HIV/AIDS PREVALENCE AND LABOUR FORCE PARTICIPATION IN KENYA

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DECLARATION

This Research Project is my original work and has not been presented for the award of a degree in any other University.

Signature …… Date ……

LUCY KARIMI KITHINJI

This Research Project has been submitted for examination with my approval as University Supervisor.

Signature ……. Date……..……

Prof G, Mwabu

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DEDICATION

This research paper is dedicated to my dear husband Davis Mawira who believed in me and gave me the push to go on and to my two children Amy and Ira

ACKNOWLEDGEMENT

I am very grateful to God almighty who gave the inspiration, strength and health to do this work. To Him is the glory forever. I am thankful to my supervisor, Prof G, Mwabu, for his guidance and insightful comments throughout this process.

LIST OF ABREVIATIONS

HIV: Human immunodeficiency virus

AIDS: Acquired immune deficiency syndrome

ILO: International Labor Organization

IMF: International Monetary Fund

UNAIDS: United Nations Programs on AIDS

KAIS: Kenya Aids Indicator Survey

LFPR =Labour force participation rate

HIVP=HIV prevalence rate

EG- Economic Growth

GCF –Gross capital formation

FDI -Foreign direct investment

PG-Population growth

WR-Wage rate

SE-Secondary school enrollment

KNBS-Kenya National Beaureau of Statistics

VIF- Variance Inflation factor

NASCOP- National AIDS and STI Control Programme

NACC- National Aids Control Council

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ABSTRACT

HIV/AIDS pandemic has not only been a major health issue in many third world economies, but has also slowed the development of these economies in the last decades. The greatest impact of this pandemic has been experienced among the working population. Global statistics indicate that more than 36 million people who are infected by HIV/AIDS fall among the economically active category. Among the individuals participating in labour market in Kenya, more than 5.6% of economically active individuals are infected with HIV/AIDS. The high prevalence among the working population is expected to affect participation of employee's labour market significantly in the long-run if the issue is not addressed. This paper seeks to examine the impact of HIV/AIDS prevalence on labour force participation in Kenya. The results of this study indicate that HIV prevalence is significant in reducing the rate of participation of employees and potential workers. HIV/AIDS causes morbidity and mortality. Mortality leads to withdrawal from the labour force while morbidly can reduce activity or lead to withdraw depending on severity of the illness. The results of this examination also indicate that population growth has a positive relationship with labour force participation. Population increases the working age population and consequently the labour force participation rate. The paper recommends that policy on HIV prevalence which focuses on labour force specifically ought to be developed. Campaigns to reduce the prevalence among the working population should be encouraged.

CHAPTER ONE

1.0. INTRODUCTION

HIV/AIDS Pandemic has not only been a key health issue in most developing countries but has also dragged the development of these countries in the last decades. While the impacts of HIV/AIDS are experienced in all the countries and/or economies involved, Sub-Saharan Africa is expected to have more profound impact especially on labor supply, productivity as well as population growth. The number of people living with the HIV/AIDS globally has been increasing over the past few years. More than 35 million individuals (children and adults) were infected with HIV/AIDS pandemic in the globe by 2013 (UNAIDS, 2013). More than seventy percent of the World infected populations reside in Sub-Saharan Africa (UNAIDS, 2013). The number of new infections as well as the number of deaths related to Aids has been found to be high in sub-Saharan Africa compared to other regions.

According to the table one below, the total numbers of new infections at a global level were 2.1 Million while the numbers of total adults' deaths were about 1.5 Million. Sub-Saharan Africa had 1.5 million cases of new infections and 1.1 cases of Adults AIDS related deaths by 2013 (UNAIDS, 2013). HIV/AIDS has devastated many families, individuals as well as communities across the world. The epidemic has contributed significantly to the deterioration of many economies; the greatest impact of the disease is felt among the working population where the prevalence is higher. HIV/AIDS has also left thousands of children orphaned as the adults die every year because of HIV/AIDS or other AIDS related complications. As the disease progresses, the impact will be felt more by nations and/or communities which have high levels and /or degrees of poverty, social inequality as well as economics whose health infrastructures are not fully developed (Gayle and Hill, 2001).

Table 1: HIV /AIDS statistics by continent

Region	People living with HIV 2013	New Infections 2013	Adults Related deaths
Sub-Saharan Africa	24.7 Million	1.5 Millions	1.1 Millions
Asia and the Pacific	4.8 Million	350,000	250,000
Latin America	1.6 million	94,000	47,000
Western and Central Europe and North America	2.3 Million	88,000	27,000
Eastern Europe and Central Asia	1.1 Million	110,000	53,000
Caribbean	250,000	12,000	11,000
Middle East and North	230,000	25,000	15,000
Global	**35 Million**	**2.1 Million**	**1.5 Million**

Table showing HIV statistics by region. Source (UNAIDS, 2013)

1.1. HIV prevalence in Kenya

Kenya is among the countries in the world which are heavily stricken by HIV/AIDS pandemic. HIV prevalence among the adults was 6.2% .5.6 % of the total adults prevalence comprised of people aged between 15 and 64 years (NASCOP, 2014). The highest Adult prevalence in Kenya was reported in 1990's. More than 14% of the adult population was infected by HIV /AIDS by the late 1990's. The prevalence has declined over the years. HIV prevalence rate in Kenya fell by about 2.8% between 2000 and 2002 (Kenya, 2003, NASCOP, 2014). Declined in the prevalence rates could be attributed to spirited campaigns by both governmental and non-governmental organizations advocating for reduction in new infections through preventing infection to infants born of HIV positive mothers during birth (NASCOP, 2014, UNAIDS, 2014). HIV in Kenya displays extreme gender, age and geographical disparities. The most vulnerable group's are: rural populations, pregnant women and AIDs orphans who have the largest disease burden. The prevalence of HIV/AIDS in Kenya is higher in the urban areas compared to the rural areas (NACC, 2009).

According to the NASCOP (2012) 15-64 years age bracket estimates, about 6.5 % of the total number of people living with HIV/AIDS in Kenya reside in the urban area while 5.6 reside the rural place. Prevalence also varies with regions. Nyanza region has the highest prevalence rate of about 15.1 % while the lowest prevalence is seen in Eastern north region (NASCOP, 2014). HIV/ AIDS epidemic has increased mortality rates among infants, decreased life expectancies in addition to reducing the country's labour force. The Kenya government ought to increase the awareness of the disease to minimize new infections as well as to improve the health of the labour force infected with the disease in order to realize vision 2030 goal of attaining a ten percent growth rate by end of 2017.

