



The Impact of HIV/AIDS Expenditure on HIV/AIDS Incidence Rate in Sub-Saharan Africa

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Abstract

Over the last two decades, HIV has been the greatest public health challenge confronting the world. The threat that HIV/AIDS has posed to the health of citizens across the world has been severe making it the most devastating pandemic and this has led nations to declare it a national disaster. Sub-Saharan Africa has been the most affected region. There are approximately 6,000 new HIV infections occurring on daily basis mostly in developing countries with young people in the age bracket (15- 24) years representing more than 33% of the total new HIV infections. In 1990, the global HIV incidence rate was 0.03 percent and in 2015, the rate stood at 0.04 percent. On the other hand, there has been a rising trend in HIV/AIDS expenditure. For the period 2000 to 2015, \$562.6 billion was directed towards HIV fight globally. While the response to AIDS menace has been incredible demonstrating global unity and transformative collective responsibility, deep concern has been expressed on the number of new infections as 90% of the newly infected persons lived in 35 countries. Majority of these countries are in the sub-Saharan Africa. This study used a longitudinal research design whereby data from 11 sub-Saharan countries on HIV/AIDS expenditure and HIV/AIDS incidence rates over a number of years were analyzed. The study conformed to a number of studies that have shown that there exists a relationship between HIV/AIDS expenditure and HIV/AIDS incidence rate. Therefore, to reduce new HIV infections, there is need to allocate more resources.

Key words: HIV/AIDS; HIV/AIDS expenditure; HIV/AIDS Incidence Rate.

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1. Introduction

Over time, HIV epidemic has remained a dominant health and human right challenge that has posed serious challenges to the development of human resource in families, communities and nations across the world. Since the beginning of the epidemic there have been an estimated 77 million HIV infections and that 35 million people have lost their lives courtesy of from AIDS [1]. Globally, HIV/AIDS has been identified as the leading cause of loss of human life among adolescent girls and generally women of reproductive age. According to [1] there are 6,000 new infections occurring every day, mostly in developing countries and among the 36.9 million living with HIV, more than half of this population are not conscious of their HIV status. Africa has been on the receiving end in terms of the pain endured from HIV with the Sub-Saharan Africa region carrying an enormous disproportionate burden. As of 2013, two out every three newly infected persons lived in Sub-Saharan Africa implying that Sub-Saharan region accounted for over 70% of the world new HIV infections. Women in Sub-Saharan Africa are the most affected compared to their male counter parts as young women of age 15 years to 24 years and adolescent girls are eight times more likely to get infected[2]. Countries all over the world have developed frameworks to improve health outcomes of their citizens among other social concerns [3]. HIV/AIDS being one of the greatest health concerns, more spending has been committed to current measures of HIV prevention and care. Such spending is to subsidize the delivery of AIDS education and health –care service which is intended to benefit in a profound way the population at large improving health status, reducing morbidity, raising literacy and numeracy, expanding opportunities for economic and social well-being. The distinguished global efforts in ensuring the AIDs epidemic is eradicated as stipulated in the 2030 Agenda for Sustainable Development Goals remains to be the incomparable commitment to ensuring modern- day health issues related to HIV/AIDS are well addressed. The framework of the strategy on global health sector with the focus on HIV, for the period 2016-2021 is anchored on the premise of ensuring zero new HIV infections, zero discrimination with regard to HIV and in general zero HIV-related deaths where HIV positive persons have equal opportunities in the society. [4] As a key element in the 2030 Agenda for the Sustainable Development, health sector has been identified play a key role. The international community has committed to eradicate the AIDS catastrophe and the entire health sector is expected to play a key role in achieving these targets.

