

**DEVELOPMENT ISSUES IN SUB-SAHARAN
AFRICA AND SOUTH ASIA**

**In Honour of
Professor Herath Madana Bandara**

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CHAPTER 5

IMPACT OF HIV/AIDS BURDEN ON ECONOMIC GROWTH IN SUB-SAHARAN AFRICA

D. S. Oyerinola

Abstract

This chapter investigates the impact of HIV/AIDS burden on SSA's economic growth using a macroeconomic model for 39 countries for the period 1990-2015. Economic growth, proxied by growth rate of the GDP, is the dependent variable while the explanatory variables are population growth, human capital, health expenditure, HIV burden and investment. The chapter employed three regression models – the pooled OLS, Fixed and Random Effects, but the random effect model is the preferred model. The model shows that both investment and population growth have a positive and significant impact on economic growth at the 10 per cent level of significance. In contrast, HIV burden has a negative but insignificant impact on economic growth. Public health expenditure has a negative and significant impact on economic growth. The chapter therefore, recommends that the respective governments of the studied areas should improve the quality of public health expenditure and continue with the programme of curbing HIV and improving its management.

Keywords: Economic Growth; Investment; Health Expenditure; Human Capital; HIV Burden.

1.0 Introduction

Human Immunodeficiency Virus/Acquired Immuno-deficiency Syndrome (HIV/AIDS) has become one of the biggest causes of death among infectious diseases in the world as it has claimed about 22.5 million people since the onset of the scourge (UNAIDS, 2000). The pandemic has now been recognised in Africa as a serious macro issue that has significant adverse effect on economic growth and development. In sub-Saharan Africa (SSA) alone, it has pushed people deeper into poverty as households lose their breadwinners to AIDS, livelihoods are compromised and savings are consumed by the cost of health care and funerals.

The SSA States, devastated by HIV/AIDS scourge have over the years been diverting their scarce resources to stem the menace rather than investing in profitable sectors. Invariably, the resultant effect of this diversion is reduction in investment needed for economic growth. The combination of the aforementioned factors exacerbates poverty and undermines countries' effort to reduce poverty and improve standard of living, resulting into a number of problems ranging from low savings and disinvestments to low demand and invariably low economic growth. However, several SSA countries and international donors' efforts were directed towards the prevention of HIV/AIDS scourge, without significant effort and action towards minimising the impact of the epidemic on HIV/AIDS victims by reducing and alleviating poverty incidences. Moreover, the trends and predictors of public expenditure provide countries and coalition of development partners with significant

information about the economic costs and financial burden of the HIV/AIDS scourge, the strategies designed to alleviate its resultant poverty on a long-term basis, towards the achievement of long-term high economic growth for the achievement and sustenance of human development.

Furthermore, in most SSA countries, HIV/AIDS has grown to the extent that its effect on their economies and societies is evident and very serious. Studies such as Worobey *et al.* (2008) and Oster (2012) have shown that HIV/AIDS tests were performed and confirmed in some SSA countries such as Rwanda, Democratic Republic of Congo as far back as the 1980s. Recent studies have shown that more than 35 million people are HIV positive in SSA (UNAIDS, 2013) and about 1 in 20 adults is infected by the epidemic (Haacker, 2004; UNAIDS, 2013). However, the incidence of HIV/AIDS has declined considerably by 33 per cent over the last decade through preventative means and antiretroviral treatment (ART) (UNAIDS, 2013). It is pertinent to note that, globally, as at 2018, about 37.9 million people were living with HIV out of which 23.3 million people were accessing antiretroviral therapy (UNAIDS, 2019). The rapid spread of HIV/AIDS in SSA has been facilitated by some factors which are related to issues such as labour supply, poverty and population growth. One can easily connect HIV/AIDS to the social and economic development of SSA. For instance, one expects that when labour supply is reduced, due to declining life expectancy, it will have a negative effect on output; and this will eventually affect many macroeconomic indicators of the economy. Emphasis in this

chapter is to break this vicious cycle and proffer solutions on how to stem the disease in order to minimize erosion of savings, low productivity and low economic growth.

The main objective of this chapter is therefore, to examine the link between HIV/AIDS burden and economic growth in SSA. Against this background, this chapter is divided into five sections. Section 1.0 forms the introductory part and will be followed by a review of literature in Section 2.0. Section 3.0 presents the theoretical framework and model formulation. Section 4.0 deals with data presentation and analysis. Section 5.0 draws the conclusion and makes some recommendations.

2.0 Literature review

HIV/AIDS, like all communicable diseases, is linked with economic growth. The complex relationship between economic growth and HIV/AIDS is central to an understanding of the impact of the epidemic on rural livelihoods. HIV/AIDS has a bi-directional relationship with the economic growth. Quinn (1996) remarked that HIV/AIDS pandemic could reduce output (GNP) through high morbidity and mortality among young adults. The resultant effects of this are low income, destitution, social and economic disintegration that further lead to the spreading of HIV/AIDS pandemic. In the same vein, Were & Nafula (2003) opined that HIV/AIDS undermines economic growth leading to vicious development cycle. This two-way causal effect between economic growth and HIV/AIDS may promote the spread of the scourge and even

reduce economic growth in the sense that it is having short and long-run effects on output as well as future economic development. Related to the above, the Bureau for Economic Research (2006) submitted that an unchecked spread of HIV/AIDS in Africa might cause labour loss and reduction of profits, thereby resulting in disinvestment. This according to this body may in due course threaten the foundation of economic growth and development of Africa that is a labour intensive economy. In addition, IMF (2004), asserted that the scourge affects all levels of an economy and society, from individuals and households to small and large businesses to the different levels and activities of government. Furthermore, Twumasi-Ankrah, Ashaolu & Ankrah (2015) citing early empirical studies such as Over (1992), Cuddington (1993), and Dixon *et al.* (2001) concluded that the epidemic would have an appreciable impact on economic performance.