Table 2: Prevalence among women and men aged 15-64 by residence and County

Residence/County	Women (Weighted %)	Men (Weighted %)	Total (Weighted %)
Prevalence by Residence			
Rural	6.2	3.9	5.1
Urban	8.0	5.1	6.5
Prevalence by County			
Nairobi	6.1	3.8	4.9
Central	5.6	2.0	3.8
Coast	6.1	2.6	4.3
Eastern North	3.6	0.8	2.1
Eastern South	5.3	2.3	3.9
Nyanza	16.1	13.9	15.1
Rift Valley North	3.6	2.7	3.1
Rift Valley South	4.9	3.6	4.3
Western	5.8	3.5	4.7
Total	6.9	4.4	5.6

Tables showing HIV prevalence by residence and county. Source (NASCOP, 2012)

1.2. Labour Participation rate

Labor force participation rate could be defined as the ratio of the labor force to the population which has attained the working age in a given economy expressed as a percentage. The legal working age differs across countries. For most of the countries, it is defined as the age between 15-64 years. LFPR measures the numbers of people who have reached the working age who could be in employment or actively looking for employment. LFPR helps in determining the size and/or quantity of labor available to engage for use in production of goods and services, relative to the population at working age. The labor force participation rate is calculated by expressing the number of persons in the labor force as a percentage of the working-age population. LFPR can be computed by dividing the total labour force (economically active persons) by the working age population. Working population refers to the number of individuals who have attained legal working age (ILO, 2004). The labour force in Kenya (individuals aged 15-64 years) was estimated to be 7.8 Million 1989 and 12.4 Million in 1999 (Ministry of Finance and Planning, 2002).

1.3. Problem statement

According to ILO report (2004), more than 36 million people who are economically active in the world are infected with HIV/AIDS. Thousands of economically active people are dying yearly due to AIDS mortality while others leave the work place due to morbidity (ILO, 2004). The impact of HIV/AIDS on communities, society and individuals is devastating. AIDS prevalence is high among the individuals who are in their economically productive years (Vass *et al.*, 2002). Aids related mortality and morbidity among the economically active population affects the quantity and quality of labour. A large population which is infected by the epidemic comprise of individuals who are experienced and highly trained. High HIV/AIDS infection among the labour force is likely to reduce labour supply or create an excess demand for labour. The total products of firms or organizations are expected to eventually fall if labour demand exceed the supply. HIV/AIDS morbidity also has several costs to households as well to firms. One of the costs is increased absenteeism among employees (Wasunna *et al.*, 2004, Thirumurthy *et al.*, 2011, Collewet *et al.*, 2015).

Employees could absent themselves from work in order to funerals of their colleagues who die due HIV/AIDS, giving care to individuals infected by the disease or even due to AIDs related complications if the affected person is the employee. Additionally, Adults deaths leave many children orphaned. Most of these might grow without guidance and support and may even become economically active with no skills (Nyambedha *et al.*, 2003, Simtowe *et al.*, 2011). The increasing number of people living with HIV /AIDS (See table 1) will have a major impact on the economic development of countries in the Sub-Saharan Africa in the long run. HIV pandemic affects labor supply and/or labor participation rate and as well as labor productivity. Most developing countries are labor intensive compared to developed countries which are capital intensive. The effect of HIV prevalence is therefore likely to affect labor markets in developing countries than developed nations. To ensure economic growth, policies of HIV prevention and treatment among the working population ought to be developed and adhered to.

1.4. Research questions

The study seeks to answer the following questions:

i. What is the impact of HIV/AIDS on labor participation rate and/or supply in Kenya?

ii. What are the measures the government has taken to reduce HIV/AIDS prevalence in Kenya?

1.5. Purpose of the study

The main objective of the study is to investigate the impact of HIV/AIDS on labor force participation rate in Kenya.

1.5.1. Specific objectives

i. To examine the impact of HIV/AIDS prevalence on Kenya labor force participation
ii. To assess the measures the government has taken to reduce HIV/AIDS prevalence in Kenya

1.6. Study scope and limitations

The study covers the age bracket of 15-64 years for ease of comparison. The major limitation of this study was the availability of data. Data on HIV /AIDS and labour forces was only available from 1989.

1.7. Organization of the work

The next chapter analyzes theoretical and empirical literature on impact of HIV/AIDS prevalence on labor participation rate. Chapter three outlines the methodology and theoretical framework. Chapter four gives the research analysis and chapter five discusses the empirical outcome and/or results, summary, conclusions and policy recommendations

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Introduction

This section consists of theoretical and empirical literature review. The theoretical literature review gives an economic reckoning on the labor force participation and explains theories on labor participation. This is then followed by the empirical literature review which provides an analysis based on facts from past studies

2.2. Theoretical Literature Review

The study will explain some of the theories of labor force participation

2.2.1. Basic neoclassical model of labour supply

Labour participation rate can be explained by neoclassical model of labor supply. The model describes the tradeoff between labour and leisure among individuals. It explains an individual's choice between work and leisure. The models assumes that time is used either in labour or in leisure. It further assumes that individuals are rational economic agents who seek to achieve maximum satisfaction and/or utility by choosing leisure and labour combination which yields the highest level of utility. If the market wage is lower the leisure time value, individuals may prefer leisure over work. Conversely, if the wage rate is higher than leisure time value, individuals may choose work over leisure. The decision making problem of the individual is divided into preferences and constraints. An individual has to choose between the two alternatives available to him. That is labour or leisure subject to a time constraint and a good constraint. A rational economic agent will seek to maximize his utility and/or satisfaction at the point where the indifference curves and the budget constraint intersect. The slope of the indifference curve at zero hours of work point is the reservation wage (Collewet *et al.*, 2015).

Reservation wage refers to the level of wage where the individual value of leisure time is equal to market value. Therefore, the individual is indifferent between participating at work and not participating. In other words, the slope of the indifference curve at zero hours of represents the reservation wage. If the reservation wage is lower than the real wage, the individual will choose to work. Conversely, if the reservation wage is higher than real wage an individual will choose not to work. Basically, labour supply is positive if reservation wage is lower than current wage and this depends on non-earned income and preferences. The relationship between hourly wage

and labor supply comprise of both income and substitution effect. High wages results to higher labour supply in substitution effect and income effect is explained by rise in real income as a result of increase in real wage. If leisure is a normal good, the consumption will rise. In neoclassical theory, labour force participation rate comprise of proportion of people whose current wage is higher than the reservation wage (Blundell and Macurdy, 1999).

