THE EFFECT OF HIV/AIDS ON PRIMARY SCHOOL ENROLMENT IN KENYA ''

By

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DECLARATION

This research paper is my original work and has not been presented for award of a degree in any other university.

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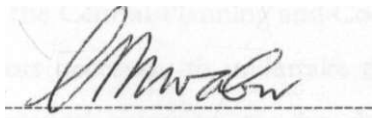
This research paper has been submitted for examination with our approval as university supervisors.



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DEDICATION

To my loving wife Faith Queen and my beautiful three daughters: Sheila Mwikali, Grace Wayua and Marionne Mueni.

ABSTRACT

The fact that HIV/AIDS, has been recognized as a human tragedy and a major health problem, which calls for urgent attention, need not be overemphasized. The scale of the disease is so large that it raises questions about its impact on the future development path of most developing countries, majority of which are in Africa. The scourge has caused untold suffering to many households and ruined lives of many young and dynamic Kenyans. The disease is caused by HIV, which acts by weakening the immune system, malting the human body susceptible to other diseases. It is contracted mostly through heterosexual contact. Infected people become progressively sick and weak; they steadily lose their ability to work. Eventually, the disease kills them in their prime, thereby destroying the human capital build up in them over the years through child-rearing, formal education and learning on the job. It has affects people physically, spiritually and emotionally. As a result, many children drop out of school either due to lack of household income after the death of the breadwinner, or take care of sick parents or relatives suffering from HIV/AIDS, among others.

This sad situation justifies the need to carry out this study. The study investigates the effect of HIV/AIDS on enrolment in primary education. It employs OLS and 2SLS methods to estimate a school enrolment model. The empirical findings suggest that HIV/AIDS has a negative effect on primary school enrolment. The results indicate thai a 10% increase in the population with HIV/AIDS is associated with a 2.9% decline in primary school enrolment. Gender is not identified as a significant factor in school enrolment analysis even though being female infected of HIV/AIDS reduces enrolment. Other variables found to significandy affect enrolment negatively are primary school fees and the under-five mortality rate while school age population and household wealth affect enrolment positively.

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ABBREVIATIONS AND ACRONYMS

2SLS	Two Stage Least Squares
ADF	African Development Fund
AIDS	Acquired Immune Deficiency Syndrome
CAER	Consulting Assistance on Economic Reform
CBOs	Community Based Organizations
CBS	Central Bureau of Statistics
CPI	Consumer Price Index
EFA	Education for All
GDP	Gross Domestic Product
GER	Gross Enrolment Rate
GOK	Government of Kenya
HIV	Human Immuno-deficicncy Virus
IPAR	Institute of Policy Analysis and Research
IV	Instrumental Variables
KDIIS	Kenya Demographic and Health Survey
KIPPRA	Kenya Institute for Public Policy Research and Analysis
MOEST	Ministry of Education, Science and Technology
NACC	National AIDS Control Council
NARC	National Rainbow Coalition
NASCOP	National AIDS/STD Control Programme
NGOs	Non-Governmental Organizations
OLS	Ordinary Least Squares
STDs	Sexually Transmitted Diseases
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Education Fund
UPE	Universal Primary Education
WMS	Welfare Monitoring Survey

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CHAPTER 1: INTRODUCTION

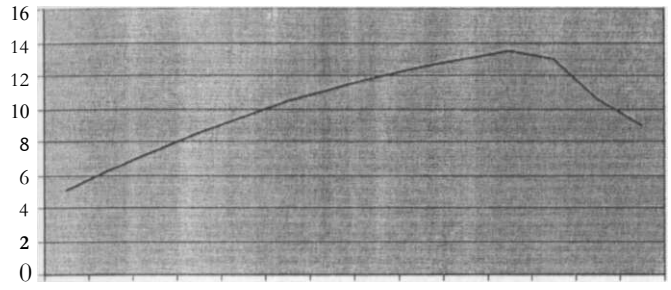
1.1 Background

Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV /AIDS) poses one of the greatest challenges to humanity. It is among the highest killer diseases in the world. It kills young economically productive people, brings **socio**-economic suffering to households and adversely affects economic development. The disease is rampant in most of the countries, especially in sub-Saharan Africa. In the high HIV prevalence countries, a generation of educated civil servants, teachers, health workers, and professionals is being lost at a time when the skills are still in short supply (Bonnel, 2000). It is estimated that 22 million in the world have died of AIDS; 36 million are currendy infected with HIV out of which about 70% live in sub-Saharan Africa (Republic of Kenya, 2001a). In Africa HIV is mainly spread through heterosexual relations.

Since the first case was diagnosed in 1984 in Kenya, the number of new AIDS cases reported every year stood at 12,000 on average since 1990 (Republic of Kenya, 1997). However, the reported cases are just a tip of the iceberg due to underreporting, missed diagnosis and delays in reporting. The real situation is expected to be quite alarming. Since 1984, HIV infection has spread all over the country like wildfire. By 1995, HIV cases reported had reached 63,179. This made the Government to begin taking the disease seriously. In 1997, a Sessional Paper No. 4 of 1997 on AIDS in Kenya was prepared, in 1999 HIV/AIDS was declared a national disaster and National AIDS Control Council (NACC) was established to combat the scourge. This witnessed the country mobilize available resources vigorously to fight the killer disease. The year 2003 saw the new NARC Government form a Cabinet sub-committee on HIV/AIDS to be chaired by the President (Government of Kenya, 2003). The fact that President Mwai Kibaki chairs the Cabinet committee and participates on media advertisements against HIV/AIDS shows serious Government commitment to fight the epidemic.

Trends of HIV prevalence rates in Kenya are shown in Chart 1.1 below. As shown in the Chart, it is clear from the sentinel surveillance data compiled by National AIDS/STDs Control Programme (NASCOP) that HIV prevalence in the country rose from 5.1% in 1990 to peak at 13.4% in 2000 after which it started falling steadily to reach 9.0% in 2003. The drop may be associated with the intensive campaigns against the pandemic by the Government, NGOs and the people of Kenya.

Chart 1.1: HIV Prevalence Rates, 1990-2003



Source: NASCOP

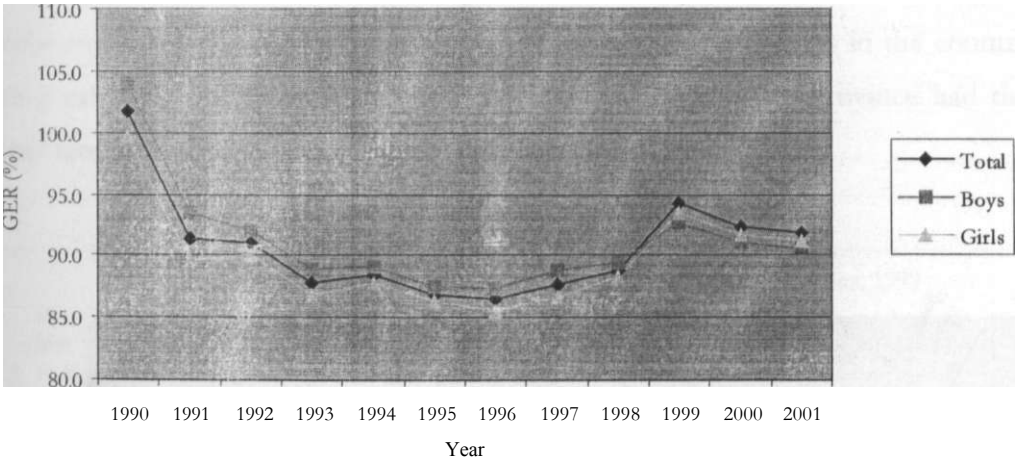
On the economic impact, AIDS kills young adults in their most economic productive life, depriving the economy of qualified and productive labor force, restricting the tax base and raising the demand for social services due to increased orphaned children, widows and health care (Republic of Kenya, 1997). The epidemic affects the demographic composition of population, social and economic structures of the country. It has negative effects on life expectancy, mortality and dependency ratios. In addition, AIDS brings hardships in families due to reduced earnings and increased health care expenditure hence adversely affecting economic development in the country. The disease is clearly a human disaster of unknown full impact, as nowhere has the epidemic run its course (World Bank).

