(s) at the 0.05 level

Summary of co-integration test conducted in this section as presented in table 3a and 3b showed that there is enough evidence to reject the null hypothesis of no co-integration equation in favour of 1 co-integration equation both for the trace test statistics and the maximum eigen value test statistics. This implies that though there is no short run equilibrium relationship among the variables include in the model, on the long run there is existence of equilibrium relationship. Given the confirmation of co-integration relation among the variables, the long run estimation result is thus presented below:

Long Run Estimation (Model 1)

HC =f(PAID, PCI,GEH) (Model 1)

HC	PAID	LNPCI	LNGEH	C
1.000000	0.429677	5.830243	-3.554510	-21.41599
	(0.30508)	(0.94557)	(0.86977)	(4.57384)

The long run model is thus presented in linear representation below:

$$HC = 21.41599 - 0.429677PAID - 5.830243LNPCI + 3.554510\text{LNGEH} + U$$

Estimation result presented in linear form above revealed that in the long run prevalence of HIV/AIDS exert insignificant negative impact on human capital in the country, with reported long run coefficient estimate of -0.429677. Per capita income also exerts significant negative impact on human capital with reported coefficient of -5.830243. On the other hand, impact of government expenditure on HIV/AIDS is positive and significant with report coefficient estimate of 3.554510. In clear terms result showed in the long run increase in prevalence of HIV/AID affect the human capital index negatively, thought such effect is not statistically significant. In the long run also higher per capita income will significantly lead to a decline in the measure of human capital in the country.

Table 4 Parsimonious ECM Estimation (Model 1)

Series: *HC PAID lnPCI lnGEH*

Variables	Coefficient	Std. Error	t-statistics	Probability
C	0.013789	0.004138	3.332216	0.0049
D(HC(-1))	0.755405	0.181512	4.161736	0.0010
D(HC(-3))	-0.288427	0.112658	-2.560200	0.0227
D(PAID)	-0.003099	0.004952	-0.625887	0.5415
D(PAID(-1))	-0.006025	0.003117	-1.932758	0.0738
D(PAID(-2))	0.004782	0.001874	2.551865	0.0230
D(PAID(-3))	0.005155	0.001924	2.678778	0.0180

Table 4…

D(LNPCI)	0.013441	0.008473	1.586258	0.1350
D(LNGEH)	0.001397	0.002339	0.597304	0.5598
D(LNGEH(-1))	-0.004314	0.002888	-1.493965	0.1574
D(LNGEH(-2))	-0.003367	0.002923	-1.151966	0.2686
D(LNGEH(-3))	-0.002304	0.002421	-0.951633	0.3574
ECT(-1)	-0.033153	0.017700	-1.873007	0.0821

R-square=0.856119*, Adjusted R-square*=0.732792, Durbin-Watson=2.432366

Parsimonious error correction model estimation result presented in table 4 revealed that on the short run prevalence of HIV/AIDS has negative insignificant impact on human capital with reported coefficient estimates of -0.003099(p> 0.05). On the short run per capita income exert positive insignificant impact on human capita with coefficient estimate of 0.013441(p> 0.05). Government expenditure on HIV/AIDS on the short run has positive insignificant impact on human capital, with coefficient estimates of 0.001397(p> 0.05). Coefficient of one period lagged error correction term reported in table 4.6 stood at -0.033153 with probability value of 0.0821 which reflect that about 0.03% of the short run inconsistencies is corrected and incorporated into the long run dynamic annually. Observably, the reported speed of adjustment is only statistically significant at 10%. Reported R-square statistics of 0.856119 revealed that about 86% of the systematic variation in human capital can be jointly explained by prevalence of HIV/AIDS, per capita income and government expenditure on HIV/AIDS.

Model 2**:** *Analysis of impact of government expenditure on prevalence of HIV/AIDS*

This section presents analysis of the impact of government expenditure on prevalence of HIV/AIDS. Results detailed in this section include ARDL bound co-integration test result, co-integration regression result and error correction model (ECM) estimation result ARDL approach to co-integration was used in this section because variables included in the model have mix order of integration of I(1) and I(0).