2.3. Empirical Literature Review

Previous studies have shown a positive correlation between HIV /AIDS prevalence and labour force participation. Coulbaly (2005) assessed the impact of the HIV/AIDS on the labor force participation in Sub-Saharan countries from 1986 to 2003 (Coulibaly, 2005). The impact estimation was based on theoretical projection and estimates models under two scenarios: 'AIDS' and 'no AIDS' rather than examination actual and past conditions. He compared the effect of HIV prevalence on labour force composition and structure by classifying a sample of Sub-Saharan Africa into three categories: - High prevalence, medium prevalence and low prevalence. The proponents of this study concluded that HIV/AIDS has significantly changed some of the labour force characteristics which were in the cluster of high prevalence. HIV/AIDS has reduced the rate of growth of the reduced the growth rate of the population which is economically active among the countries with high prevalence. The study confirmed that there is a general decline of the male participation rates and a slight increase in female participation Labour force participation could be enhanced among individuals living with HIV.Work provides workers with social connection, self determination and fulfils their need for survival. Literature evidence displays participation in the labour market as uncertain and complex due transitions from state of being economically active to state of being employed due to illness. Living with AIDS is a major setback to employment and in turn participation in the labour market in many economies (Worthington *et al.*, 2012).

HIV/AIDS mortality can reduce labour participation and increase the costs of companies due to loss of skilled labour, funeral expenses among others (Feeley *et al.*, 2004). The impact of HIV/AIDS Pandemic on two Ugandan Corporations was examined by Feeley and other researchers .The result showed that the two firms used in the study were more losing 1.6% of the labour force to deaths as a result of HIV/AIDS. The measured costs due to the death of a worker

were more than 17 million shillings in one company and nearly 41 million in the other company. The study concluded that the HIV/AIDS related deaths reduce the work force supply or participation and increase the direct costs for the affected companies. Previous studies have also indicated a high prevalence of HIV/AIDS among workers from Zambia, Botswana and south Africa. 44000 employees were included in a study to determine the effect of HIV prealence on labour participation. The results from the study by a group of reserachers indicated a high infection rate among the skilled workers in Zambia. Contract workers such as security guards , cleaners , ground men as were also found to have a high prevalence across the three countries. The overall prevalence was 17% on average in Botswana , South Africa and Zambia(Evian *et al.*, 2004, Feeley *et al.*, 2004).

Literature also exists which supports the relationship between HIV/AIDS and labour productivity. Research was conducted to examine the attendance and productivity of employees in a tea estate who were medically retired or had died because of HIV/AIDS related complications in western Kenya (Thirumurthy *et al.*, 2011). Output in kilograms, leave and work assignment were compared for individuals with AIDs and those without. The finding indicated that, those infected with the epidemic had lower output in terms of kilograms of tea leaves plucked. The AIDS infected individuals also had more sick leaves and were also allocated lighter assignments compared to their counterparts. Human capital development and productivity is crucial in propelling economic development (Hotchkiss, 2009).

Previous studies also support the relationship between the labour force participation and health status of employees. The relationship between employees' participation and health status in Sub-Sahara has been found to be positive by researcher's .Novignon *et al* (2005) used panel data was used for 46 countries .He used generalized methods to measure the effect of population health on the rate of labour participation. His findings denote a positive relationship between labour force participation. A significant positive association was also found between the prevalence of HIV /AIDS and employees participation. His findings also showed a statistically significant relationship between female participation and life expectancy.HIV /AIDS reduce life expectancy and consequently the ability of employees to engage in productive activities. Male participation rate was also positively related to life expectancy and the relationship was found to be

significant. These findings advocate for measures to improve the health of population such as combating HIV Prevalence both at micro and macro levels. (Novignon *et al.*, 2015). The relationship between these key variables was also examined in Australia. Male aged between 50-64 years, 15-49 years and females aed 15-49 years were included in the study. The findings indicated a positive realtioship between health of older women while a negative relationship was found between young men haelth and labour force participation (Cai and Kalb, 2006).

AIDS treatment can reduce the progression of a disease and increase participation rate. (Thirumurthy *et al.*, 2011) used AIDS treatment as the predictor variable to labour supply in western Kenya to determine whether treatment of HIV had any effect on labour supply. Data from longitudinal survey was collected to measure the effect of treatment on supply of labour. The study had two major outcomes: the supply of labour of adults with AIDS who have been treated and patients not treated. This study concluded that the likelihood of the patients who have been treated for AIDS was twenty percent more than those adult patients who had not been included on treatment. The study also concluded that there was the probably of HIV patients under treatment working for longer hours was 35% more compared to those were not under treatment. HIV treatments reduce the prevalence of HIV/AIDS. Literature also reveals that the HIV positive individuals are les likely to participate in the labour markets as compared to the HIV negative people . A cross sectional survey with a sample 2932 individuals who were infected with HIV/AIDS in France was also conducted in France to demostrate the effect of HIV prevalence on labour participation. The results indicated that the rate of employment was 25% higher among HIV negative individuals compared to those who were negative before 1994. The percentage was seen to decline from 1995 onwards..(Dray-Spira *et al.*, 2007, NASCOP, 2012).

CHAPTER THREE

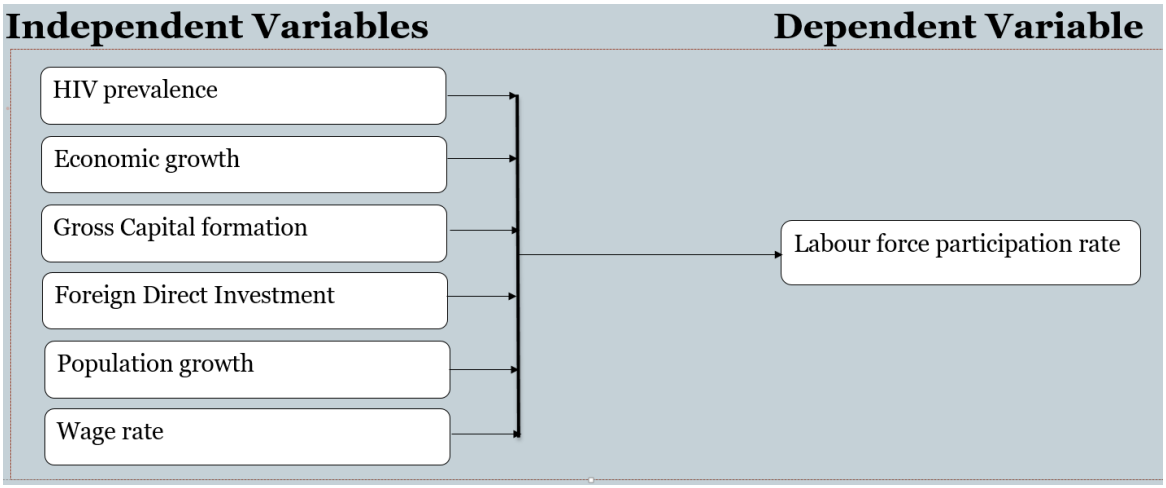
3.0. RESEARCH METHODOLOGY

3.1. Introduction

This section covers the methodology which will be used in conducting this study. It consists of Economic model and variables which will be examined, the conceptual frame work, sample size and sampling procedure, research design, data collection method ,data analysis and presentation techniques.