AIDS affects demand and supply of education. It affects demand by reducing pupils' access, participation, retention and completion rates in schools. This is mosdy as a result of death of either one or both parents, which reduces household income

causing school children to either repeat or drop out of school. This is pardy demonstrated by the declining enrolment rates, and high dropout and repetition rates discussed hereafter in this proposal. On the other hand, death due to AIDS deprives the country of professionally qualified teachers adversely affecting supply of quality education.

Analysis of primary school data indicates that school enrolment in absolute terms has been rising. It rose significandy by 17.1% from 5,392,319 in 1990 to 6,314,726 in 2001 (Ministry of Education, Science and Technology-MOEST). In spite of the rising number of pupils enrolled in primary schools, the Gross Enrolment Rate (GER) has declined from 101.8% in 1990, with a GER for boys being 104.0% and girls 99.6% to 91.2%, with boys constituting 91.9% and girls 90.6% as shown in Chart 1.2. The drop in the GER was most pronounced between 1993 and 1998. The marked rise of GER from 88.8% in 1998 to 94.3% in 1999 was due to revision of the Ministry of Education, Science and Technology data.

Chart 1.2: Primary School GER by Sex, 1990-2001

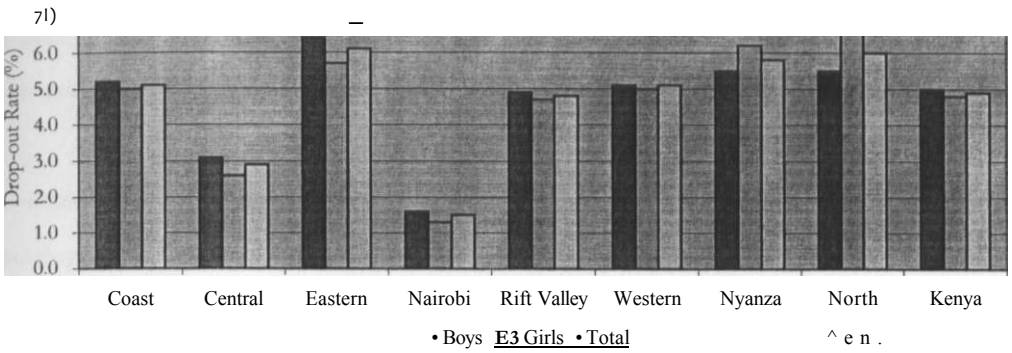


Source: MOEST data

As shown in Chart 1.3, the primary school dropout rate improved marginally from 5.4% in 1993 to 4.9% in 1999 with boys recording 5.0% drop-out rate and girls 4.8%. Regionally, Eastern province registered the highest dropout rate of 6.1% followed closely by North Eastern province with 6.0% (MOEST). Nairobi had the lowest

dropout rate of 1.5% followed by Central province with 2.9%. More boys than girls were reported to be dropping out of school in all the provinces except North Eastern and Nyanza provinces.

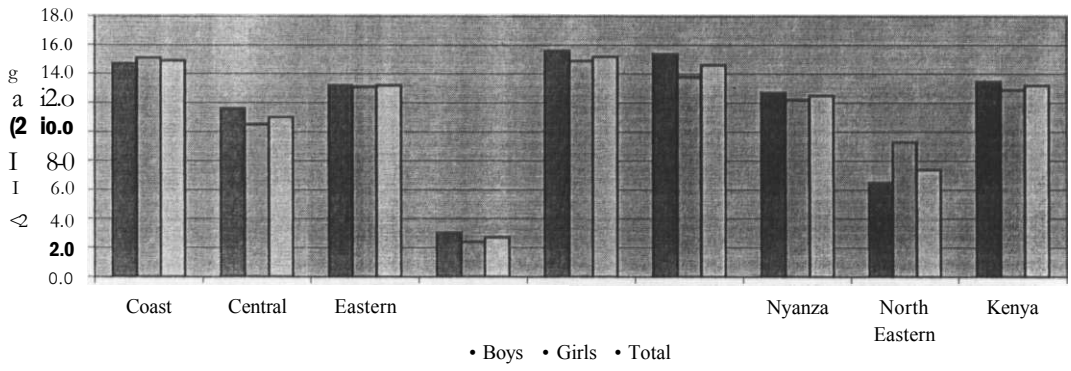
Chart 1.3: Primary School Drop-out Rates by Province and Sex, 1999



Source: MOEST data

Repetition rates improved significandy from 15.4% in 1993 to 13.2% in 1999 as shown in Table 1.4 and Chart 1.4; however, the rates are still unacceptably quite high. Boys recorded the highest repetition rate of 13.5% as opposed to 12.9% for girls. Nairobi and North Eastern provinces had the lowest repetition rates in the country posting values lower than 10%. On the other hand Rift Valley province had the highest rate of repetition with a rate above 15% (MOEST).

Chart 1.4: Primary School Repetition Rates by Province and Sex, 1999



Source: MOEST data

Any factor that has a negative effect on primary schooling is of a major concern since primary education plays a key role in the economy. Primary education has been found to yield higher returns to invest than post primary education. It improves economic productivity in the formal and informal sectors, reduces fertility, infant mortality and improves family health and nutrition, and increases awareness necessary for effective participation in civic affairs and economic development (Republic of Kenya, 1998a). The crucial role of primary education has led to it being declared a human right to which every child is entitled.

HIV infection also is more rampant in females than males. This is mostly due to their physiological differences in genital tracks, which contribute to high vulnerability for females to acquire HIV and other STDs compared to males (UNICEF, 2000). Also, women are at a greater risk of HIV infection than men because of their lower socio-economic status. Tins makes them to be more vulnerable to HIV infection either because they lack bargaining power in sexual relationship or in marriage market (Were and Nafula, 2003). Usually, when demand for education falters, the first casualty to be negatively affected is the girl, especially in rural areas. If there are financial constraints in meeting the cost of education in the family, a boy is likely to be favoured in preference to a girl. This is because culturally girls are considered to be homemakers, hence are most likely to be deprived of educational opportunity. If there is a HIV/AIDS case in the family, the girl child may even be drawn from school to take care of the sick parent. As collaborated by Malaney (2000), studies have shown that HIV infection rate tends to be considerably higher among teenage girls than boys. This is mostly because girls attain puberty at an earlier age compared to boys. This makes them engage m sexual activities earlier and with older men.

1-2 Statement of the Problem

lhe assertion that HIV/AIDS has become the world's most devastating epidemic does not need to be overemphasized. It has become an extremely serious problem and a major development crisis, particularly in developing countries. In Kenya, it is estimated that 2.2 million people are now living with HIV infection while 200,000 have AIDS. About 1.5 million have already died of AIDS since 1984 (Republic of

Kenya 2001a). The HIV/AIDS prevalence rate in 2000 was 13.4%, making Kenya one of the countries with high HIV/AIDS prevalence rates in Africa. It is projected that HIV positive cases will reach 3.3 million in 2010 (Ennew, 2000).