1.1 HIV/AIDS burden

Despite the increasing collective measures to fight HIV, the HIV epidemic continues to be a global scare where new infections continue to be reported as well as alarming HIV related mortality [5]. In 2015, 2.1 Million people were reported to have been infected, 36.69 million persons were living with while 1.1 million people succumbed to HIV[1]. According to [2], the number of HIV positive persons was 35 million globally in the year 2013. Sub-Saharan Africa region accounted for 71 per cent of worldwide burden of the total HIV infection despite being home to 12% of the entire world population. There is still uneven distribution of the burden in Sub-Saharan as ten countries within sub-Saharan Africa in Eastern and Southern Africa being South Africa (25%), Uganda (6%), Kenya (6%), Tanzania (6%), Nigeria (13%), Malawi (4%), Mozambique (6%), Zambia (4 %), Zimbabwe (6%) and lastly Ethiopia (3%) accounted for approximately 80 per cent of all persons who were living with HIV[2]. There has been a declining trend of new HIV infection over the several years of interventionist measures across sub-Saharan countries. The number of new infections was 1.51 million in 2013 as compared to

2.1 million persons that got infected in 2005. Even though the statistics are still high, there was a significant reduction of more than 33 percent in the new HIV infections. Despite the reduction, it is worth noting that more than 75 percent of the world 2.1 million new HIV infections occurred within fifteen countries [2]. The new infections occurred disproportionately within sub-Saharan Africa. Figure 1 shows how different countries within sub-Saharan Africa shared the burden of new HIV infections.

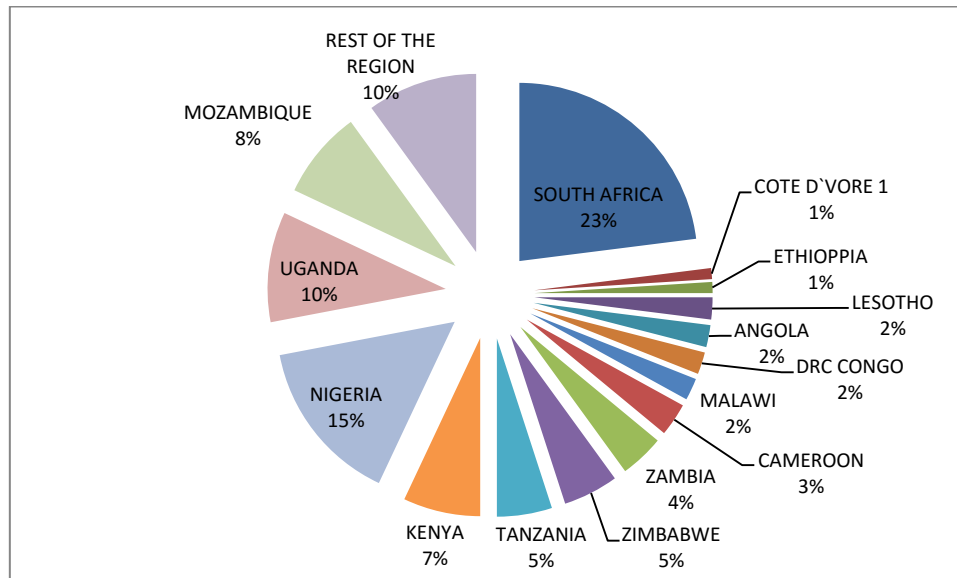


Figure 1: Global share of new HIV infection

Source: [2]

There have been significant worldwide gains made worldwide in bringing down new HIV infections cases over the last two decades. While the results on the trend of new infections are appreciated, the progress is deemed inadequate. There have been mixed results in the sense that while some regions have been registering substantial reductions in the newly infected persons, there are others that have been witnessing rising numbers in terms of new infections. The number of newly infected population fell by approximately 8% from 2010 to 2014 [5]. With the emergence of new prevention approaches and new prevention tools, prevention programs have been dwindling in recent years courtesy of declining HIV programs funding, poor accountability and partly inadequate leadership.

1.2 Global trend of new HIV infections

In the year 2016, the global incidence rate was 0.05%. This was half of the global incidence rate of 0.1% that was reported in 1990 [6]. Global statistics indicate a varying pattern of the new HIV infection patterns around the world. Countries in Latin America and in Asia have enjoyed incidence rates of lower than 0.1% while some African countries suffer higher incidence rates such South Africa where 1.44% of the total population got new infected in 2015 [6]. Figure 2 shows the global trend of new infections from 1990 to 2016.