3.2. Conceptual framework

Figure 1: Conceptual framework showing the dependent and the independent variables.



As shown in the conceptual framework above, the rate of participation of employees and/or workers is dependent on the rate of HIV /AIDS prevalence among the working population such a high rate HIV prevalence is assumed to lead to lower rate labour force participation .Similarly, a lower rate of HIV/AIDS prevalence results to higher rate of participation from the workers (Rueda *et al.*, 2012). LFPR is also dependent on the economic growth and/or development of a given economy such that a high level economic growth results to high level of participation of the working age population in the labour market. Stronger economic growth and/or development are likely to attract more workers due to higher wages. GDP is used in this study as the proxy for economic growth (Shahid, 2014). LFPR is also dependent on the rate of gross capital accumulation. It is presumed that a high rate of capital accumulation will lead to higher rate of participation. LPFR is also dependent on FDI. FDI have both positive and negative effects on the

share of the labour in the host country. Labour participation rate is also dependent on population growth of a given economy. It is presumed that a higher rate of population growth will result to a higher rate of labour force participation. LFPR also depends on the wage rate. High wage rate is assumed to result to higher participation of workers in labour market.

Labour supply comes from households in any given economy. Individuals as presumed to seek to maximize their satisfaction and /or utility by allocating their time between two goods (labour and leisure) subject to the total number of total hours at their disposal. Their utility function can therefore be written as:

Maximize U ($wL+\mu$, A) subject to $L+A \leq k$

w= Represent the wage rate per hour

k= Represents number of hours available to an individual and includes both labour and leisure hours

L= Represents the number of hours an individual chooses to work

μ= Denotes the non-labour income

A= the number of leisure hours selected by a given worker

3.3. The empirical model

Let LFPR represent the labour force participation rate and consider the following equation

Labour participation rate = f (HIV prevalence, population growth rate, Economic, Gross capital formation, Foreign direct investment, per capital wage and literacy level

LFPR=f (HIVP, EG, GCF, FDI, PG, SE, WR, ε)……(1)

LFPR= Labour force participation rate

HIVP=HIV prevalence rate

EG- Economic growth measured by gross domestic product

GCF –Gross capital formation

FDI -Foreign direct investment

PG-Population growth

WR-Per capital wage

SE-Secondary school enrollment

ε- The error term- explains other factors which explain the labour force participation rate not included in the model.

The empirical model will therefore be stated as

$$LFPR_t = f(HIVP_t, EG_t, GCF_t, FDI, PG_t, WRt, SE_t, \varepsilon) \quad \ldots\ldots (2)$$

HIVP denotes HIV prevalence, EG represents economic growth. GCF is gross capital accumulation, FDI is foreign direct investment, PG is population growth, WR per capita wage rate, SE represents secondary school enrollment and t denotes current time period.

Thus the model to be estimated will be explicitly stated as

$$LFPR_t = \beta_o + \beta_1 HIVP_t + \beta_2 EG_t + \beta_3 GCF_t + \beta_4 FDI_t + \beta_5 PG_t + \beta_6 WR_t + \beta_7 SE_{t+} \varepsilon \ldots. (3)$$

β_i represents the coefficients which will be estimated and ε denotes the error term. OLS techniques will be employed in the factors which affect labour force participation in Kenya. The equation will be estimated excluding Secondary enrolment and compared with the equation where Percapita wage rate is excluded to compare the results.

3.4. Definition and measurement of variables

3.4.1. Dependent variable

LFPR is Labor force participation rate is the ratio of the labor force to the population in has attained the working age in a given economy expressed as a percentage. LFPR will measure the labour share in the given economies

3.4.2. Independent variables

HIVP refers to the percentage and/or the number of labour force living with HIV /AIDS in the age bracket (15-64).GDP is the Gross domestic product. It is used as a proxy for economic growth. It is assumed that, as the GDP changes, labour participation rate also change in the same direction. In other word, a positive relationship is expected.GCF is Gross capital accumulation. It is assumed that, the lower the level of capital accumulation the lower the rate of labour participation.FDI is foreign direct investment. It is assumed that, FDI will have both negative and positive effect on the labour share of the host country.PG is population growth rate of the productive labour force. PG is assumed to have positive relationship with LFPR (Cheluget *et al.*, 2006). LE is the level of education has a positive relationship with labour force participation rate.

Per capita wage rate is expected to increase the rate of participation of workers (Ray *et al.*, 1971)..

3.4.3. Expected signs of coefficient estimates

Table 3: Measurement of variables and expected sign

Variables	Definition and Measurement	Expected sign
$LFPR_t$	Labour force participation rate for each year *t*. It is the number of people working or actively looking for work among the Kenya working population	$\beta_{o>0}$
$HIVP_t$	HIV prevalence for each year *t.* It is the percentage of persons living with HIV/AIDS in Kenyan population	$\beta_{1<0}$
EG_t	Economic growth for each year *t.* it is measured by the final value of goods and services produced in Kenya	$\beta_{2>0}$
GCF_t	Gross fixed capital formation for each year *t.* Represents the value of fixed assets such as machinery , buildings and structures	$\beta_{3>0}$
FDI_t	Real FDI for each year *t.* Represents Kenya's net inflows	$\beta_{4>0}$
PG_t	Population growth rate for each year *t.* It is the percentage change in population	$\beta_{5>0}$
WR_t	Per capital wage for each year *t.* It is the total wage bill divided by the total wage employees	$\beta_{6>0}$
SE_t	Secondary school enrollment for each year *t*. It is number of students enrolled in secondary school each year	$\beta_{7>0}$

Table showing estimated signs of coefficient estimates

3.5. Research Design

Time series data will be used to compare the effect of change in HIV prevalence (HIVP) to the dependent variable (LFPR).Data used for empirical analysis in this study will be derived from World Bank Development indicators, Economic surveys and statistical abstracts from KNBS.