Available data from NASCOP and Central Bureau of Statistics (CBS) indicate that **HIV**/AIDS prevalence has started declining. However, this has not changed the painful effects die scourge is inflicting on the people of Kenya, and especially children and women. HIV/AIDS affects all aspects of social and economic life of the people, including education. According to the Kenya National HIV/AIDS Strategic Plan, 2000-2005 (Republic of Kenya, 2000a), education is affected by HIV/AIDS in three ways:

1. Children are kept out of school if they are needed at home, to care for sick family members or to work in the fields.

2. Children may drop out of school if their families cannot afford school fees due to reduced income as a result of HIV/AIDS death.

3. HIV/AIDS related illness and death reduce supply of experienced teachers, hence affecting delivery of quality education.

In general, HIV/AIDS reduces enrolments in schools as well as trained and experienced teachers. As mentioned by Njeru and Kioko (2004), one of the greatest effects of the HIV/AIDS pandemic on the education sector has to do with the increased rates of morbidity and mortality among teachers. It destroys human capital stock and reduces die incentive to invest in training and schooling (Bonnel, 2000). Since parents play a very key role on the welfare of children, it is expected that high prevalence of HIV/AIDS (especially on parents) will have significant negative impact on primary school children. The purpose of the study is therefore, to establish the impact of HIV/AIDS on primary school enrolment and propose relevant policies necessary to address the problem effecuvely.

1.3 Objectives of the Study

The overall objective of the study is to investigate the existence of any significant relationship between HIV/AIDS prevalence and primary school enrolment. If such a relationship is found to exist, necessary policy proposals will be made to address the situation.

To achieve the overall objective, the study pursues the following specific objectives:

1. To determine the impact of HIV/AIDS prevalence on primary school enrolment.
2. To explore the gender dimension on the effect of HIV/AIDS on primary school enrolment.
3. To explore other relevant policy variables that affect demand for primary education enrolment.

1.4 Justification of the Study

It is common knowledge that HIV/AIDS is a human disaster. It threatens the very existence of humanity and affects every sector of the economy including education. As stated by Mandela (2000), AIDS in Africa is claiming more lives than the sum total of all wars, famines and floods, and ravages of such deadly diseases as Malaria. It is effectively wiping out the development gains of the past decades and sabotaging the future. Worse still, the disease hits hardest among the more-educated and skilled workers hence, threatening to reverse gains already made in developing human capital.

1 lie fight against HIV/AIDS demands a high investment in health. This may call for shifting of resources from productive investments in other sectors including education to health expenditures and health care. A shift of resources from other sectors means that sectors such as education will be inadequately funded hence adversely affecting delivery of quality education to our children as well as making the international goal for achieving Universal Primary Education (UPE) by the year 2015 elusive. Any adverse effect of HIV/AIDS on the education sector is serious. The

reason being that education is a key player in the development of human resource (human capital) in the country. It imparts knowledge and survival skills to people in readiness for effective participation in nation building. Investing in primary education in particular has been found to yield higher social returns in developing countries. UNDP (1999) gives some study results showing social returns of 26% for primary, 17% for secondary and 13% for higher education. It is therefore, critical to ensure that children have access to primary education without any hindrances.

Given this pathetic and worrying trend, there is need to carry out thorough empirical studies to establish the extent to which HIV/AIDS affects education in Kenya. Since the education sector is key to development of human capital necessary for economic development and a major factor in poverty reduction, policies geared towards increased access to primary school, participation and retention of children in school are crucial. The study will therefore, help in informing policy formulation process in order to assist in combating the scourge more effectively in an effort to improve enrolment rate in primary education. This study is motivated by the need to have informed and effective policies, necessary for addressing the HIV/AIDS pandemic.

1.5 Scope and Limitation of the Study

The study focuses on the entire country since it mostly uses Kenya Demographic and Health Survey (KDHS), **2003** data collected by CBS. The survey was carried out using CBS sampling frame, which has representative clusters in all the districts in Kenya. It covered 8,561 households and a total number of 8,226 respondents were tested of HIV/AIDS. The data is expected to have the usual errors caused due to sampling, questionnaire administration and editing among others. However, the data was thoroughly cleaned by CBS to improve quality and reliability.

Another limitation of the data may occur due to the fact that when collecting the HIV/AIDS data by actual medical tests as was done by CBS, people are tested of the presence of HIV virus. If an individual tests HIV positive, it does not always imply that the person has AIDS. The person may just be having the HIV virus in its initial Plages before he/she gets full blown AIDS. The two terms aie significantly different.

One can live with HIV without necessarily getting AIDS. But if an individual has AIDS he/she must test positive for HIV virus. Availability of data on AIDS status would give better results of such a study. In general HIV/AIDS data is difficult to collect since most people are reluctant to take HIV test and even if they are tested, they prefer to conceal their HIV status.

Availability of a more recent household expenditure data will be one of the weaknesses of the research. The most recent information is contained in the Welfare Monitoring Survey (WMS), 1997, which appears to be rather outdated. However, due to lack of any more current information on the same, the study will have to depend 011 the same survey data, but adjusted for the 2003 prices using the revised Consumer Price Index (CPI) computed by CBS. The CPI is made up of about 40% of Nairobi index and 60% of the rest of urban towns in Kenya (Republic of Kenya, 2004).

CHAPTER 2: LITERATURE REVIEW

2.1 Theoretical Literature

Most of the researchers such as Bennell et al. **(2002);** Ennew **(2000);** Republic of Kenya (1997) support that HIV/AIDS affects demand and supply of education **services.** In their unpublished report, Bennell et al. **(2002)** argue that, the epidemic **reduces** demand for schooling in three ways:

1 Smaller students' intake: lower fertility levels would lead to smaller than expected cohort of the six year olds. Also affected families will have fewer resources for education.

2 Impact on students: as the number of orphans, caregivers and children with AIDS related illnesses increase, the education of these children is likely to deteriorate. This could impact negatively on intake, repetition and dropout rates.

3. Level of poverty: parents and guardians would be poorer because of the macro-economic impact of the scourge.

I he supply could be affected by changes in teacher requirement and productivity. The number of teachers who die of AIDS is expected to increase rapidly hence, reducing the teaching force significantly. In addition, absenteeism and morbidity among teachers would result in reduction of teacher-hours available hence compromising the quality of education.

Besides the HIV/AIDS pandemic, which has devastating effects on the education sector other factors that have adversely affected the demand for education as discussed by MOEST (2001) are:

1 • Poor economic growth and increased poverty which result in non-enrolment of school-age children, especially girls; pulling out those in school to supplement

household income; not investing in school materials, not participating actively in school affairs; marrying off girls when still young and supporting child labour.

2. Increased cost of education that lead to decline in access and enrolment to basic education, increased dropouts and repetition, inadequate and lack of teaching-learning resources, poor quality of education offered and limited investment.

3. Inappropriate policy frameworks resulting in major issues of concern including laws and regulations, which do not actively address equity issues in education; overloaded, inappropriate and gender insensitive curricula; centralization of education management; inadequate transparency and accountability within the education sector; political interference; and non-involvement of all stakeholders in policy formulation and the management of education.