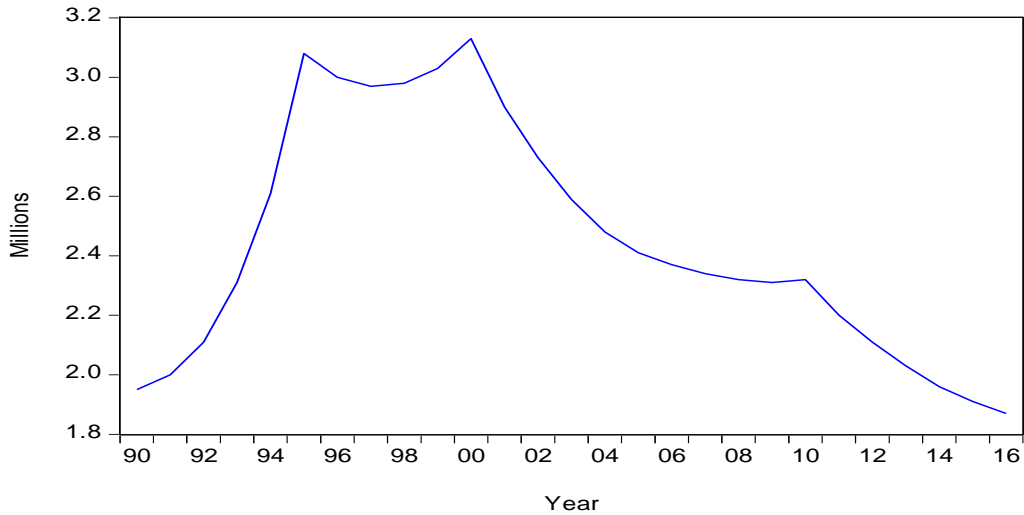


Figure 2: Global trend of new HIV infection

Source: World Bank WDI

Global new HIV infections have reduced tremendously by 54% compared to the highest ever recorded new infection statistics in 2000. In 2016, the number of new HIV infections was 1.87 compared to 3.13 million that was reported in 2000. In a period of six years, from 2010 to 2016, global new HIV infections declined by 18%. There is however renewed concerns that the annual statistics of new HIV infections among adults has been static in recent years.

1.3 Sub-Saharan Africa trend of new infections

Global statistics suggest that sub-Saharan Africa continues to report high prevalence rates compared to global figures. Figure 3 shows the results of selected world regions and the outcome is not impressive for sub-Saharan region.

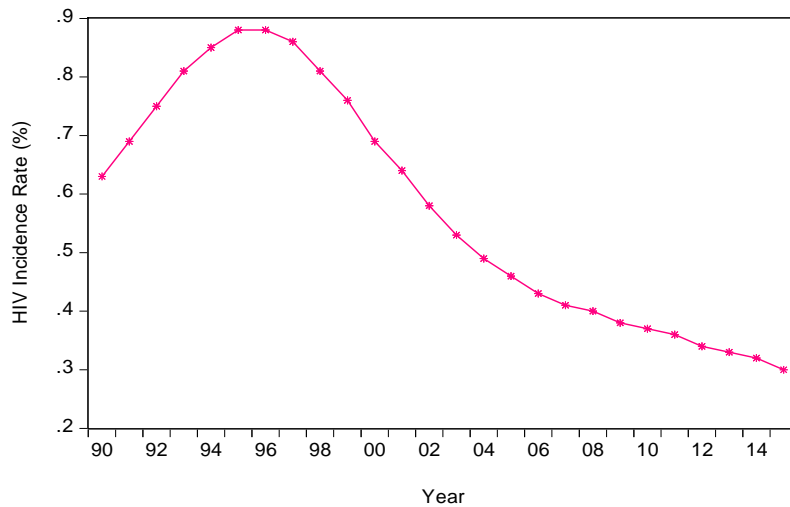


Figure 3: Sub-Saharan Africa new HIV infection trend

Source: World Bank WDI

The sub-Saharan Africa region continues to suffer disproportionately when it comes to the global share of HIV burden. From figure 3, HIV incidence rate exhibits an increasing trend from 1990 up to 1996 where the rate of new infection begins to decrease. The incidence rate in 2015 was 0.3 percent. Some countries have reported a declining tendency of new infections while others have recorded rising statistics of new infections.