3.6. Data collection and analysis methods

This study will rely mainly on secondary data. Data will be sourced from World Bank Development indicators, Economic surveys and Statistical abstracts from KNBS. An alternative and null hypothesis will be set as below to conduct the significant tests on OLS estimates.

H0: $b_i = 0$, meaning that, the variables do not have a significant effect on labour force participation rate.

H1: $b_i \neq 0$, meaning that, the variables do not have a significant effect on labour force participation rate.

The hypothesis will either be rejected or accepted using the student t- values. If the null hypothesis is rejected, it will imply that the coefficients in question will significant because they

3.7. Pres -estimation tests

3.7.1. Stationarity tests

Most often than not, time series variables are non stationary in nature. Non –stationary time series data has mean, variance and covariance which vary over time. Unit root tests and order of integration will be tested to avoid erroneous inferences and spurious regression. Long-term relationship between variables (co-integration) will be examined using the granger causality test (Pemberton, 1990).

3.7.2. Multicollinearity tests

Multicollinearity exists in a given model when various independent and/or explanatory variables highly are correlated. If the independent variables are highly correlated in a given model, the standard errors and the variance will be large and thus may not be reliable. Multicollinearity can be detected by using a correlation matrix and is concluded by examining coefficients of each pair of the variables in the model. Variance inflation factor can also be used to detect Multicollinearity. If VIF is greater than ten, the variables are highly correlated and less than ten,

the correlation is not high. Correlation can be reduced by either dropping the variable or obtaining the first difference. Dropping the variable may lead to specification error. Per capita wage and secondary school enrolment are expected to be correlated and therefore this test will be conducted (Pemberton and Series, 1990).

CHAPTER FOUR

4.0. RESULTS AND DISCUSSION

4.1. Introduction

This chapter will examine and present the empirical results of the study. This first section will give econometrics as well as descriptive statistics. The next section will discuss the results.

4.2. Descriptive statistics

Table 4: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Economic Growth (%)	3.46	2.007694	.2	7
Gross Capital Formation (% of GDP)	18.3096	1.942414	15.39	21.39
Foreign Direct Investment (% of GDP)	.548	.6091935	.04	2.53
HIV prevalence (% of GDP)	6.322	2.603242	1.99	10.25
Labour force participation rate	69.264	3.224758	65.5	75.7
Population growth (% of GDP)	.7058513	.0672565	.6450508	.8638288
Log of Secondary School enrollment	5.954065	.1781588	5.725374	6.3231
Log of Per Capita Wage rate	4.610878	1.037774	3.186119	5.696786

From table 4, the average LFPR is 69.264% with a minimum of about 65.5% while the maximum value was 75.7%. The average HIV prevalence rate was about 6.332 %, the minimum prevalence was 1.99% while the maximum prevalence and/or percentage of people living with HIV/AIDS pandemic was 10.25%. On average, the economy grew by an average of 3.46% between 1989 and 2013. The minimum growth experienced was about 0.2% while the maximum value is 7%.

On the other hand, the average Gross capital formation was 18.3096%. The minimum value of Gross capital formation was 15.39% while the maximum value was 21.39%. The mean FDI was 0.548%; the minimum value is 0.04 % while the maximum foreign direct investment was 2.53 % of Gross domestic product.

Population growth averaged at 70.5 % with the minimum growth under the study period being 64.5% while the maximum growth was about 86.3%. Per capita wage rate was kshs.185824.6. The lowest values of per capita wage recorded were 3.186119 (log base 10 values) while the highest values of per capital wage recorded was Kshs 5.696786 (log base 10 values).Per capita

wage is calculated by dividing the total wage bill by the total number of wage employees. Conversely, the average number of children enrolled in secondary schools was 4.610878(log base 10 values); the minimum number enrolled was 3.186119(log base 10 values) while the maximum number was 5.696786 (log base 10 values).

4.3. Trend results

Figure 2: Labour force participation rate and HIV prevalence rate (1990-2015)

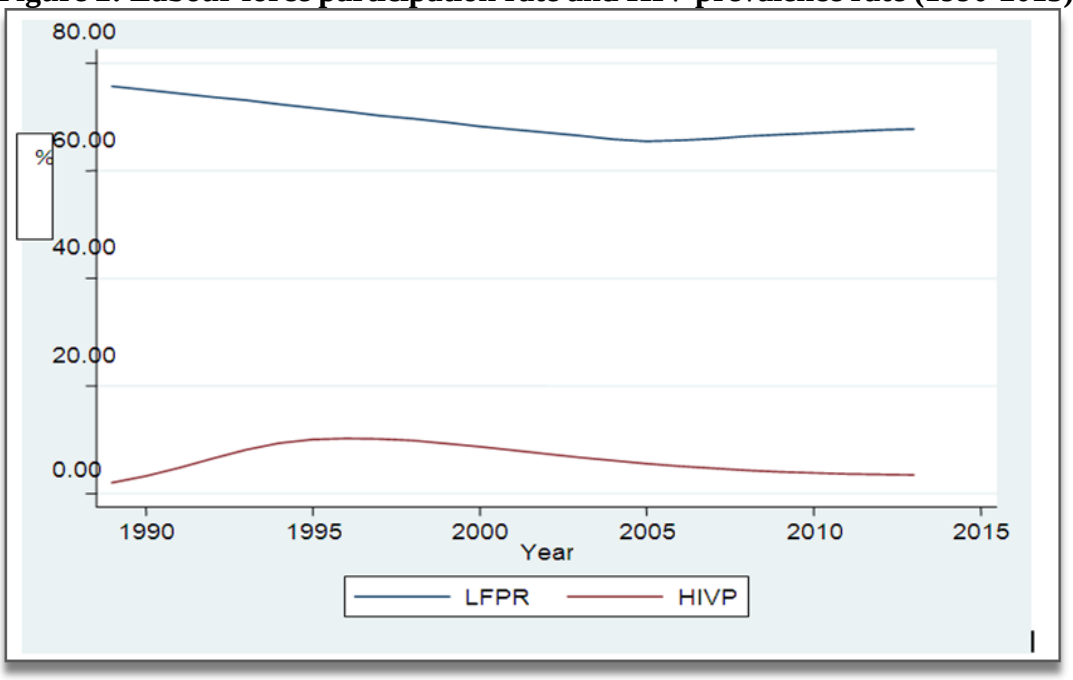
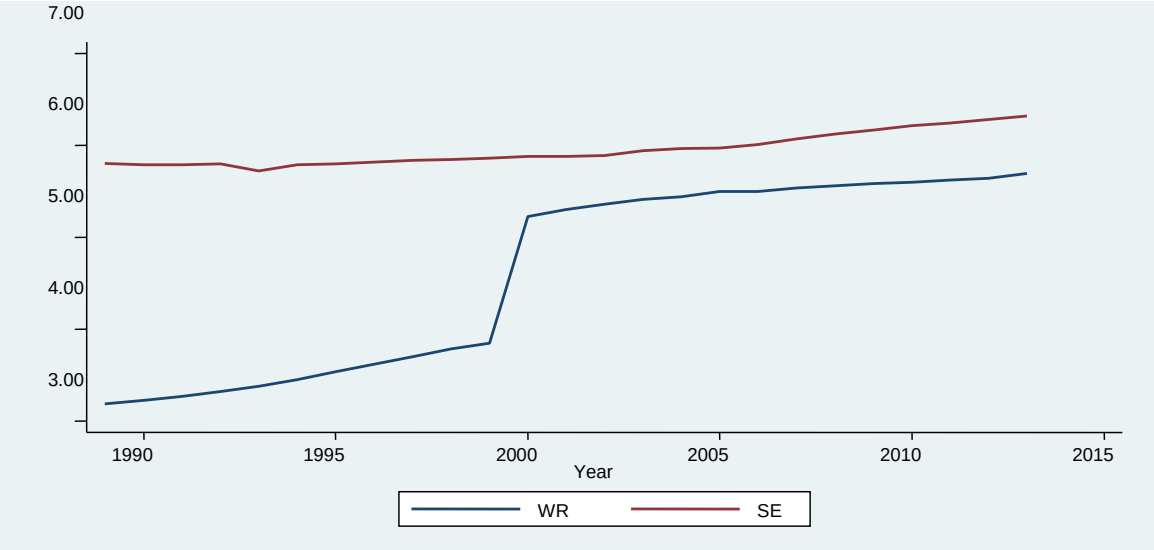