4. Insecurity and social strife such as catde rustling and banditry, and tribal clashes.

A research carried out by UNICEF (2002) found that teachers, teaching AIDS 1 xlucation are not fully equipped and were unable to respond to key questions posed by pupils hence, the need for capacity building. The findings of the study also intimated that boys and girls are faced with serious challenges in their development. This is evident from the increasing number of children becoming sexually active at early ages, teenage pregnancies, school dropouts and drug abusers among others. This requires equipping the children with knowledge and life skills including communication and negotiation skills, value analysis, decision-making skills, resisting peer pressure and behaviour change among other things. This will enable them to successfully meet the challenges of growing up and help reduce the risks associated with STDs and HIV/AIDS.

2-2 Empirical Literature

Detailed analysis of the impact of HIV/AIDS on education is hampered by lack of reliable data and quantitative empirical studies. However, available information indicates that IIIV/AIDS prevalence rates are falling. The intensive sensitization

campaigns against the scourge appear to have borne fruits. The HIV sero-prevalence **indicated** by antenatal sero-surveillance data from NASCOP and reported in the Economic Survey, 2003 shows that HIV prevalence has declined from a high 13.4% **in 2000** to 13.0% in 2001 and 10.2% in 2002 (Republic of Kenya, 2003a). A more **recent** study (KDHS) carried out by CBS in 2003 indicates that HIV/AIDS **prevalence** rate stand at 6.7% with prevalence for women being 8.7% and 4.5% for men (Republic of Kenya, 2003c).

In modeling the impact of HIV/AIDS on the education sector, Malaney (2000) used an input-output model to estimate the impact of the disease on enrolment and teacher attrition. The model was a slight modification of the version developed by Al-Samarrai (1997). The estimation process begins by modeling the demographic impacts of the AIDS epidemic. This was done through the use of readily available software known as SPECTRUM System of Policy Models prepared by the Future Group International in collaboration with Family Health International.

1'he AIDS projection requires demographic projection using demographic data. The AIDS projection module, AIM, can then be used to calculate the impact of the disease, but it requires an estimate of future levels of HIV prevalence. DemProj (Demographic Projection) and AIM together allow for calculation of age-specific populations with and without AIDS to assess the burden of the epidemic. They also calculate die number of orphans, the age-specific mortality, life expectancy and other demographic variables tha: are affected by AIDS. The demographic data can then be used to calculate the flow of students and teachers based on two scenarios: in the absence or presence of HIV/AIDS. Based on the above modeling, a case study for Namibia found out that the total projected enrolment rates would decline to 86.4% in 2005 and 85% in 2010 from the overall average of 87%. In the case of teachers, it was found that with-AIDS scenario the shortfall of teachers will be 7,161 by 2010.

Bonnel (2000) used a simple semi-log regression model to study the key determinants of HIV/AIDS. The suggestion that the spread of HIV epidemic is related to various economic, sociological and cultural characteristics was explored through a cross-

country regression of HIV prevalence rate for 60 developing countries. The results reveal that secondary school enrolment rate has a weak negative relation with the spread of HIV. Although the coefficient is not statistically significant, it shows that education is likely to reduce the spread of HIV/AIDS pandemic in developing countries.

A study done by Bedi et al (2002) on the decline of primary school enrolment in Kenya estimated a probit enrolment model where the probability of attending school was expressed as: Pr[a=l]=Pr[/?,Z> - fi_2p + e_a > 0], with a representing a dichotomous variable, b denoting the benefits associated with attending school, p being the total cost associated with attending school, /?(being the coefficients to be estimated and $\pounds_a$ representing a composite error term assumed to be normally distributed. The above probit equation was adjusted and re-written as: l)r|a=l]=h'[x$_{s./r}$5F + $y_X X + y_{,,}H + y_{s/}SI$] where F represents the standard normal cumulative distribution function, SF denotes school fees, X is a vector of child and family characteristics that influence the opportunity cost of enrolment, H is a measure of expected human capital gains, SI is a vector of school inputs and y_t are the coefficients to be estimated.

To determine the effect of HIV prevalence on enrolment, they included HIV prevalence rates in the model as an additional regressor. Since the HIV data used was for urban areas, they decided to estimate an enrolment specification based only on the sample residing in urban areas. The results of the estimation showed a strong and clear negative effect of HIV/AIDS prevalence on enrolment in urban areas. The estimate indicated that a 10% increase in HIV prevalence results to a 2% reduction in enrolment.

As mentioned by Kelly (2000), HIV/AIDS affects the demand for education because there will be fewer children: to educate, wanting to be educated, able to afford education and able to complete their schooling.

He presents population projection on a few selected countries to show the impact of HIV/AIDS on population and by extension, the demographic impact on the number of **school**-age children. At the macro level, AIDS will have the long-term effect of population being significandy smaller than they would have been in the absence of AIDS as shown in Table 2.2. This will result in the number of pupils of school-age being smaller than it would otherwise have been.

Table 2.1: Projected Demographic Impact of HIV/AIDS in Selected Countries, 2010

Country	Population (Millions)			Percentage Loss to AIDS	Life Expectancy (Years)
	Without AIDS	With AIDS	Loss to AIDS		
Botswana	2.1	1.6	0.5	23.8	33.4
DRC	74.6	69.3	5.3	7.1	51.3
Cote d' I voire	23.5	20.3	3.2	13.6	44.8
Ediiopia	87.0	81.2	5.8	6.7	51.3
Kenya	39.1	33.9	5.2	13.3	43.2
Malawi	14.1	10.7	3.4	24.1	29.5
South Africa	53.6	49.2	4.4	8.2	47.8
Tanzania	43.9	36.1	7.8	17.8	36.5
Uganda	32.7	26.4	6.3	19.3	35.2
Zambia	15.7	11.5	4.2	26.8	30.3
Zimbabwe	16.4	11.9	4.5	27.4	33.1

Source: Kelly (2000)

Carr-Hill et al. (2003) summarized the impact of AIDS in Kenya using NASCOP, 1999 data as follows:

The impact of AIDS deaths would result in 3.6 million fewer people by 2005 and the cost of health care is prohibitive and is estimated to be US$ 10,000 to 20,000 per year per patient, apart from other treatment associated with AIDS. The number of orphans was estimated to be 860,000 by 2000 and 1.5 million by the year 2005.

AIDS patients occupied more than 30% of hospital beds by 1995. In severe affected areas like Busia and Kisumu, the hospital bed occupancy rate is high as 70%. It was estimated that by the year 2000 about 50% of all hospital beds would be required for AIDS patients.

About 30-40% of babies born to infected mothers will be infected with HIV and majority will develop AIDS and ultimately die before their third birthday. It is estimated that child deaths because of measles and malaria are expected to range between 5,000 and 10,000 by the year 2005. In the case of child deaths due to AIDS in the same period, the number will be 40,000 to 50,000.

Infant mortality during the first year of life per 1,000 live births: because of AIDS, it will amount to 55-60 instead of 45-50 if there was no AIDS. The mortality rate for children dying before their fifth birthday per 1,000 live births may rise from the current figure of 112 to 120-125, instead of a decline to 70 if there was no AIDS.

2.3 Overview of the Literature

As mentioned earlier, one of the problems of carrying out a study on HIV/AIDS is lack of accurate data and economic oriented empirical work. Most of the empirical literature is qualitative with no strong scientific and statistical methodological approach. The study carried out by UNICEF (2002) and Hyde et al (2002) gathered most of the information through focused group discussions, hence their usefulness, especially in modeling is limited.

Malaney (2000) concentrated his HIV impact study through using demographic projection software and input-output analysis to project school enrolment in the absence and presence of HIV/AIDS. The study already assumes HIV prevalence affects enrolment significandy, which may or may not be the case. There is need to test the assumption, after which enrolments are projected based on the two scenarios (with AIDS and without AIDS).