The complex relationship between poverty and HIV/AIDS is central to an understanding of the impact of the epidemic on rural livelihoods. This is because, the relationship is bi-directional in that poverty is a key factor in the transmission and HIV/AIDS can impoverish people in such a way as to intensify the epidemic itself. In addition, AIDS has a profound impact on economic growth, income and poverty. It is estimated that the annual per capita growth in half the countries of SSA is falling by 0.5 – 1.2 per cent as a direct result of AIDS. By 2010, per capita GDP of some of the hardest hit countries may drop by 8 per cent and per capita consumption may fall even further (UNAIDS, 2010). Thus,

the relationship between poverty and HIV transmission is not simplistic (Collins and Rau, 2001). The debate on the role of poverty in driving the sexual transmission of HIV in SSA is widely acknowledged and accepted in the literature around HIV/AIDS (HSRC, 2001 a & b).

Several studies have attempted to assess AIDS impact on population growth and labour supply. For instance, Igwike & Hussain (2013) cited UNAIDS Global Report (2010) that shows that the SSA still bears an inordinate share of the global HIV burden. The same report stated that as at 2009, people with new HIV infections in sub-Saharan Africa reached 22.5 million (20.9 million–24.2 million), which is 68 per cent of the global total. In the light of the above, Twumasi-Ankrah, Ashaolu & Ankrah (2015) submitted that AIDS is no longer only a health issue but also a significant threat to the economic growth and development of the affected countries. Furthermore, Twumasi-Ankrah, Ashaolu & Ankrah (2015), stated that as at 2013, over 35 million people infected with HIV. Specifically, more than two-thirds (which is 70 per cent) of these people living with HIV, that is 24.7 million, live in SSA (UNAIDS, 2013). The current trend of new AIDS cases with respect to SSA countries seems not to be getting better. In 2013, an estimated 1.5 million people in the region were living with HIV and about 1.1 million adults and children died of AIDS (accounting for 73 per cent of the world's AIDS death) (UNAIDS, 2013). This alarming trend of HIV/AIDS has attracted the concern of many researchers from different fields to investigate various aspects of the pandemic. It also shows that in SSA-

Ethiopia, Nigeria, South Africa, Zambia, and Zimbabwe have huge problem with the disease.

Lipsey (1983) described productivity growth as the rise in the ratio of output per unit of workers. He asserted that long-run increase in productivity may be as a result of improvement in input and output qualities amongst other things. Bannock, Baxter & Evan (1998) explained that productivity is usually measured by ratios of changes in input to changes in output using productivity index numbers. Meanwhile, Bloom, Canning & Malaney (2000) explained that if labour is healthy, there is a tendency for the development of new skills and knowledge because of the anticipated enjoyment of long-term benefits. They argued further that the labour force that comprises of workers with poor health may result in low productivity, and as such, are the principal manifestations of and contributors to regional disparity in development in the world. Todaro and Smith (2004) posited that "a healthy population is a prerequisite for successful development." They argued further that poor health conditions harm the productivity of adults. Related studies show that healthier people earn higher wages (Schultz 1974 and Todaro and Smith 2004). For example, daily wage rate in Cote d'Ivoire has been estimated to be about 19 per cent lower among men whose health status makes them likely to lose a day of work per month because of illness than daily wage rate of healthier men. In addition, careful statistical methods have shown that a large part of the effect of health on earnings is due to productivity differences (Todaro & Smith, 2004). Similarly, Kameda (2009) cited in

Koji *et al.* (2018: 3) remarked that “labour productivity provides a measure of the efficiency with which one unit of labour input can produce goods and services and can be measured in various ways”.

Some studies have demonstrated that AIDS is no longer only a health issue but also a significant threat to the built up of stock of capital and foreign direct investment. For example, Bonnel (2000) pointed out that the pandemic destroys the built-up stock of human capital. Also, Asiedu, Jin & Kanyama (2015) found that HIV/AIDS has a negative but diminishing effect on Foreign Direct Investment (FDI). They remarked that the relationship between HIV/AIDS and growth is non-linear.

Furthermore, a reviewed literature search showed that most of the studies on the impact of HIV/AIDS on economic growth have concentrated mostly on single country analysis. Examples of such studies are Arndt & Lewis (2000) and Bell *et al.* (2006). Other empirical studies that dwelt on panel data or cross-country analysis are Over (1992) and Asiedu, Jin & Kanyama (2015). The above studies examined the relationships between HIV/AIDS and economic growth using the traditional static panel approach. The current study will contribute to the literature in the following ways. First, random effects model is applied as opposed to the traditional static model, using economic growth as the dependent variable. Second, tertiary enrolment (per cent of Gross enrolment) as a proxy for human capital and HIV burden (Incidence of HIV per cent of population) were adopted to

analyse the health–growth nexus in SSA, contrary to literature like Cuddington & Hancock (1995), Kunze (2014) and Asiedu, Jin & Kanyama (2015).