Figure showing the relationship of labour force participation rate and HIV prevalence.

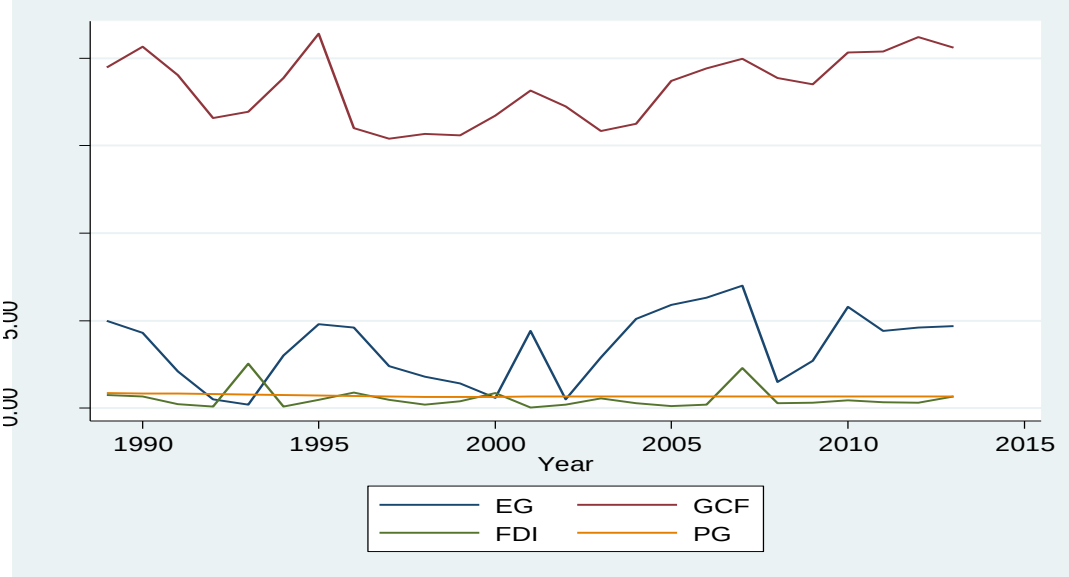
As the rate of HIV prevalence increased from between 1990 and 1995 the labour force participation rate consequently declined between the same period. However, the participation rate began to rise from the year 2005. It is also evident from the graph above that when HIV Prevalence was increasing, labour force participation was declining. Similarly, when the prevalence started declining, the labour force participation rate went up. One of the reasons for observed decline in HIV prevalence was due to interventions by the government such scaling up of the HIV testing and treatment, Prevention of infection from mother to the unborn child through various interventions such PMCT, home based testing and increased access to treatment.

Figure 3: Per capita wage and secondary school enrollment per rates 1000 (1990-2015)



From figure three above the per capita wage has seen to increase at a lower rate between 1990 and 2005. From the 2005, the per capita wage is seen to be increasing sharply. The secondary school enrollment was fairly constant between the year 1990 and 1999. However, the number of enrollment has been on an increasing trend since the year 2000. The increase could be attributed to the provision of primary and secondary school education by the government among other factors.

Figure 4:Economic growth rate, Gross capital formation, Population and Foreign direct investment growth rates



From the figure above, population growth rate declined between 1990 and the year 2000. However, the growth rate started increasing as shown in the figure above from 2000. Economic growth, foreign direct investment and gross capital formation measured as a percentage of GDP has been fluctuating every year as shown in the figure 4 above.

4.4. Pre-estimation results

4.4.1. Unit roots

Table 5: Dickey-Fuller test for unit root

Variables	Test statistic	1% Critical value	5% Critical value	MacKinnon approximate p-value for Z(t)	Stationary/Non stationary
Labour force participation rate%	-4.228	-3.750	-3.000	0.0006	Stationary 1(0)
HIV prevalence (% of GDP)	-1.287	-3.750	-3.000	0.6350	Non Stationary 1(1)
Economic growth (% of GDP)	-3.023	-3.750	-3.000	0.0328	Stationary 1(0)
Gross capita formation (% of GDP)	-2.182	-3.750	-3.000	0.2130	Non stationary 1(1)
Foreign Direct Investment (% GDP)	-6.158	-3.750	-3.000	0.0000	Stationary 1(0)
Population growth (% of GDP)	-4.218	-3.750	-3.000	0.0006	Stationary 1(0)
Log of per capita wage rate	0.958	-3.750	-3.000	0.7682	Non stationary 1(1)
Log of secondary school enrollment	2.310	-3.750	-3.000	0.9990	Non stationary 1(1)

Unit root test showed that HIV prevalence, gross capital formation and per capita wage and secondary school enrolment were non stationary and were differenced to attain stationarity. The rest of variables were stationary.