I he study by Bonne! (2000) is very enriching as he applied semi-log regression model for estimation. However, the study focused on the key determinant of HIV where school enrolment was part of the explanatory variables. Bedi et al. (2002) researched on the factors contributing to the declining primary enrolment in Kenya. They included HIV prevalence rates in their model to determine its effect. They estimated a ptobit enrolment model. This study is quite close to the proposed one, but it is

limited to urban areas since the HIV/AIDS prevalence data was mainly urban based. **However,** it is going to be a key reference material for the proposed study.

The proposed study differs from others and particularly the one done by Bedi et al. (2002) on the coverage, modeling approach and the variables included in the model. While Bedi et al. (2002) estimated a discrete choice model, the proposed study is going to use continuous consumer choice model. The study will also utilize the latest HIV data from the KDHS, 2003 which has a wider coverage (both rural and urban areas) and more accurate than the sero-surveillance data compiled by NASCOP. The results of the proposed study are likely to be more credible than any other findings from other studies done in the country.

CHAPTER 3: METHODOLOGY

3.1 The Model

The most appropriate economic model to analyze the problem is based on consumer choice theory where the consumer maximizes utility on primary school enrolment subject to a budget constraint. The consumer's utility function can be expressed as:

$$U = U(E,C) \quad \ldots\ldots 1$$

Where E is quantity of primary education (enrolment) and C is quantity for other substitute commodities, which are held constant. To maximize utility for primary education subject to budget constraint, we may write the following expression as:

Maximize $U = U(E,C)$, subject to: $P_E E + P_C C = Y$. $\ldots\ldots 2$

Solving equation 2, we get demand function for primary education. The demand function for primary school enrolment will be a function of price for primary education (P_E) and prices for other goods (P_c)> particularly substitutes and complements, and income (Y) as shown by equation 3 below:

$$Q_e = A(P_E, P_C J), \quad \ldots\ldots 3$$

Since the study is supposed to investigate the impact of HIV/AIDS on primary school enrolment, the HIV/AIDS and other variables, which affect the demand for enrolment in primary education will be included in equation 3. In addition prices for alternatives goods will be dropped since the study is not concerned about the cross prices effects. The demand function in general form will therefore be re-written as:

$$QE = f(P_E, H_P, Y, Q), \quad \ldots\ldots 4$$

Where P_E, H_p, Y, and Qare price for primary education, population infected with **HIV/AIDS**. household income and other factors that affect demand for enrolment in

primary school respectively. In this case, we assume a Cobb Douglas (CD) demand function expressed as shown by equation 5 below:

$$Q_E = A\ H\ \$\ Y^{h}\ P\ £\ £\ W \quad \ldots\ldots 5$$

The equation to be estimated is a double log regression model as specified in the following equation 6 in its general form. This is obtained after applying logs on both sides of equation 5.

$$lnQ_E = a + /?,\ h\backslash H_p + \quad \text{In } Y + fa\ \backslash nP_E + /?_4 \ln Q + // \quad \ldots\ldots 6$$

where a *and ftsMc* regression parameters (coefficients), */u* is a disturbance term and other variables are as previously specified.

Specifically, the empirical model to estimate in this study is as specified by equation 7 below. To capture the gender component in the analysis, the following equation 8 is estimated.

$$'^{n}\ P\_enrol = a + /?,\ \text{In } hiv + (5_2\ \text{In } p \quad unit \cos t + /?_3\ \text{In } nonpoor + /?_4\ \text{In } schage\_pop + ju \quad 7$$

$$\text{In } p\_enrol = S + </>_{l}\backslash n/iiv\_fp + </>_{2}\backslash np\ unit \cos / + \text{fa In } nonpoor + (f>_{A}\ \text{In } schage\_pop + e \quad 8$$

where *a, 8, fts and (/)s* are the coefficients to be estimated while *[lands* are the error terms. Detailed descriptions of the variables being estimated are as follows:

Dependent Variable-. lnp_enrol represents the log of primary school enrolment.

Explanatory Variables

lnluv: is the log of population with HIV/AIDS, expected to have a negative effect of primary school enrolment.

lnhiv_fp: is the log of female .proporuon with HIV/AIDS, expected to have a negative effect on primary school enrolment.

lnp_unitcost: is the log of primary school unit-cost, which is expected to impact negatively on primary school enrolment.

lnnonpoor: is the log of non-poor population (a proxy of household income derived from household assets index), expected to have a positive relationship with primary school enrolment.

lnschage_pop: is die log of school going age population (age group 6-13 years), which is supposed to affect primary school enrolment positively.

It is possible that HIV/AIDS explanatory variable may be highly correlated with the disturbance term hence, resulting in a likely encounter of an endogeneity problem. Bonnel (2000) found that secondary school enrolment was a weak determinant of HIV/AIDS. In this case, HIV/AIDS may be endogenous. To cater for this problem, a Durbin-Wu-Hausman Specification test is carried to test for the exogeneity of HIV/AIDS variable. If the test is negative, then an Instrumental Variables (IV)/2-Stage Least Square (2 SLS) method will be applied to estimate the specified double log regression model.

The double log regression model has been selected for estimation largely because it is simple to apply and easy to interpretation. As mentioned by Johnston and DiNardo (1997) and Maddala (2002) the log-log transformations frequently appear in applied work, mosdy because of their simplicity and ease of interpretation, since slopes in the models are direct estimates of elasticities. In addition, log-linear form is often used in models of demand and production (Greene, 1997).

3.2 Data Types and Sources

The study utiles cross sectional secondary data mostly obtained from the Kenya Demographic and Health Survey (KDHS) of 2003, the Welfare Monitoring Survey (WMS) of 1997 and the 1999 Population and Housing Census conducted by CBS. It gready benefits from the most recent and comprehensive data on HIV/AIDS obtained from the KDHS, 2003. The survey captured information on HIV/AIDS from the entire country including actual tests on sampled respondents to establish their HIV status.

The CBS has about 1,800 enumeration areas spread all over the country known as clusters. It is within these clusters that CBS draws household samples for carrying out national sample surveys. The study of HIV/AIDS prevalence in the KDHS of 2003 utilized 400 clusters selected at random and was representative of the entire country. Clusters are therefore, used as the units of analysis in this study.

3.3 Hypothesis Testing

The study attempts to address the following hypothetical research questions:

1. Is there a significant impact of HIV/AIDS prevalence on primary school enrolment?
2. Does gender play any role on the effects of HIV/AIDS on primary education enrolment?
3. Are there any other variables that have significant effect on primary school enrolment?

After fitting the data on the above-described model, hypothesis tests are to be carried out to assess the significance of the variables in question so as to get answers for the research questions. In order to carry out the tests of significance on the estimated coefficients (/?,), the null and alternative hypotheses (*H_0 and H_1 respectively*) were set as follows:

1. *H_0 :/3J=0=>* There is no significant impact of HIV/AIDS prevalence on primary school enrolment, against and an alternative hypothesis $//_s$: /?, * 0 there is a significant impact of HIV/AIDS prevalence on primary school enrolment.

2. H_0 '• ft, = 0 => The gender component has no significant effect on the relation between HIV/AIDS prevalence and primary school enrolment, against and an alternative hypothesis //,:/?, ^ 0 => the gender component has a significant effect on the relation between HIV/AIDS prevalence and primary school enrolment.

The t-values helped evaluating whether to accept or reject the null hypothesis. Rejecting null hypothesis implies that the coefficient in question is significandy different from zero hence statistically significant and vice versa.