3.0 Theoretical framework and Model formulation

Here, theories on economic growth in relation to the significance of HIV/AIDS burden and health expenditure and its implication on the study are discussed. In addition, this chapter analyses the HIV/AIDS government spending by adopting countries' reports on domestic expenditure on the pandemic. This chapter is inspired by and recognises the works of Lucas (1988), Igwike & Hussain (2013), Mandiefe & Tieguhong (2015), Twumasi-Ankrah, Ashaolu & Ankrah (2015) and Piabuo & Tieguhong (2017) that adopted GDP per capita as an indicator of economic growth. Control variables adopted are health expenditure per capita (logged), labour force (logged), tertiary enrolment (proxy for human capital) and HIV burden. Following the Solow (1956) and endogenous growth models, the model used is $RGDP = f(HIV\ prevalence, control\ variables)$. This chapter adopts the countries specific dummy variables as controls for cross-country heterogeneity. This comprise of panel data from 1990 to 2015, taken from 39 countries, amongst 15 country-years. The data is extracted from the World Development Indicators of the World Bank. This chapter adopts the pooled OLS, Fixed and Random Effects (but the random effect model is the preferred) to analyse twenty-five years trend, thereby identifying predictors of government financing of HIV/AIDS.

Solow's Neoclassical Growth Model

This session dwells on the Solow's neoclassical growth model (Solow, 1956), incorporating a Cobb-Douglas production function that exhibits diminishing returns to labour and capital separately and constant returns to both capital and labour and their relationship with output. The main idea in this theory is that technological progress is assumed as a residual factor for explaining long-term growth, which accordingly is determined exogenously.

The implication of the adoption of this growth theoretical formulation for this study arises from the fact that there is an increasing recognition of the impact of labour force, education, health, capital accumulation and technological advancement on output growth in an economy. For example, either economic growth can be attributed to short-term adjustments in labour and capital or technological progress, otherwise known as Solow's residual. Therefore, the SSA that are experiencing increment in labour loss due to HIV/AIDS scourge resulting into compromising livelihood and consumption of savings by the costs of health care and funerals of the victims may not experience output growth in all the sectors of the economy. It becomes expedient that economic growth is only achievable through an increase in the quality and quantity of labour force, healthy population growth, quality education, increase in capital through savings and investment and more importantly technological progress. Economic growth was associated with residual of the developed countries amongst other variables as expounded in Solow's growth model.

The empirical model for this study is therefore presented as follows:

$$\Delta \log GDP_{it} = \alpha_0 + \alpha_1 POPg_{it} + \alpha_2 INV_{it} + \alpha_3 HCAP_{it} + \alpha_4 PHE_{it} + \alpha_5 HIV_{it} + \epsilon_{it} \quad (1)$$

where $\Delta \log GDP$ is economic growth, $POPg$ is population growth, INV is investment, $HCAP$ is human capital, PHE is public health expenditure, and HIV is HIV/AIDS burden. α_0 is the constant term while $\alpha_1 - \alpha_5$ are the coefficients. Subscript it indicates that each variable is observed over countries and time periods. ϵ_{it} is the unobservable component of each country and time period.

4.0 Data Presentation and Analysis

Table 1 presents the average behaviour of economic variables in SSA countries over the period concerned. The result shows that average Real GDP growth of SSA countries is about 4.2 per cent per year, average capital formation is about 21.9 per cent of GDP, average population growth is about 2.5 per cent, average human capital (measured by per cent of tertiary school enrolment to gross enrolment) is about 4.6 per cent, average health expenditure per capita is about \$78.2 and average incidence of HIV as percentage of the total population is about 0.76 per cent during this period.

For individual countries, Table 1 shows that 16 out of the 38 sampled-countries have real GDP growth above the region's average. These countries are Benin, Botswana, Burkina Faso, Chad, Equatorial Guinea, Ethiopia, Ghana, Malawi,

Mali, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Tanzania and Uganda. Other countries including South Africa grew below the region's growth.

Table 1 also reveals that 14 countries, namely Botswana, Burkina Faso, Chad, Congo Rep., Equatorial Guinea, Ethiopia, Gabon, Ghana, Lesotho, Mauritius, Mozambique, Namibia, Seychelles and Tanzania have capital formation greater than the region's average while other countries including Nigeria have capital formation below the region's average.

Table 1 also indicates that majority of the countries (26 countries) have population growth higher than the region average while countries like Botswana, Central African Republic, Mauritius, Lesotho and South Africa among others have lower population growth than the region's average.

Table 1 also shows that only eight countries, namely Botswana, Equatorial Guinea, Gabon, Mauritius, Namibia, Seychelles, South Africa and Swaziland have health expenditure per capita above the region's average. Other countries including Nigeria have their health expenditure per capita to be below the region's average.