1.4 HIV/AIDS expenditure

In the last three decades, there has been great advancement in the collective global HIV response. This has been coupled with unprecedented health innovations and increased financial investment. However, despite all these developments, there exist serious service gaps in the response mechanisms. Over the last two decades, huge resources have been mobilized as part of the response to address HIV/AIDs. In the fight against HIV and its effects, there has been unending gap between the necessary resources required to support several programs and the actual amount allocated for HIV programs. In 2011, there was a global call by the United Nations` Political Declaration centred on HIV and AIDS to aid the process of mobilizing funding as part of the global HIV response. The international community was called upon to marshal between 22 billion US Dollars and 24 billion US Dollars which would stretch up to 2015. This was however not actualized by the end of 2016 as the actual funding channelled to the low-income and middle-income countries was a total of US \$ 19.1 billion that fall short of the real target set by the United Nations [6]. With the realization of failed targets, the UN General Assembly endorsed the UNAIDS` ambitious Fast-Track approach in 2016 in what would later be called the 2016 Political Declaration on Ending AIDs. This was a united commitment by the countries worldwide that would ensure an end to HIV by the year 2030. This was projected as long term goal but in the meantime, medium term goals to end the HIV epidemic focussed the year 2020. To facilitate quick realization of 2020 goals, a sum of US\$26.2 billion was projected to address the short term target by the year 2020. This further implied that an annual increase of US\$ 1.5 billion would be required in the period 2016 to 2020 [7]. Countries severely hit by the HIV epidemic were expected to scale up internal funding to this effect in addition to establishing efficient ways of addressing the menace. Over time there has been a notable increase in domestic resources mobilization. In 2015, a total of US\$ 10.9 billion was mobilized domestically. The amount of domestic funds surpassed the resources availed by donors and this accounted for 57% of total global HIV resources mobilised. For the period 2006 to 2016, there was an annual average increase of 11% in the total domestic investments aimed at eradicating the HIV epidemic [6]. Cumulatively, US \$9.3 billion was directed to HIV prevention initiatives. This amount was 19% of the total global funds financing HIV and the resources mainly centred on prevention programs that would create awareness about HIV epidemic and how to prevent new infections. Treatment and care of persons living with the HIV virus was US\$27.3, which was 55.8% of the global HIV total amount [6].

1.5 HIV/AIDS Funding gap

As at 2015, there was a gap of US \$ 9 billion between the actual resources available for reaching the UNAIDS 2020 Fast-Track Targets versus what was required. The annual resource needs for attaining the Fast-Track