Table 5: ARDL Co-integration Bound Test (Model 2)

F-Statistic	**Lower Bound Critical Value**	**Upper Bound Critical Value**
8.206932	3.23	4.35

Note: *critical values are at 5% significant level*

Table 5 reported lower and upper bound critical values, as well as the F-statistics for the wald test carried out to test the joint null hypothesis that the coefficients of the lagged level variables are zero, that is, no long run relationship exist between the variables. The result

showed an f-statistics value of 8.206932 and bound critical values of 3.23 and 4.35 for lower and upper bounds respectively. Comparing the f-statistic to the critical values it was observed that the f-statistics is greater than the upper bound critical value (a condition for the rejection of the null hypothesis of no long run relationship). Thus the study rejects the null hypothesis in favour of the alternative hypothesis of presence of long run relationship between the variables.

Table 6: ARDL Short Run and Long run Estimation Result (Model 2)

Series: PAID lnGEH LEX MRT

Short Run Estimation				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PAID(-1))	0.179836	0.054093	3.324572	0.0077
D(PAID(-2))	0.157577	0.039868	3.952434	0.0027
D(PAID(-3))	0.120699	0.025762	4.685235	0.0009
D(LNGEH)	0.021730	0.043087	0.504322	0.6250
D(LNGEH(-1))	-0.041020	0.060486	-0.678184	0.5130
D(LNGEH(-2))	0.081547	0.139593	0.584175	0.5720
D(LNGEH(-3))	0.324264	0.125665	2.580391	0.0274
D(LEX)	-0.389252	0.352425	-1.104496	0.2952
D(LEX(-1))	-9.825712	3.361415	-2.923088	0.0152
D(LEX(-2))	9.039174	4.017548	2.249923	0.0482
D(LEX(-3))	-2.955416	1.617155	-1.827541	0.0976
D(MRT)	-0.148162	0.038841	-3.814599	0.0034
CointEq(-1)	-0.578364	0.185254	-3.122013	0.0108
Cointeq = PAID - (-0.3200*LNGEH -0.5693*LEX -0.0425*MRT + 39.4075)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGEH	-0.320039	0.501100	-0.638672	0.5374
LEX	-0.569325	0.1 75712	-3.240110	0.0089
MRT	-0.042548	0.011597	-3.668929	0.0043
C	39.407483	9.862835	3.995553	0.0025

Estimation result presented in table 6 revealed both the short run and the long run estimation result. As show in the table on the short run government expenditure in the same period exert insignificant positive impact on the prevalence of HIV/AIDS, with report coefficient estimate of 0.021730 ($p > 0.05$). Notably, result showed that on the short run a period lag in government

expenditure on HIV/AIDS reflect negative insignificant impact on prevalence of HIV/AIDS with reported coefficient estimate of -0.041020($p > 0.05$). Result showed that on the short run life expectancy exert insignificant negative impact on prevalence of HIV/AIDs, with reported coefficient estimates of -0.389252 ($p > 0.05$). Mortality rate on the short run also exert significant negative impact of prevalence of HIV/AIDS, with coefficient estimate of -0.148162($p < 0.05$). Reported ECT(-1) reflect that about 57.8% of the short run inconsistencies is corrected and incorporated into the long run dynamic annually, with reported probability value of $0.0108 < 0.05$ showing significant speed of adjustment at 5% level of significance. The insignificant negativity of the result may be due to funding not properly channeled to the right source.

The long run estimation result presented in table 6 revealed that government expenditure has significant negative impact on prevalence of HIV/AIDS on the long run to the tune of -0.320039($p > 0.05$). The result also revealed that both life expectancy and mortality rate exert significant negative impact on prevalence of HIV/AIDs on the long run, with reports coefficient estimate of -0.569325($p < 0.05$) for life expectancy and -0.042548($p < 0.05$) for mortality rate

Model 3: *Analysis of the Impact of HIV/ AIDS on Economic Growth in Nigeria*

This section presents analysis of the impact of HIV/AIDS on economic growth. Results detailed in this section also include ARDL bound co-integration test result, co-integration regression result and error correction model (ECM) estimation result.