Table 1: Average Value of Variables by Country (1990-2015)

Country	Economic Growth	Investment	Population Growth	Human Capital	Public Health Expenditure	HIV Burden
	Real GDP Growth (%)	Gross Capital Formation (%)	Population Growth (%)	Tertiary Enrolment (% of Gross enrolment)	Health Expenditure per capita (\$)	Incidence of HIV as % of Population
All Countries	4.24	21.96	2.54	4.59	78.21	0.76
Benin	4.52	21.14	3.02	6.60	24.12	0.14
Botswana	4.70	31.19	1.92	11.00	234.49	2.55
Burkina Faso	5.37	23.87	2.87	2.19	22.74	0.16
Burundi	1.23	15.33	2.53	2.06	12.05	0.22
Cameroon	2.60	17.33	2.68	6.86	39.88	0.56
Central African Republic	0.49	11.26	1.77	1.88	13.47	0.67
Chad	5.97	24.38	3.41	1.34	20.24	0.30
Comoros	2.23	16.10	2.56	3.33	29.47	-
Congo, Dem. Rep.	0.94	11.87	3.16	3.67	9.24	0.14
Congo, Rep.	3.19	26.86	2.86	5.84	54.72	-
Cote d'Ivoire	2.57	12.11	2.57	6.11	58.92	0.46
Equatorial Guinea	21.04	87.00	4.01	2.69	265.70	0.45
Ethiopia	6.59	27.10	2.94	3.14	10.44	-
Gabon	2.45	25.81	2.82	7.24	212.72	0.45
Gambia, The	3.37	17.16	3.11	1.77	25.67	0.20
Ghana	5.49	22.99	2.54	5.18	37.05	0.23
Guinea	3.09	18.18	2.85	4.42	16.68	0.19
Guinea-Bissau	2.29	13.93	2.24	1.31	25.15	-
Kenya	3.62	18.91	2.83	2.67	30.89	0.84
Lesotho	4.19	42.35	1.24	3.96	59.63	2.62
Madagascar	2.37	17.99	2.95	3.07	13.95	0.05
Malawi	4.29	16.84	2.53	0.56	18.21	1.48
Mali	4.44	19.83	2.86	3.01	27.04	0.15
Mauritius	4.67	25.29	0.70	18.70	243.94	0.10
Mozambique	7.47	27.08	2.93	2.07	18.46	1.09
Namibia	4.39	22.29	2.23	6.72	243.19	1.58
Niger	3.60	20.09	3.62	1.05	16.48	0.09
Nigeria	5.65	10.82	2.57	7.41	58.34	0.38
Rwanda	5.62	17.67	1.84	2.96	23.86	0.37
Senegal	3.53	19.60	2.75	5.37	34.07	0.06
Seychelles	3.82	29.25	1.16	3.02	376.04	-
Sierra Leone	2.83	11.83	2.05	1.88	40.89	0.13
South Africa	2.46	18.74	1.63	15.30	395.32	1.97
Swaziland	4.07	16.75	1.77	4.92	146.72	3.27
Tanzania	5.32	24.10	3.01	1.36	21.21	0.68
Togo	2.77	17.37	2.69	5.04	19.90	0.39
Uganda	6.65	20.34	3.34	2.94	33.20	0.76
Zimbabwe	1.11	13.67	1.79	5.92	37.72	37.72

Source: Author's Computation based on World Bank (2018).

Similarly, in Table 1, only 9 countries, namely Botswana, Kenya, Malawi, Mozambique, Namibia, South Africa, Swaziland, Uganda and Zimbabwe experience higher incidence of HIV than the region's average. The majority of countries have incidence of HIV lower than the average.

The diagrams in Figure 1 show the trend of each of the variables over time. Figure 1 shows the trend of economic growth, population growth, investment, human capital, public health expenditure and incidences of HIV. While the trend of economic growth and population growth are in diagrams (a), the trend of investment and human capital are in diagram (b), and the trend of public health expenditure and incidence of HIV/AIDs in diagram (c). The figures show that GDP growth, population growth and investment are relatively unstable overtime. It can be seen that they exhibit periods of vicissitudes. On the other hand, human capital and public health expenditure are seen to be upward sloping overtime while incidence of HIV is seen to be downward sloping over time. Upward sloping human capital and public health expenditure indicates sub-Sahara African countries have made significant improvements in education and in the proportion of government spending allocated for health purposes. Downward sloping incidence of HIV indicates these countries have also made significant improvement in the reduction of HIV burden in the region and that expenditure on health purpose has witnessed significant reduction in HIV/AIDs incidence.