Target have been projected to be at least 31.1 Billion US Dollars by the year 2020. This will be followed by a declining resource needs trend. In 2016, US \$ 19.1 billion was devoted for in-county HIV programs [6]. However, this amount still fall short of the necessary resources by US 7.2 billion. According to [7], the total cost of the UNAIDS 2016-2021 entire strategy is projected to increase to US \$ 22 Billion in 2020 up from about US\$20 Billion in 2016. In 2021, this is expected to increase further to about US \$ 21Billion. As part of the major prevention interventions, condom distribution programs are expected to consume 8% of the allocations while HIV testing service is expected to account for 9%. To push the prevention agenda forward, the program enablers allocation is the second largest budgetary allocation with 13 % of the total funding while the treatment process through Antiretroviral therapy will have the highest allocation of about 47% of the total allocation. Out of the total resources allocation, more than 30 percent is to be directed to four countries namely Nigeria, South Africa, Brazil and China. This is courtesy of the order of the HIV burden. About 55% of all resources are required for countries considered to be in the low income cluster and middle income cluster in the African region. The American region takes the second largest share of 16% while the Western Pacific and the South East Asia Regions will be allocated 13% and 8% respectively. Only 5% of the total resource will be required in the European region while the East Mediterranean Region will need 4% of the resource allocation.[7] Generally, there has been a momentous increase in the amount of resources directed to address HIV over years. Approximately, US\$ 562.6 billion was channelled between 2000 and 2015 towards HIV activities and programs that would ease the HIV burden globally and fast track the goal of ensuring HIV free world. Even with the recorded significant response in the HIV epidemic fight, HIV has remained a big global public health threat. The rate of expansion in terms of service coverage has been inadequate and the HIV epidemic effects have been shadowing the full benefits of services and interventions aimed at eradicating the HIV menace. Despite incredible progress in the response, HIV/AIDS remains a serious public health threats in all regions. There have been continued discussions on the effect of increased HIV/AIDS expenditure on the reduction of incidence rate amongst citizens. Countries all over the world have engaged numerous prevention strategies to address the high HIV Incidence rates. The prevention interventions include programmes on behavior change, encouraging use of condoms, HIV testing, male circumcision and blood supply safety. This study therefore sought to use Panel data to establish the impact of expenditure directed to HIV/AIDS care on HIV incidence rate in sub-Saharan Africa countries.

2. Methodology

2.1 Theoretical Framework

The study was anchored on theoretical framework borrowed from The Bergson-Samuelson Social Welfare Model. In the Bergson-Samuelson Social Welfare Model, health care trust receives financial lump sum budget and then decides on the budget allocation across the care programmes. Every programme of care has a specified health production function which indicates the linkage between expenditure on programme and health outcomes in the specified programme. The Bergson-Samuelson Social Welfare Model indicates health outcomes to depend on the level of spending, clinical needs of the population that is relevant to the programme of care and wider environmental factors pertinent to delivering the programme of care according to the following functional form;

$$h_{it} = f(x_{it}, n_{it}, z_{it}) \quad (1)$$

Where,

h_{it} is health outcome in country i in the period t

x_{it} is expenditure by country i in the period t

n_{it} is the local population clinical needs relevant to HIV/AIDS in country i in the period t

z_{it} is local broader environmental factors in country i relevant in the delivery of HIV/AIDS programmes

The model implies that health outcome improves with expenditure until an optimum is realised. The nations in sub-Saharan Africa in an attempt to deal with challenges of HIV/AIDS have continued to review expenditure allocations on HIV/AIDS programmes. Since the clinical needs and the environmental factors affecting the delivery of various programmes differ across countries in Africa, the Bergson-Samuelson Social Welfare Model was appropriate for analysing the relationship between HIV incidence rate and HIV/AIDS expenditure.

2.2 Empirical Model

The study adopted The Bergson-Samuelson Social Welfare Model with modification. The health outcome in this study was HIV Incidence rate. The clinical needs were; number of people tested for HIV/AIDS, population on antiretroviral therapy, number of prevention of mother to child transmission, literacy rate while environmental factor considered was doctors' population. It was expected that a health outcome is influenced by previous conditions and as such the incidence rate was expressed as a function of the lagged variables of expenditure, clinical and environmental factors as follows:

$$HIR_{it} = f(TEH_{it-1}, PMTCT_{it-1}, LR_{it-1}, DP_{it-1}) \quad (2)$$

HIR_{it} is Incidence rate in country i in the period t ,

TEH_{it-1} is total expenditure on HIV/AIDS in country i in the period $t-1$,

$PMTCT_{it-1}$ is prevention of mother to child transmission with regard to HIV in country i in period $t-1$,

LR_{it-1} is literacy rate as percentage of population aged over 15 years in country i in the period $t-1$,

DP_{it-1} is population of doctors per 100,000 people in country i in the period $t-1$,

3. Results

The objective of this study was to establish the effect of HIV/AIDs expenditure on HIV/AIDS incidence rate in sub-Sahara African Countries. To achieve this objective, HIV/AIDs incidence rate was regressed on the first differenced variables of HIV/AIDS Expenditure, number of people put on antiretroviral therapy, preventions of mother to child transmissions, literacy rates and doctors population. The findings are presented in [table 4.4](#).