4.4.2. Multicollinearity

Table 6: Correlation matrix before correcting Multicollinearity

	lfpr	hivp	eg	gcf	Fdi	pg	wr	se
lfpr	1.0000							
hivp	0.1043	1.0000						
eg	-0.2942	-0.4104	1.0000					
gcf	0.0119	-0.6428	0.5745	1.0000				
fdi	0.1332	0.0049	0.0239	0.0070	1.0000			
pg	0.8793*	-0.2621	-0.1094	0.2189	0.1462	1.0000		
wr	-0.9255*	-0.3911	0.3388	0.2245	-0.1156	-0.7134	1.0000	
se	-0.6697	-0.6031	0.4060	0.4902	-0.1100	-0.5136	0.8126*	1.0000

Table 7: VIF table before correcting Multicollinearity

Variable	VIF	1/VIF
Population growth (% of GDP)	14.79	0.067601
HIV prevalence (% of GDP)	9.80	0.101995
Log of secondary school enrollment	9.36	0.106892
Log of per capita wage rate	7.85	0.127405
Gross capita formation (% of GDP)	3.16	0.316558
Economic growth (% of GDP)	1.84	0.544625
Foreign Direct Investment (% GDP)	1.03	0.967757
Mean VIF	6.83	

VIF refers to variance inflation factor and is used to measure the extent to which a given variable in the regression contributes to standard error. A VIF value greater than ten indicates that a high correlation exists between one or two pairs of independent variables. A high VIF value for a given variable denotes a high contribution to the standard error.

From the table 6 above, secondary school enrollment is highly correlated with per capita wage. Per capita wage is calculated as a ratio of total wage bill and the total wage employees. Additionally, the VIF of population growth rate is greater than ten indicating Multicollinearity (see table 7). This means that we should difference the variable whose VIF is greater than ten until we are able to correct for Multicollinearity. Population growth, secondary school

enrollment and per capita wage rate are highly correlated with the LFPR coefficients as shown by the coefficient of 0.8793, 0.6697 and 0.9255 respectively.

Table 8: Correlation matrix after correcting for Multicollinearity

	lfpr	hivp	eg	gcf	fdi	pg	wr	se
lfpr	1.0000							
hivp	0.2913	1.0000						
eg	-0.4017	-0.3834	1.0000					
gcf	-0.0436	-0.6446	0.5663	1.0000				
fdi	0.1152	0.0308	0.0131	-0.0016	1.0000			
Pg D1.	-0.7463	-0.4964	0.0844	0.0735	-0.1655	1.0000		
Wr D1.	-0.0126	0.2589	-0.3197	-0.2074	0.1143	0.1936	1.0000	
se	-0.6675	-0.7174	0.4459	0.5232	-0.0998	0.5769	-0.1504	1.0000

Table 9: VIF after correcting for Multicollinearity

Variable	VIF	1/VIF
HIV prevalence (% of GDP)	3.47	0.288337
Log of secondary school enrollment	2.78	0.359490
Gross capita formation (% of GDP)	2.69	0.371513
D1. Population growth (% of GDP)	2.41	0.414553
Economic growth (% of GDP)	1.71	0.585197
D1.Log of per capita wage rate,	1.46	0.684099
Foreign Direct Investment (% GDP)	1.09	0.919875
Mean VIF	2.23	

Table 8 shows a lower correlation between secondary school enrolment and per capita wage rate. Differencing population growth rate and the Percapita wage rate addresses the problem of Multicollinearity.

Table 9 shows that all variables have VIF of less than ten indicating that the problem of Multicollinearity has been addressed.

4.4.3. Cointegration

Co integration is used in the study to depict the long run relationship between the variables. Engle-Granger test is used to test for Cointegration. The null hypothesis states that there is no Cointegration. The null hypothesis is rejected if the P value is greater than 0.05 at 95 percent

confidence interval. The P value after testing for Cointegration was 0.0000 and thus the null hypothesis is rejected, implying that there is Cointegration in this time series data.

4.4.4. Heteroscedasticity

Heteroscedasticity testing will be carried out using Breusch-Pagan / Cook-Weisberg test. Heteroscedasticity occurs if the variance of a given data set is infinite. The null (hypothesis Ho) states that the variance is constant or there is homoscedasticity. The P value of 0.000 from table 10 below is significant and therefore we do not reject the null hypothesis. The results indicate the absence of Heteroscedasticity. The p value of 0.62 is more than significance level of 0.05, thus we do not reject the null hypothesis. The results indicate the absence of Heteroscedasticity. The chi2 (1) value is 0.62

Table 10: Heteroscedasticity results

Labour force participation rate	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
HIV prevalence (% of GDP)	.1046356	.1614801	0.65	0.526	-.2360576	.4453289
Economic growth (% of GDP)	-.1542951	.09061	-1.70	0.107	-.3454655	.0368752
Gross capita formation (% of GDP)	.133894	.1228439	1.09	0.291	-.125284	.393072
Foreign Direct Investment (% GDP)	.029981	.2240183	0.13	0.895	-.4426563	.5026184
pg Population growth (% of GDP)	22.87936	7.677325	2.98	0.008	6.681617	39.0771
Log of per capita wage rate	-2.134754	.3624317	-5.89	0.000	-2.899418	-1.37009
Log of secondary school enrollment	3.342235	2.304846	1.45	0.165	-1.520564	8.205034
_cons	40.46216	18.46807	2.19	0.043	1.497946	79.42638
F(7, 17) = 80.00 **Prob > F = 0.0000** **R-squared = 0.9705** **Adj R-squared=0.9584** **Root MSE = .6577** **chi2(1)=0.62**						

4.4.5. Autocorrelation

When a time series is correlated and/or linked with its own future and past values, it is said to be auto correlated (Robinson, 2004). Autocorrelation was tested using Breusch-Godfrey LM test. The null hypothesis is absence of serial correlation .chi 2 value is 6.777 (see table 11), is greater than x^2 critical at 5% confidence interval which is given as 3.84 from tables. This means that that we do not reject the null hypothesis thus indicating presence of serial correlation. Serial correlation however, be corrected by use of robust regression