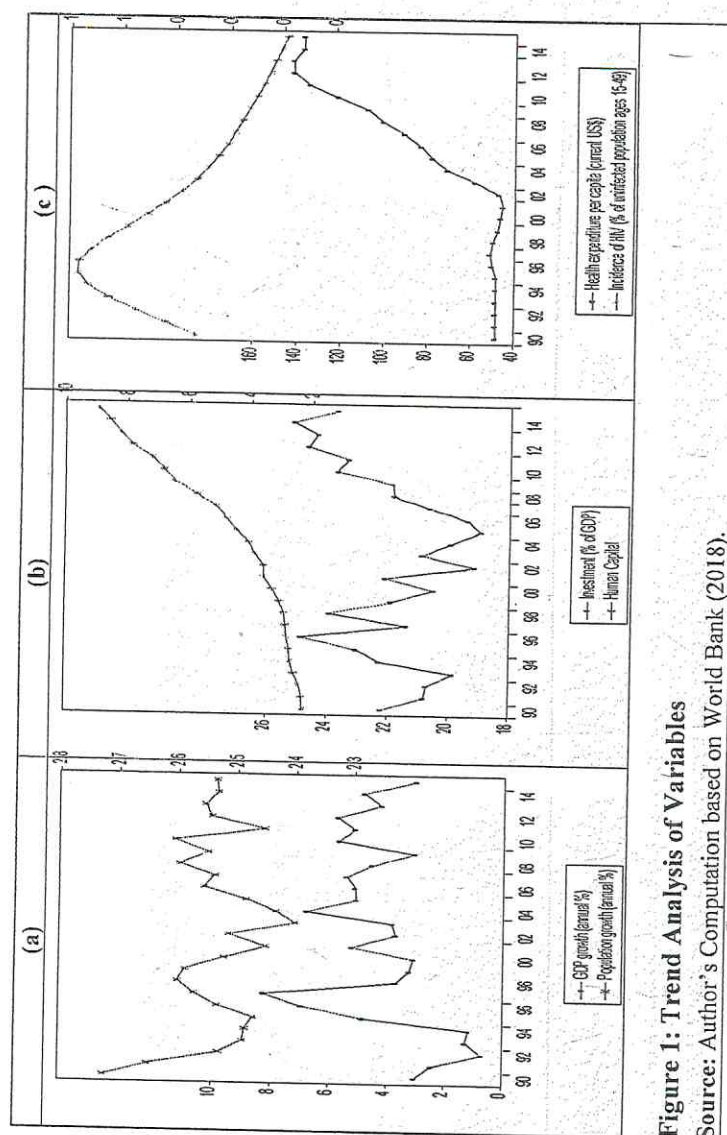


Figure 1: Trend Analysis of Variables

Source: Author's Computation based on World Bank (2018).

Figures 2 and 3 present scatter diagrams showing the relationship between HIV burden (measured by incidence of HIV) and government health expenditure (as percentage of GDP). While Figure 2 presents the relationship across years, Figure 3 presents the relationship across countries.

In Figure 2, the fitted regression line indicates that there is a negative relationship between the two variables across periods. This implies that periods with greater incidences of HIV are associated with lower public health expenditure, and vice versa. The reported R-squared of the relationship also indicates that public health expenditure predict about 84 per cent of changes in incidence of HIV.

In Figure 3, the fitted regression line indicates that there is a positive relationship between the two variables across countries. This implies that countries with greater incidence of HIV are associated with higher public health expenditure, and vice versa. The reported R-squared of the relationship also indicates that public health expenditure predict about 60 per cent of changes in incidence of HIV across countries.

Presented in Table 2 is the Pairwise correlation analysis conducted to assess the relationships that exist among all variables. The variables included are GDP growth, population growth, investment, human capital, government health spending and HIV burden. The result shows that economic growth has a positive and statistically significant correlation with population growth and investment. This is evident from each of their very low p-values. However, it is

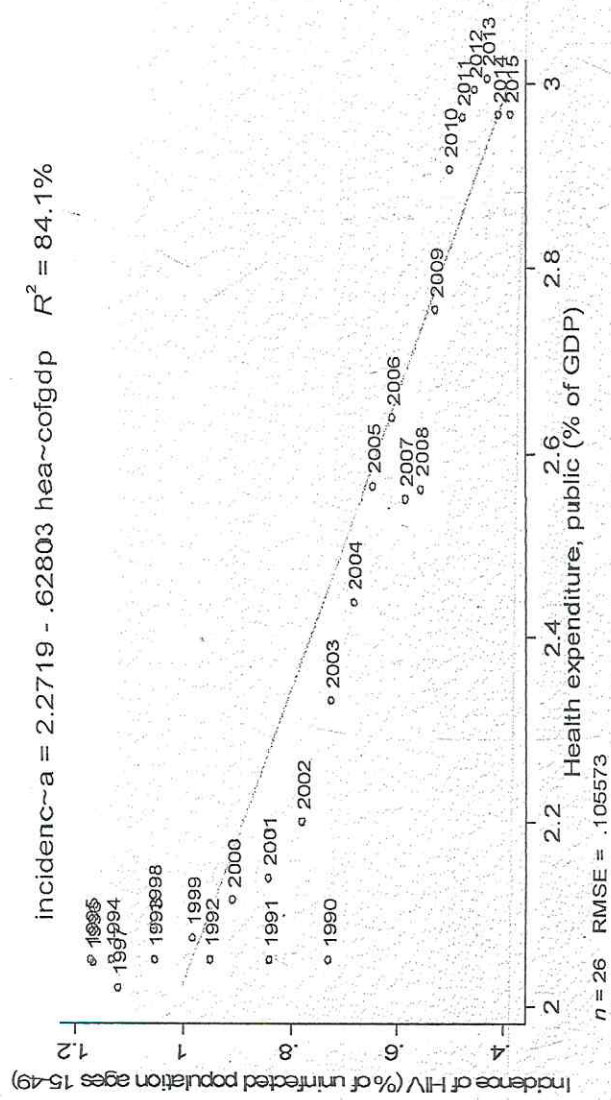


Figure 2: Scatter Plot of Incidence of HIV/AIDS and Government Spending by Year
 Source: Author's Computation based on World Bank's World Development Indicators (World Bank, 2018).