CHAPTER 4: RESULTS AND DISCUSSIONS

4.1 Descriptive Statistical Analysis

Provisional data from the Kenya Demographic and Health Survey (KDHS) of 2003 conducted by CBS reveals that the Net Enrolment Rate (NER) in primary education stands at 86.3% as shown in Table 4.1. This means that out of all the primary school going age children, 86.3% are enrolled in primary schools in the country and about 13.7% are out of school. Regionally, Central province has highest enrolment rate of 97.6% followed by Nyanza province with a rate of 96.7%. North Eastern province records the lowest enrolment rate of 39.8%.

Gender disparity with respect to primary school enrolment is generally not a serious problem. At the national level, enrolment rate for boys is higher (87.4%) than that of girls (85.1%) by 2.3 percentage points. At the regional level, most of the provinces except North Eastern province have nearly achieved gender parity. In North Eastern province, enrolment rate for boys stands at 48.5% compared to 29.4% rate for girls giving a remarkable gender gap of 19.1 percentage points. The low enrolment rate in North Eastern province and especially the wide gender gap is an area of major concern. The low enrolment of 39.8% in the province is quite glaring as it implies that 60.2% of children in the province who are eligible to be in primary school are not enrolled, with majority of them being girls.

Table 4.1: Primary School Enrolment Rate by Sex and Region

	Boys		Girls		Total	
Region	**No.** Enrolled	NER (%)	No. Enrolled	NER (%)	No. Enrolled	NER (%)
Nairobi	242	92.7	249	90.5	491	91.6
Central	595	97.9	585	97.3	1,180	97.6
Coast	445	87.1	392	85.8	837	86.5
Eastern	522	94.2	513	94.3	1,035	94.3
Nyanza	540	96.8	522	96.7	1,062	96.7
Rift Valley	691	83.0	661	80.3	1,352	81.6
Western	553	96.8	480	95.0	1,033	96.0
North Eastern	226	.48.5	113	29.4	339	39.8
Total	3,814	87.4	3,515	85.1	7,329	. 86.3

Source: KDHS 2003

Provisional data for HIV/AIDS prevalence by sex and region is shown in Table 4.2. The Table reveals that the HIV/AIDS prevalence in the country stands at about 7.0% with the prevalence for males being 7.2% and 6.9% for females. Coast province leads by recording the highest prevalence rate of 8.5% followed closely by Nyanza province with 8.0% prevalence rate. Central province has the lowest prevalence of 5.5%. The gender gap is less than 1 percentage point in most of the provinces except for Nyanza, Rift Valley and Coast provinces. In Nyanza province exhibits a wide gender gap of 3.3 percentage points with males being affected more than females while Rift Valley and Coast provinces registers gender differential of 2.1 and 1.1 percentage points respectively, where in both cases females are affected more than males.

Table 4.2: **HIV/AIDS Prevalence** by **Sex and Region**

Region	Male		Female		Total	
	Number HIV+	HIV Prevalence	Number HIV+	HIV Prevalence	Number HIV+	HIV Prevalence
Nairobi	24	7.1	53	6.4	77	6.6
Central	26	5.9	53	5.4	79	5.5
Coast	21	7.7	59	8.8	80	8.5
Eastern	21	6.5	45	6.5	66	6.5
Nyanza	33	10.3	49	7.0	82	8.0
Rift Valley	22	5.6	70	7.7	92	7.0
Western	24	7.8	51	7.2	75	7.4
North Eastern	9	8.0	22	7.7	31	7.8
Total	180	7.2	402	6.9	582	7.0

Source: KDHS 2003

More descriptive statistics for the variables utilized in the study are presented in Table 4.3 in their level form. The total observations are 400 in number, which equals to the number of clusters included in the KDHS sample. The mean (average) primary school enrolment per cluster is estimated at 19.3 while that of population with HIV/AIDS is 2.5. Their standard deviations stand at 9.0 and 1.6 respectively. The standard deviations, which measures variables dispersion from the mean are fairly small hence, an indication of data reliability. The unit cost for primary education and healthcare expenditure variables whose cluster means records 2845.7 and 497.6, have

high standard deviations of 3706.1 and 483.9 respectively. Descriptive statistics of the variables in log form are shown in Appendix 5.

Table 4.3: Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Primary school enrolment	400	19.3	9.0	1	45
School age population	400	21.3	10.7	1	57
Population with HIV/AIDS	400	2.5	1.6	1	11
Female proportion with HIV/AIDS	400	45.1	46.0	1	101
Primary school unit-cost	400	2845.7	3706.1	402.7	12194.3
Non-poor population	400	59.7	32.5	1	152
Days away from home	400	4.3	3.8	1	29
Healthcare expenditure	400	497.6	483.9	24.5	1780.2
Under-five mortality rate	400	114.5	48.3	53	254

4.2 Regression Analysis

4.2.1 The Effect of HIV/AIDS on Primary School Enrolment

The estimation results of the double log regression model are reported in Table 4.4. Column (1) gives Ordinary Least Squares (OLS) reduced model estimates where the log of population with HIV/AIDS is treated as dependent variable and other variables as exogenous including the Instrumental Variables (IV) namely: log of healthcare expenditure, log of healthcare expenditure squared, log of under-five mortality rate and log of under-five mortality rate squared; but excluding log of primary school enrolment.

Column (2) also presents OLS reduced model estimates with log of primary enrolment taken as dependent variable. All other variables are taken as explanatory variables except for log of population with HIV/AIDS, which is treated as potentially endogenous and excluded from the model. Column (3) shows OLS structural regression results with log of primary school enrolment remaining as dependent variable, while others including log of population with HIV/AIDS are treated as exogenous variables, but excluding instrumental variables. Column (4) reports the log of primary school enrolment equation estimated using the IV (2SLS) method with log of population with HIV/AIDS taken as endogenous. Finally, column (5) reports the

same estimates as column (4) but includes the residuals from prediction equation for the log of population with HIV/AIDS, which provides the basis for performing the Durbin-Wu-Hausman (1987) specification test for exogeneity of log of population with HIV/AIDS variable (Schultz and Mwabu, 2003).

The Durbin-Wu-Hausman specification test results reported in column (5) indicates that log of population with HIV/AIDS is rejected as an exogenous variable since the coefficient for residuals of the prediction equation of log of population with HIV/AIDS is significant at 5% level of significance (p-value=0.017) with t-statistic of 2.40. This implies that the variable log of population with HIV/AIDS is endogenous hence, the OLS estimates reported in column (3) are biased. The IV (2SLS) estimates reported in column (4) or (5) are therefore, the preferred estimates in this study.

Estimates in column (5) confirm the intuitive expectation of the negative effect of HIV/AIDS on primary school enrolment. The effect is found to be significant at 10% level of significance (p-value=0.087) with t-statistic of -1.72. The results reveal that a 1% increase in the number of HIV/AIDS cases reduces enrolment in primary schools by 0.29%. In other words, a 10% rise in HIV/AIDS infection results in a 2.9% decline in primary school enrolment. This closely agrees with the findings of Bedi et al. (2002) who found that a 10% increase in HIV prevalence is associated with a 2% reduction in enrolment.

Other variables that affect enrolment significantly are unit cost of primary education, number of non-poor population and the school going age population as shown in column (4) and (5) of Table 4.4. According to the results, a 10% increase in cost of primary education per pupil reduces enrolment by 1%. On the other hand, a 10% rise in the number of the non-poor population and the number of children of the school going age would result in a 2.5% and 7.9% rise in primary school enrolment respectively. All these variables are significant at 1% level of significance. An increase in the number of school age children obviously has more positive impact on enrolment compared to a rise in the wealth index of the community. Conversely, an

increase in HIV/AIDS has a more severe effect on enrolment compared to the rise in the cost of primary education.