Table 11: Autocorrelation results

Breusch-Godfrey LM test for autocorrelation			
lags(p)	chi2	df	Prob > chi2
1	6.777	1	0.0092
	H0: no serial correlation		

4.5. Robust Regression Results

Table 12: Final regression results excluding secondary enrolment

Dep Variable: Labour force participation rate	Coef.	Std. Err.	t	P>t	[95% CF	Interval]
HIV prevalence (% GDP).D2.	-5.389495	.9867531	-5.46	0.000	-7.481318	-3.297672
Economic growth (% of GDP)	-.2287099	.1395692	-1.64	0.121	-.5245834	.0671636
Gross capita formation (% of GDP) D1.	-.1513974	.0826874	-1.83	0.086	-.3266868	.0238921
Foreign Direct Investment (% GDP)	-.2097694	.2171836	-0.97	0.348	-.670178	.2506392
Population growth (% of GDP)	43.31071	6.01545	7.20	0.000	30.55852	56.06289
Log of per capita wage rate. D1.	.5904108	.5668454	1.04	0.313	-.6112478	1.792069
_cons	39.22649	4.556612	8.61	0.000	29.56691	48.88608
F(7, 15) = 35.11 **Prob>F=0.0000** **R-squared=0.8912** **Root MSE =0.1102**						

Table 13: Final regression results excluding Percapita wage rate

Dep Variable: Labour force participation rate	Coef.	Std. Err.	T	P>t	[95% CF	Interval]
HIV prevalence (% GDP).D2.	-5.327517	.8851754	-6.02	0.000	-7.204005	-3.451029
Economic growth (% of GDP)	-.2268494	.1240417	-1.83	0.086	-.4898059	.0361072
Gross capita formation (% of GDP) D1.	-.1474717	.0748301	-1.83	0.086	-.4898059	.0238921
Foreign Direct Investment (% GDP)	-.2636532	.3312917	-0.80	0.438	-.9659604	.4386539
Population growth (% of GDP)	41.22711	5.135772	8.03	0.000	30.33976	52.11446
Log of per capita wage rate. D1.	-7.43877	8.848653	-0.84	0.413	-26.19708	11.31954
_cons	40.9318	3.812865	10.74	0.000	32.84889	49.0147

N = 25
F(6,16) = 39.20
Prob>F=0.0000
R-Squared=0.8945
Root MSE =0.0512

4.6. Interpretation of Results

The objective of this paper was to examine the impact of HIV Prevalence on Kenya labour force participation in Kenya. A linear regression of LFPR ,HIV prevalence, economic growth, gross capital formation, foreign direct investment, per capita wage, secondary enrollment and population growth. Values obtained after regression conform to the expectations except economic growth, gross capital formation, foreign direct investment and secondary school enrollment. The constant term value means that when all explanatory and/or independent variables assume a zero value, the labour force participation rate will be 39.22649 as seen in the table 12 (final regression results excluding secondary enrolment table). Similarly, table 13 (final regression results excluding per capita wage rate gives the value of the constant term as 40.9318. HIV prevalence has a statistically significant negative relationship with labour force participation rate. The negative relationship is significant at 95% confidence level in explaining labour force participation. HIV prevalence and labour force participation has a strong relationship which is given by an average of -5.3% in both from the regression of the equation which excludes per capita wage rate as one of the explanatory variables and the equation which excludes secondary school enrollment as one of the key variables (see tables 12 and 13 respectively).

An increase of 1% in HIV prevalence will lead to a 5.3% decrease in labour force participation. These findings are consistent with a study by Coulibaly in 2005 (Coulibaly, 2005). These results are also consistent with theoretical literature where health is considered as human capital. A good health state would result to a higher rate of participation among the workers.

Population growth measured by gross domestic product has a positive statistically significant relationship with LFPR at 5% interval. An increase in population growth increases labour force participation rate by an average of 40.6%. Foreign direct investment has a negative relationship statistically insignificant relationship with labour force participation. 1% increase in FDI decrease labour force participation rate by an average of 0.235 %. Gross capital formation also has a negative relationship with labour force participation. 1 % increase in gross capital formation will led to a 0.15% decline in LFPR. Similarly, secondary school enrolment and per capita wage have a positive relationship with LFPR. An increase in secondary school enrolment

and per capita wage by 1% will increase labour force participation by 0.59% and -7.43% respectively

CHAPTER FIVE

5.0. SUMMARY AND POLICY RECOMMENDATIONS

5.1. Summary

The main objective of this study was to examine the impact of HIV /AIDS prevalence on labour force participation rate in Kenya. Specifically, the study assessed weather HIV burden had any effect on labour force participation rate. OLS technique was used in testing the relationship between HIVP and labour force participation rate in Kenya using time series data running from 1989 to 2013. The empirical results indicated that there is a negative relationship between the two key variables. HIV prevalence has a significant negative relationship with LFPR. This denotes that a high HIV prevalence could result to lower participation of employees. Population growth also has a significant positive relationship with LFPR. These results are consistent with other literature in the area such as Coulibaly 2005 (Coulibaly, 2005).

5.2. Policy recommendations

The study has established that a significant negative relationship exists between HIV/AIDS prevalence in Kenya and labour force participation in Kenya. A significantly high percentage of individuals living with HIV/AIDS in the Kenya are in their economic active years. The Kenyan government has employed many interventions with collaboration of other key stakeholders to reduce the prevalence of this pandemic. Apart from the targeted approach of reducing the transmission of the pandemic from mother to their unborn children, most of the strategies have focussed on the incidence of the disease with no particular reference to age category. The strategy has helped in reducing the overall prevalence but has not taken into consideration the impact of HIV/AIDS labour participation.

Human capital is one the major source of technological advancement and increased productivity. Health of human capital is fundamental in realizing a continued growth in the economy especially for the developing nations which are labour intensive like Kenya. Healthy workers are likely to participate more in labour markets. Kenya government can increase the economic growth by focussing strategies which improve labour participation; productivity as well as retention of key skills among the employees. This can be done by addressing major epidemics which are contribute significantly to mortality and morbidity among the working population such as HIV/AIDS. There is need to develop policy on HIV/AIDS which focus on labour force participation. Measures taken by the Kenyan government have not addressed the effect on labour

force specifically. More targeted approach to combat HIV /AIDS among the working population is therefore recommended. Employers should also be develop employment policies which focus on improving the workers who are HIV infected as well as incorporating regular sensitization programs in their short-term plans to minimize the risk of disease among the exposed as well as the unexposed group.

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