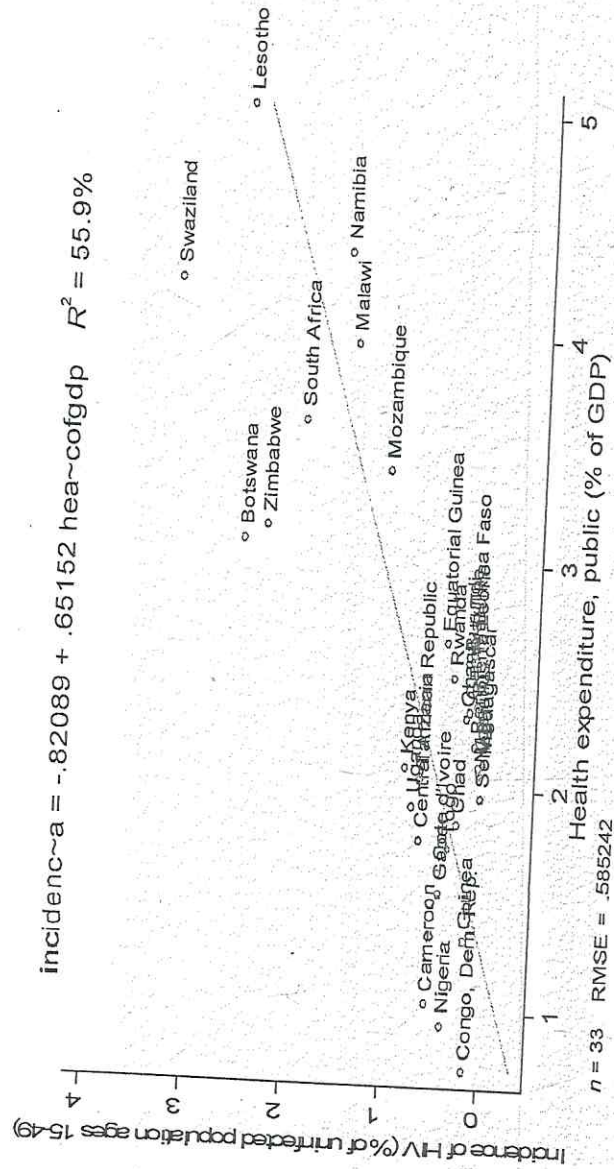


Figure 3: Scatter Plot of Incidence of HIV/AIDS and Government Spending by Country
 Source: Author's Computation based on World Bank's World Development Indicators (World Bank, 2018).

negative and insignificantly related to others. The result indicates that higher levels of economic growth are associated with higher levels of population growth and investment and vice-versa.

Table 2: Pairwise Correlation Matrix of Variables

	1	2	3	4	5	6
GDP Growth	1.0					
Population Growth	0.2168 (0.000)	1.0				
Investment	0.4914 (0.000)	0.1199 (0.000)	1.0			
Human Capital	-0.0104 (0.744)	-0.2922 (0.000)	0.028 (0.379)	1.0		
Health Expenditure	-0.0077 (0.809)	-0.236 (0.000)	0.1117 (0.014)	0.5392 (0.000)	1.0	
HIV Burden	-0.0301 (0.379)	-0.278 (0.000)	0.049 (0.151)	0.0601 (0.079)	0.1823 (0.000)	1.0

Source: Author's Computation based on World Bank (2018).

Note: P-values in parenthesis.

Population growth is seen to have a statistically significant correlation with investment, human capital, government health spending and HIV burden. This is also evident from each of their low p-values. The relationship of population growth with investment is positive while its relationship with each of human capital, government health spending and HIV burden is negative. The result indicates that higher levels of population growth are associated with higher levels of investment and lower levels of human capital, government health spending and HIV burden, and vice versa. Investment is seen to have a statistically significant relation with health expenditure and this relation is positive. However, it is insignificantly related to human capital and HIV burden.

Human capital is seen to have a statistically significant relation with government health spending and HIV burden and each of these relationships is positive, indicating that higher levels of human capital are associated with higher levels of health expenditure and HIV burden, and vice versa. Surprisingly, government health spending is seen to have a statistically significant relation with HIV burden.

The Pairwise correlation result presented in Table 2 shows that all of the coefficients are well below 0.6, which is considered below the level at which the inclusion of such explanatory variables in a model, would lead to multicollinearity problem.

Table 3 presents three regression results – the pooled OLS, Fixed and Random Effects models. The reported R-squared in the three models indicates that the models explain about 28.6 per cent, 66.1 per cent and 79.4 per cent (in the pooled OLS, fixed and random effects respectively) of variations in economic growth of SSA countries. The reported F-statistic in both the pooled OLS and fixed effect models and the chi-square in the random effect model indicate that the overall model is significant. The underlying assumption of the pooled OLS regression is that all individual countries are homogenous. F-test of homogeneity was conducted to verify the validity of this assumption. The result shows F-test of homogeneity value of 1.41, with its p-value less than 0.0684; it means the statistic is significant at 10 per cent level of significance, hence, rejection of the null hypothesis of homogeneity of all countries. This means that the pooled

Table 3: Panel Estimation Results from Pooled OLS, Fixed and Random Effects Regression

Variables	(1) Pooled Panel	(2) Fixed Effects	(3) Random Effects
Population growth	1.381*** (0.254)	1.635*** (0.298)	1.424*** (0.262)
Investment	0.223*** (0.0135)	0.207*** (0.0218)	0.223*** (0.0145)
Human capital	0.114* (0.0619)	0.129 (0.0816)	0.119* (0.0652)
Public health expenditure	-0.00470* (0.00257)	-0.0113*** (0.00429)	-0.00529* (0.00274)
HIV burden	0.0282 (0.257)	-0.570 (0.506)	0.0174 (0.283)
Constant	-4.304*** (0.871)	-3.720*** (1.155)	-4.383*** (0.916)
Observations	858	858	858
R-squared	0.286	0.661	0.794
F/Chi ² statistic	68.34***	37.83***	297.93***
F-test of homogeneity	1.41*		
Hausman test	5.43		

Source: Author's Computation based on World Bank (2018).