Table 7 ARDL Co-integration Bound Test (Model 3)

F-Statistic	Lower Bound Critical Value	Upper Bound Critical Value
66.09724	2.62	3.79

Note: *critical values are values at 5% significant level.*

Table 7 reported lower and upper bound critical values, as well as the F-statistics for the wald test carried out to test the joint null hypothesis that the coefficients of the lagged level variables are zero, that is, no long run relationship exist between the variables. The result showed an f-statistics value of 66.09724 and bound critical values of 2.62 and 3.79 for lower and upper bounds respectively. Comparing the f-statistic to the critical values it was observed that the f-statistics is greater than the upper bound critical value (a condition for the rejection of the null hypothesis of no long run relationship). Thus the study rejects the null hypothesis in favour of the alternative hypothesis of presence of long run relationship between the variables.

Table 8: ARDL Short Run and Long run Estimation Result

Series: RGDP PCI GEE PAID GEH LEX

Short Run form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1))	0.374784	3.023248	0.123967	0.9062
D(LNRGDP(-2))	2.215939	1.811095	1.223535	0.2756
D(LNPCI)	1.003926	0.000885	1134.383	0.0000
D(LNPCI(-1))	1.840478	4.777029	0.385277	0.7159
D(LNPCI(-2))	-2.213753	1.811575	-1.222005	0.2762
D(GEE)	-0.000045	0.000022	-2.096986	0.0901
D(GEE(-1))	0.000046	0.000023	1.967539	0.1063
D(PAID)	-0.008847	0.002038	-4.341183	0.0074
D(PAID(-1))	-0.000824	0.000338	-2.434197	0.0591
D(PAID(-2))	-0.001189	0.000249	-4.780375	0.0050
D(LNGEH)	-0.000301	0.000233	-1.290851	0.2532
D(LNGEH(-1))	0.000090	0.000550	0.162763	0.8771
D(LNGEH(-2))	0.002852	0.000730	3.908163	0.0113
D(LEX)	-0.011491	0.002037	-5.642074	0.0024
D(LEX(-1))	0.087331	0.007555	11.558966	0.0001
D(LEX(-2))	-0.038968	0.004413	-8.830278	0.0003
CointEq(-1)	-0.064407	0.026607	-2.420650	0.0601
Cointeq = LNRGDP - (1.0770*LNPCI -0.0027*GEE + 0.1048*PAID -0.0773				
*LNGEH + 0.0712*LEX + 0.4193)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPCI	1.077031	0.039117	27.533688	0.0000
GEE	-0.002729	0.001398	-1.951643	0.1084
PAID	-0.104801	0.009233	-11.350690	0.0001
LNGEH	-0.077308	0.021153	-3.654772	0.0147
LEX	0.071198	0.004386	16.233156	0.0000
C	0.419311	0.539175	0.777689	0.4719

Estimation result presented in table 8 revealed both the short run and the long run estimation result. As shown in table 8, on the short run prevalence of HIV/AIDs exerts significant negative impact on real gross domestic product with reported coefficient estimate of -0.008847($p < 0.05$). Result revealed that government expenditure on education and health exerts insignificant

negative impact on real gross domestic product with coefficient estimates of -0.000045(p> 0.05) and -0.000301(p> 0.05) respectively. The result also revealed that life expectancy has significant negative impact on real gross domestic product on the short, while on the other hand per capita income exert significant positive impact on real gross domestic product on the short with reported coefficient estimate of 1.003926(p< 0.05). Coefficient of one period lagged error correction term reported in table 4.12 stood at -0.064407, which implies that over time about 0.06% of the short run inconsistencies is corrected and incorporated into the long run dynamic annually, with reported probability value of 0.0601 showing significant speed of adjustment at 10% level of significance.

The long run estimation result presented in table 8 revealed that both per capita income and life expectancy exert significant positive impact on real gross domestic product, with reported coefficient estimates of 1.077031(p< 0.05) for per capita income and 0.071198(p< 0.05) for life expectancy. On the other hand the result showed that prevalence of HIV/AIDs on the long run exerts significant negative impact on real gross domestic product, to the tune of -0.104801(p < 0.05). Government expenditure on HIV/AIDS has significant negative impact real gross domestic product, with reported coefficient estimate which stood at -0.077308(p< 0.05). Result also showed that on the long run the impact of government expenditure on education is negative but not significant -0.002729(p > 0.05).