It is worth noting that about 60.9% of the variations in primary school enrolment are explained by the independent variables in the model as indicated by the R-squared. The R-squared is fairly high given that the data utilized in this study is cross sectional; hence the model has high explanatory power. In addition, the variable parameters are jointly significant (p-value=0.000) with F-statistic of 349.63.

The equation for estimating the log of population with HIV/AIDS reported in column (1) shows that only two HIV/AIDS identifying variables (instrumental variables): log of under-five mortality rate and log of under-five mortality rate squared are individually statistically significant. Log of healthcare expenditure and log of healthcare expenditure squared are not individually significant in the reduced model, though they demonstrate the expected signs. An increase in healthcare expenditure is expected to reduce HIV/AIDS prevalence, which is confirmed by the model. After subjecting the identifying variables to the test of multiple linear restrictions to check whether they are useful or they should be excluded from the model, the variable parameters are found to be jointly significant (p-value=0.0635) with F-statistic of **2.25.** The instruments therefore, qualify to be included in the estimation for HIV/AIDS.

The positive relationship between log of the under-five mortality rate and log of the population with HIV/AIDS may be mostly explained by the fact that an increases in child mortality motivates parents to give birth to more children (seeking to replace the dead or in anticipation that some might die) leading to increased probability of getting infected with HIV/AIDS. The OLS results indicate that a 1% increase in the under-five mortality rate is associated with about 3% rise in HIV/AIDS infection and the variable parameter is significant at 10% level of significance. It is clear from the analysis that the under-five mortality rate has a strong positive effect on the determination of the spread of IIlV/AIDS hence should be treaded as key policy variable. Another variable reported to have a positive effect on HIV/AIDS is the

school age population. The variable appears to be a factor in increasing HIV/AIDS prevalence probably because as the school going age population increases, the probability of having children mosdy born with HIV virus increases resulting in high cases of HIV/AIDS infection.

Table 4.4: Estimate of the Effect of HIV/AIDS on Primary School Enrolment

Dependent Variable	(1) Log of hiv/Aids*	(2) I	(3) Log of primary school enrolment	(4)	(5)
Estimation Method	**OLS Reduced Form**	**OLS Reduced Form**	**OLS Structural Form**	**IV (2SLS) Structural Form**	**IV (2SLS) Hausman Specification Test Form**
Potentially Endogenous Explanatory Variable					
Log of population with HIV/AIDS			**-0.2013 (-1.19)**	**-0.2905 (-1.72)**	**-0.2905 (-2.35)**
Exogenous Explanatory **I** *'ariable*					
Log of primary school unit-cost	**0.0215 (0.46) ,**	**-0.0807 (-2.66)**	**-0.1183 (-5.07)**	**-0.1059 (-4-18)**	**-0.1059 (-4.71)**
Log of non-poor population	**0.0495 ' (1.59)**	**0.2354 (5.54)**	**0.2469 (5.68)**	**0.2530 (5.76)**	**0.2530 (5.87)**
Log of school age population	**0.1889 (3.41)**	**0.7387 (18.15)**	**0.6838 (8.91)**	**0.7900 (16.27)**	**0.7900 (19.53)**
Interaction of log of HIV/AIDS and log of school age population			**0.0769 (1.24)**		
Log of healthcare expenditure	**-0.0476 (-0.14)**	**-0.1124 (-0.62)**		**...**	
Log of healthcare expenditure squared	**0.0070 (0.24)**	**0.0067 (0.42)**		**...**	
Log of under-five mortality rate	**2.9537 (1-77)**	**-2.1234 (-3.52)**			**...**
Log of under-five mortality rate squared	**-0.2924 (-1.66)**	**0.2259 (3.58)**			
Constant	**-7.5226 (-1.91)**	**5.7522 (3.64)**	**0.7484 (2.54)**	**0.5517 (2.32)**	**0.5517 (2.65)**
R-Squarcd	**0.043**	**0.708**	**0.704**	**0.609**	**0.704**
F-Statistic (p - value)	**2.77 (0.008)**	**379.39 (0.000)**	**565.20 (0.000)**	**349.63 (0.000)**	**543.77 (0.000)**
Durbin-Wu-Hausman Testfor Exogeneity of log ofpopulation with HIV/AIDS					
Log of population with I IIV/AIDS Residuals					**0.3223 (2.40)**
Sample Size (Clusters)	**400**	**400**	**400**	**400**	**400**

Note: Numbers in parenthesis are absolute values of robust t - statistics
** I j)g of hiv/Aids stands for Log ofpopulation with HIV/AIDS*

An examination of the reduced form equation for estimating primary school enrolment shown in column (2) confirms the expected high correlation between the

dependent variable and the following explanatory variable: primary school unit-cost (per pupil cost of primary education), household income (proxied by non-poor populadon derived from the assets index) and the school going age population. All the explanatory variables including the under-five child mortality are individually statistically significant at 1% level of significance and exhibit the expected signs, consistent with theory, except the healthcare expenditure variable. From the results, a 1% rise in the under-five mortality rate leads to a 2.1% reduction of primary school enrolment. The death of a child reduces the number children expected to enroll in school at one time or another, which eventually reduces enrolment.

4.2.2 The Gender Dimension of HIV/AIDS on Primary School Enrolment

Estimation of the gender effects of HIV/AIDS on enrolment involves replacing the log of population with HIV/AIDS variable by die female proportion with HIV/AIDS variable in the model and performing the same estimations and tests as previously described in Table 4.4. The estimated results are presented in Table 4.5 and the descriptions of the columns are the same as in Table 4.4. However, the instruments used for estimating the log of female proportion with HIV/AIDS vary slighdy. Healthcare expenditure instrument has been replaced with the days away from home (the mean number of days an individual is away from home in the last one year) instrument. Frequent field trips, touring places and working away from home among other things is associated with increased probability of getting HIV infection.

According to the Durbin-Wu-Hausman specification test reported in column (5), log of female proportion with HIV/AIDS cannot be rejected as an exogenous variable. Therefore, the 2SLS results are biased hence, the preferred results are the OLS structural model estimates reported in column (3) in Table 4.5. The OLS estimates reveal that, although the proportion of female population infected of HIV/AIDS coefficient has the expected negative sign, it is not significandy different from zero. Therefore, the hypothesis that the gender perspective of HIV/AIDS infection has no effect on enrolment cannot be rejected. The study therefore, concludes that the

decline of primary school enrolment due to a rise in the proportion of female population with HIV/AIDS, though expected is not supported by empirical evidence.