Notes: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

OLS is not appropriate; rather, models that account for heterogeneity of SSA countries such as the fixed and random effects are preferred. Hausman test was also conducted to determine the appropriate model between the Fixed and Random effects models. The test shows a chi-squared value of 5.43 and p-value of 0.3662 that indicate it is not significant, hence, a non-rejection of the null hypothesis that differences in coefficients of fixed and random effects are not systematic. This indicates that the random effects model should be considered.

In the random effects model, investment, population growth, human capital and government health spending have significant effects on economic growth. The effects of investment, population growth and human capital are found to be positive while the effect of government health spending is found to be negative. An increase in gross investment implies an increase of about 0.223 per cent points in the economic growth of SSA countries, and vice versa. Similarly, an increase in population growth brings about an increase of about 1.381 per cent points in the economic growth of SSA countries, and vice versa. In the same vein, an increase in human capital brings about an increase of about 0.114 per cent points in the economic growth of SSA countries, and vice versa. On the other hand, an increase in government health spending brings about a decrease of about 0.005 per cent points in the economic growth of SSA countries and vice versa. HIV burden is found to have an insignificant effect on economic growth of SSA countries. The result indicates that only population growth, investment, human capital and government health spending have significant impact on the economic growth of SSA countries while HIV burden does not have significant impact on the economic growth of SSA countries.

5.0 Conclusion and Recommendations

This chapter focused on the impact of HIV/AIDS on economic growth in SSA based on panel data from 1990 to 2015, taken from 39 countries, amongst 15 country-years. This chapter utilised pooled OLS and random-effects model

to analysed twenty-five years trend based on the data available, thereby identifying predictors of government financing of HIV/AIDS. The result shows that the relationship of population growth with investment is positive while its relationship with each of human capital, government health spending and HIV burden is negative, which is consistent with economic theory and relevant literature.

In addition, the chapter has revealed that many skilled and unskilled people have died worldwide and in SSA countries because of AIDS-related diseases. This scenario has culminated to reduction in population growth and incentives to invest in human capital in SSA. This further explains why the scourge has an insignificant effect on economic growth of SSA countries and that only population growth, investment, human capital and government health expenditure have significant impact on the economic growth of the SSA countries. However, it was observed that there is a noticeable and sustained domestic spending on the health sector of the studied areas and invariably increased economic growth, but not associated with HIV burden.

The result shows that HIV/AIDS pandemic spreads spontaneously in SSA countries, it has pronounced effects on human capital and affects both high- and low-income groups. This could be reduced if both skilled and unskilled workers have greater incentives to invest in preventive activities. In addition, the decline in economic growth could be avoided if external financing finances the increased

expenditures especially if such external assistance mobilised by SSA countries for HIV/AIDS is substantial and highly significant.

The result of this study also, shows that economic growth has a positive and statistically significant relation with population growth, investment, human capital and government health spending. This implies that the respective governments of the studied areas should pay more attention to these variables and they should be maintained to ensure continuous significant effects on the economic growth of SSA African countries. Furthermore, HIV/AIDS burden not having a significant impact on economic growth of SSA countries could be because of the significant impact of other variables adopted in the study. However, if HIV/AIDS burden is left unchecked, it can lead to minimised savings and productivity hence reduction in economic growth, as evident in the literature.

References

- Afolabi, L. (1999). *Monetary Economics*. Ibadan: Heinemann Educational Book (Nigeria) Plc.
- Arndt, C., & Lewis, J. (2000). The macro implications of HIV/AIDS in South Africa: A preliminary assessment. Paper presented at the International AIDS Economics Network (IAEN) Symposium, Durban, South Africa, July.
- Asiedu, E., Jin, Y., & Kanyama, I. K. (2015). The Impact of HIV/AIDS on foreign direct investment: Evidence from sub-Saharan Africa. *Science Direct Journal of*

African Trade, 2:1–17.

- Bannock, G., Baxter, R. E., & Evan, D. E. (1998). *The Penguin Dictionary of Economics*. England: Penguin Group.
- Bell, C., Devarajan S., & Gersbach, H. (2006). The long-run economic costs of AIDS: A model with an application to South Africa. *World Bank Economic Review*, 20: 55–89. <http://dx.doi.org/10.1093/wber/lhj006>.
- Bloom, D. E., Canning, D., & Malaney, P. (2000). Demographic change and economic growth in Asia. *Supply Population Development Review*, 26: 257–290.
- Bonnel, R. (2000). HIV/AIDS and economic growth: A global Perspective. *ACT Africa*, World Bank
- Bureau for Economic Research (2006). The macroeconomic impact of HIV/AIDS: Sunder Alternative Intervention Scenarios (with specific reference to ART) on the South African Economy. StellenBosch University.
- Collins, J., & Rau, D. (2001). AIDS in the context of development. *Programme on Social Policy and Development, Paper No, 4*. United Nations Research Institute for Social Development (UNRISD).
- Cuddington, J. T., & Hancock, J. D. (1995). The macroeconomic impact of AIDS in Malawi: A dualistic, labour surplus economy. *Journal of African Economies*, 4(1): 1–28.
- Cuddington, J. T. (1993). Modeling the macroeconomic effects of AIDS with Application to Tanzania. *The World Bank Economic Review*, (7):173–189.