Table 1: Impact of HIV/AIDS expenditure on HIV/AIDS Incidence rate

Dependent variable: HIV/AIDS incidence rate			
Independent Variable	Coefficient	z-statistic	Probability
THE	-0.7195381 **	-2.39	0.022
PMTCT	-2.13e-08**	-2.06	0.046
LR	-0.0001463	-1.25	0.217
DP	-0.0005383***	-4.32	0.0000
C	-0.0516743	7.75	0.0000
Adjusted R-squared			0.5539
Wald chi2(4)			32.63***

** and *** denote the level of significance at 5 percent and 1 percent respectively.

The results presented in table 1 show that HIV/AIDS expenditure, prevention of mother to child transmission, and doctor population coefficients are statistically significant while the coefficient of literacy rate is statistically insignificant. This shows that in the selected African countries, HIV/AIDS expenditure, prevention of mother to child transmission and doctors population are important determinants of health outcomes while literacy rate is not. According to the results, an increase in HIV/AIDS expenditure in the sub-Saharan countries by one US Dollar will reduce HIV/AIDS prevalence rate by 0.7195381 percent. This study results support previous research findings by [8] study on HIV response in South-East Asia nations which found out that increase in HIV/AIDS expenditure lead to decline in global HIV/AIDS incidence. The coefficient for prevention of mother to child transmission was statistically significant at 5 percent level of significance. The coefficient for prevention of mother to child transmission was -2.13e-08. According to these results, an increase in prevention of mother to child transmission by one will reduce HIV/AIDS incidence rate by 2.13e-08. percent. The results are in agreement with [9] who found a positive relationship between prevention of mother to child transmission and HIV incidence. The coefficient for doctor population was found to be statistically significant at 1 percent level of significance. Doctor population has significant influence on HIV/AIDS incidence rate. The coefficient for doctor population was -0.0005383 and this implies that an increase in doctor population by one in a population of 100,000 people will reduce HIV/AIDS incidence rate by 0.0005383 percent. These results concur with [10] study that found out that doctor population help in reducing new HIV/AIDS infections. The adjusted R-squared was 55.39% within countries, 31.73% between countries and 26.79% in the overall. This implied that 55.39% of variations in incidence rate in the selected sub-Saharan African countries can be explained by variations in HIV/AIDS expenditure, prevention of mother to child transmission, literacy rates and doctor population within the selected African counties.

4. Conclusion and policy recommendations

The major area of the wider efforts in expanding the overall investments in health is increasing the financial allocations towards programs addressing HIV. Despite the over-time increase in HIV fight allocations, there is need to scale up funding as the existing domestic and international funding fall short of the required in achieving the 2030 strategy. The anticipated new resources will not only be helpful in the scaling up services and interventions combat HIV but will also go a long way in filling up the funding gaps that have been arising due to donors shifting their priorities. To prevent new HIV infections, countries within sub-Saharan Africa will have to understand HIV incidence nationally, sub-nationally, and within varying population demographics. HIV incidence has been and still remains the most useful and widely informative measure in appreciating the dynamics of HIV epidemic in terms of where is most likely to occur and in whom new infections are most probable to occur. To achieve the global prevention target of zero new HIV infections, there is need to adopt a robust health system that will actively engage and retain the target population in the whole HIV prevention and care services. This includes but is not limited to accessing HIV prevention services and enrolment to early antiretroviral therapy if they test positively for HIV. Therefore, to reduce new HIV infections, there is need to allocate more resources.

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