DISCUSSION OF FINDINGS

Estimation results of analyses conducted to ascertain the impact of HIV/ AIDS on human capital development in Nigeria revealed that on the long run prevalence of HIV/AIDS exerts insignificant negative impact on human capital with reported coefficient estimate of 0.429677 (p < 0.05), which reflect that increase in prevalence of HIV/AIDS by 1% will culminate into decline in the human capital by about 0.4 points. On the short the impact of prevalence of HIV/AIDS on human capital is also negative and insignificant with reported short run coefficient estimates of -0.003099 (p > 0.05), which reflect that every 1% increase in the prevalence of HIV/AIDS will culminate into a decline in human capital index by an infinitesimal point of 0.003 on the short run. Result also showed that increase in government expenditure on HIV/AIDS on the short run and long run exert positive impact on human capital index development to the tune of 0.001397 points on the short run and 3.554510 point on the long run. Result showed that while effect of government expenditure is insignificant on the short run, on the long run the impact is significant. In specific terms the result showed that 1% change in government expenditure on HIV/AIDS will on the short culminate minutes increase in human capital index, while on the long run the impact of 1% change in government expenditure on health will engender about 3.6 point

increase in human capital index in the country. In clear terms this study reflect that while prevalence of HIV/AIDS is detrimental for the development of human capital in the country, government expenditure on HIV/AIDS has the capital to improve the level of human capital in the economy both of the short run and on the long run.

Estimations conducted to analyze the impact of government expenditure on HIV/AIDS on its prevalence revealed that on the short run government expenditure on HIV/AIDS exert positive but insignificant impact on the prevalence of HIV/AIDs in Nigeria, with every 1% increase in government expenditure on HIV/AIDs associated with about 0.02% increase in the prevalence of HIV/AIDs, however the result reflect that on the long run, government expenditure on HIV/AIDs exerts insignificant negative impact on the prevalence of HIV/AIDs. The long run result reflect that as government continues to allocate its expenditure to HIV/AIDs related national issues, over the passage of time such expenditure will culminate into decline in the prevalence of HIV/AIDs in the country. In specific terms, result showed that on the long run, every 1% change in government expenditure on HIV/AIDs will engender about 0.3% decline in its prevalence.

Result revealed that on the short run prevalence of HIV/AIDS exert significant negative impact on economic growth measured in terms of real gross domestic product, with reported coefficient estimate of -0.008847 ($p< 0.05$), which connote that on the short run, increase in prevalence of HIV/AIDS by 1% has the capacity to cause about 0.008% change in gross domestic product of the country. Also it was established from the estimation result that increase the level of HIV/AIDS prevalence has significant negative impact on real gross domestic product on the long run to the tune of -0.104801 ($p< 0.05$), which reflect that other things held constant, increase in HIV/AIDS prevalence in Nigeria by 1% will cause about 0.10% change in in gross domestic product on the long run. In a nutshell result showed that increase in the prevalence of HIV/AIDS is significantly detrimental to the level of economic growth of the country.

CONCLUSION AND RECOMMENDATIONS

Premise on result of estimations conducted, this study established that prevalence of HIV/AIDS is detrimental to the development of human capital, though government expenditure on HIV/AIDS has the capacity to improve the level of human capital in the economy both of the short run and on the long run. Secondly, this study established that government expenditure on HIV/AIDS in Nigeria only culminate into decline in the in the prevalence of HIV/AIDS on the long run. The study also concluded that increase in the prevalence of HIV/AIDS can significantly impede the level of economic growth of the country both on the short run and on the long run. The following are therefore the recommendations discovered in this study, which are that

government expenditure on HIV/AIDS should be directed largely on providing adequate care for HIV/AIDS victims in the country and less on bureaucratic or administrative expenses for HIV/AIDS programs and monitoring and evaluation committee at various quarters should be put in place to monitor activities of agencies and ministries involved in the disbursement and allocation of funds provided by government for HIV/AIDS programs in order to ensure adequate check and balance. Government should also commit more to sensitization and reorientation of Nigeria populace on how to prevent exposure to HIV/AIDS virus, as well as how to live with victims without stigmatizing them

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