- Dixon S., McDonald, S., & Roberts, J. (2001). HIV/AIDS and development in Africa. *Journal of International Development*, 13: 381–389.
- Goliber, T. (2002). The status of the HIV/AIDS epidemic in sub-Saharan Africa. Population Reference Bureau, USA.
- Haacker, M. (2004). *Macroeconomics of HIV/AIDS*. International Monetary Fund.
- HSRC (2001a). HIV/AIDS in Southern Africa: A review paper for the WIK Kelloggs Foundation. Unpublished report by the Social Aspects of HIV/AIDS and Health Programme for W.K. Kelloggs, Foundation, October. Human Sciences Research Council.
- HSRC (2001b). Social Aspect of HIV/AIDS Research Alliance. Unpublished report by the Social Aspects of HIV/AIDS and Health Research Programme at the Human Sciences Research Council Consultative Meeting, 7 August, Pretoria. Human Sciences Research Council.
- Igwike, R. S., & Hussain, M. E. (2013). Examining the impact of HIV prevalence on economic growth in sub-Saharan Africa: A panel data analysis. *The Global Journal of Finance and Economics*, 10(1): 13–23.
- IMF (2004). *The macroeconomics of HIV/AIDS*. International Monetary Fund.
- Kameda, S. (2009). Issues on Japan's Productivity: How do we evaluate productivity developments since 2000? *Bank of Japan Working Paper Series No. 09-J-11*.
- Koji, N., Sohe, K., & Tomoyuki, Y. (2018). Productivity

improvement and economic growth. Japan, Bank of Japan 2-1-1. Tokyo 103-0021 No.18-E-10. May, Research and Statistics Department.

Kunze, L. (2014). Life expectancy and economic growth. *Journal of Macroeconomics*, 39: 54-65.
<http://dx.doi.org/10.1016/j.jmacro.2013.12.004>.

Lipsey, R. G. (1983). *An introduction to positive economics*. London: Weindenfeld and Nicolson.

Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1): 3-42.

Mandiefe, S. P., & Tieguhong, J. C. (2015). Contribution of public health investments to the economic growth of Cameroon. *Business Economic Journal*, 6: 189.

Okoroji, L., & Ukpere, W. I. (2009). A relationship between HIV/AIDS and the productivity of hardest hit regions. *African Journal of Business Management*, 3(12): 816-825.

Oster, E. (2012). HIV and sexual behavior change: Why not Africa? *Journal of Health Economics*, 31(1): 35-49.
<http://dx.doi.org/10.1016/j.jhealeco.2011.12.006>
[PubMed]

Over, M. (1992). *The macroeconomic impact of AIDS in sub-Saharan Africa*. World Bank, Population and Human Resources Department, June.

Piabuo, S. M., & Tieguhong, J. C. (2017). Health expenditure and economic growth - a review of the literature and an analysis between the economic community for central African states (CEMAC) and

selected African countries. *Health Economic Review*, 7 (23).

Quinn, T.C. (1996). Global burden of the HIV pandemic. *The lancet* 348, 99-106. National Institute of Allergy and Infectious Diseases, and John Hopkins University, 720 Rutland Avenue, Ross 1151 Baltimore, Maryland.

Schultz, T. P. (1974). Fertility determinants: A theory, evidence, and application to policy evaluation. Santa Monica, California: Rand Corp.

Solow, R. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70 (1): 65-94.

Todaro, M.P., & Smith, S. C. (2004). *Economic development*. Delhi: Pearson education, Inc.

Twumasi-Ankrah, S., Ashaolu J. T., & Ankrah, I. (2015). HIV/AIDS scourge and economic growth in sub-Saharan Africa. *Universal Journal of Public Health*, 3(2): 84-88.

UNAIDS (2000). *Report on the Global HIV/AIDS Epidemic-June 2000*. Geneva: UNAIDS.

UNAIDS (2001). Fact Sheet: HIV/AIDS and Development. Special session on HIV/AIDS Global Crisis-Global Action, Fact Sheet, June.

UNAIDS (2010). *Global report: UNAIDS report on the global AIDS epidemic 2010*. Geneva: The Joint United Nations Programme on HIV/AIDS.

UNAIDS (2013). *Global Report 2013. UNAIDS report on the global AIDS epidemic 2013*. Geneva: UNAIDS.

UNAIDS (2019). Fact Sheet-Global AIDS Update.

Were, M., & Nafula, N. (2003). An assessment of the impact of HIV/AIDS on economic growth: The case of Kenya. CESIFO Working Paper No. 1034 Category 5: Fiscal Policy, Macroeconomics and Growth.

World Bank (2018). *World Development Indicators 2018*. The World Bank.

Worobey, M., M., Gemmel, D. E., Teuwen, T., Haselkorn, K., Kunstman, M., Bunce, J. J., Muyembe, J. M., Kabongo, R. M., Kalengayi, V. M., Eric, G. M. T. P., & W. S. M. (2008). Direct evidence of extensive diversity of hiv-1 in Kinshasa by 1960. *Nature* 455, 661-664.

PART II
SECTORAL ISSUES