Table 4.5: The Gender Effect of HIV/AIDS on Primary School Enrolment

Dependent Variable	(1)	(2)	(3)	(4)	(5)
	Female with hiv/Aids*	Log of primary school enrolment			
Estimation Method	**OLS Reduced Form**	**OLS Reduced Form**	**OLS Structural Form**	**IV (2SLS) Structural Form**	**IV (2SLS) Hausman Specification Test Form**
Potentially Endogenous Explanatory Variable					
Log of female proportion with HIV/AIDS			**-0.0066 (-0.15)**	**-0.0485 (-M1)**	**-0.0485 (-1.25)**
Exogenous Explanatory **I** *ciriable*					
Log of primary school unit-cost	**0.0873 (0.60)**	**-0.0958 (-4.36)**	**-0.1161 (-5.13)**	**-0.1120 (-5.01)**	**-0.1120 (-5.12)**
Log of non-poor population	**0.0555 (0.47)**	**0.2376 (5.39)**	**0.2461 (5.72)**	**0.2446 (5.75)**	**0.2446 (5.66)**
Log of school age population	**0.6548 (3.34)**	**0.7436 (17.10)**	**0.7356 (13.00)**	**0.7650 (19.34)**	**0.7650 (20.58)**
Interaction log female population with hiv/Aids and log school age population			**0.0023 (0.14)**		
Log of days away from home	**-0.7278 (-1.48)**	**0.0291 (0.33)**			**…**
Log of days away from home squared	**0.3441 (1.96)**	**-0.0126 (-0.46)**			**…**
Log of under-five mortality rate	**9.7543 (1.48)**	**-2.3514 (-3.99)**		**…**	**…**
Log of under-five mortality rate squared	**-0.9738 (-1.41)**	**0.2508 (4.03)**			**…**
Constant	**-24.4682 (-1.58)**	**5.9297 (4.11)**	**0.6041 (2.47)**	**0.6051 (2.70)**	**0.6051 (2.79)**
R-Squared	**0.039**	**0.706**	**0.702**	**0.672**	**0.702**
F-Statistic (p - value)	**2.54 (0.014)**	**416.33 (0.000)**	**501.08 (0.000)**	**510.86 (0.000)**	**541.63 (0.000)**
Durbin-Wu-Hausman Test for Exogeneity of log offemale proportion with HIV/AIDS					
Log of Female proportion with HIV/AIDS residuals					**0.0496 (1.19)**
Sample Size (Clusters)	**400**	**400**	**400**	**400**	**400**

Note: Numbers in parenthesis are absolute values of robust t - statistics
** Female with hiv/ Aids stands for Log of female proportion with HIV/AIDS*

The regression results of the other explanatory variables namely: unit cost, non-poor population and school age population give nearly the same coefficients as reported in Table 4.5 and are statistically significant at 1% level of significance. It is clear from

column (3) that a 10% increase in primary school unit-cost will reduce enrolment by 1.2%. On the contrary, a 10% increase in non-poor population and school going age population is associated with a 2.5% and 7.4% rise in primary school enrolment. The coefficient of the interaction variable between log of female proportion with HIV/AIDS and log of school age population, though positive is not statistically different from zero.

The OLS results reported in column (1) is against the expectation that being away from home increases the chances of contracting HIV/AIDS, as it has taken a negative sign though not statistically significant. However, the square of the variable takes a positive sign and it is significant at 10% level of significance. The results from the reduced form equation for estimating primary school enrolment shown in column (2) does not differ significandy from those reported in same column by Table 4.4.

CHAPTER 5: CONCLUSIONS, POLICY RECOMMENDATIONS AND AREAS OF FURTHER RESEARCH

5.1 Conclusions

The main objective of the study was to investigate the existence of any significant relationship between HIV/AIDS and enrolment in primary education. Further, it intended to examine whether gender dimension on HIV/AIDS infection has any effect on primary school enrolment. Other determinants of primary school enrolment were to be examined as well, in the process of pursuing the main objective.

From the study findings, it has been established that HIV/AIDS infection does affect primary school enrolment significandy (i.e. at 10% level of significance). Perhaps the level of significance could not improve to at least 5% since quite a number of the infected people are still actively involved in their daily operations and are able to fend for their families. All the same the findings that a 10% increase in HIV/AIDS cases reduces enrolments by 2.9% is an issue of major concern. Serious steps towards slowing and reversing the spread of HIV/AIDS in the country is important. It is also necessary to maintain the infected population strong and healthy before they get full-blown AIDS.

It has also been established that the effect of gender dimension of HIV/AIDS infection on enrolment is not significant. The findings are surprising since it is expected from the literature that women and girls are more susceptible to contraction of the HIV virus. From the findings, although it is necessary to be gender responsive when addressing HIV/AIDS and education, it should not be the core issue. Emphasis should be put on the spread of HIV/AIDS on all the Kenyans, as it is a key determinant of pnmary school enrolment.

Other major determinants of enrolment in primary school are the per pupil cost (unit cost) of education, non-poor population (household income proxy) and the school going age population. The cost of education is currently being addressed by the free primary education policy. However, this should not be taken too far as it is Likely to compromise on quality. From the findings of the study, HIV/AIDS is reducing

enrolments with a higher percentage as compared to the unit cost. Following this argument, the country should increase her spending on HIV/AIDS campaign by a higher percentage than for free primary education.

As expected an increase in the number of the non-poor people (i.e. a rise in the wealth index) in the country, increases the number of pupils enrolled in primary schools significandy. A poor household will not be able to take its children to school since education may not be a priority. There is need therefore to explore ways and means of empowering the people economically so that they can be able to afford any education cost. Although, there is free primary education policy, primary education is not totally free. Parents and communities are still participating in meeting some indirect costs. Programmes geared towards poverty alleviation are likely to improve access, retention and completion rates in school.

5.2 Policy Recommendations

According to die study findings, it is imperative to address effectively the issue of HIV/AIDS, cost of primary education and poverty reduction so as to improve primary school enrolment in the country. In order to address the above issues, the following policy recommendations need to be explored:

1. The Government, NGOs, CBOs and other organizations should intensify HIV/AIDS awareness campaigns. The campaigns should be intensified through mass media, schools, churches, mosques, all community gatherings, drama and music festivals, etc. Since the scourge is a threat to the very existence of Kenyans, no resources should be spared in fighting HIV/AIDS epidemic.

2. Availability and access to free or subsidized drugs for HIV/AIDS treatment is key to reducing the virus infection. Currendy, the cost for anti-retroviral drugs is beyond the reach of majority of Kenyans, especially the poor. The Government and development partners have done a commendable job in trying to avail the drugs in public health institutions. This effort needs to be intensified.

3. There is need to intensify and diversify guidance and counseling programmes of HIV/AIDS mfected cases. This will help people living with HIV/AIDS to live positively, be productive and have a longer live, hence being able to fend for themselves and their families. This ln-turn will help retain children in school who would otherwise have dropped out of school due to lack of food and school indirect fees among other necessities.

4. The government should continue to offer free primary education, as it will reduce the negative impact AIDS is likely to cause in education. Currendy, the Government has implemented free primary education programme but it's yet to make it compulsory. There is need to make primary education legally compulsory. However, this endevour is quite cosdy since the Government should pay for all the costs in primary education including school uniforms, school feeding programs and all infrastructure development.

5. There is need to intensify the poverty alleviation programmes in order to economically empower the people to improve their standard of living. More emphasis should be laid on the small-scale enterprises/Jua Kali sector since this is the sector, which accommodates majority of the poor Kenyans.

5.3 Areas of Further Research

The data used in this study is provisional hence there is need to get the final data from CBS and confirm the findings of the study. One important variable to verify is the gender component, which has not been found significant contrary to other studies.

Lack of time and funds forced this study to be limited to investigating the effect of HIV/AIDS on primary school enrolments and the gender dimension alone. There is need to study more on the effect of the pandemic on other sectors in the economy such as agriculture, labour force, health, Jua Kali sector among many other things. This will help formulate informed policies and strategies to revive die economy despite the harm the disease is causing to the people.

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APPENDICES

Appendix 1: Trends in National HIV Prevalence Rates, 990 - 2003

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Prevalence Rates	**5.1**	**6.3**	**7.4**	**8.5**	**9.5**	**10.4**	**11.2**	**11.9**	**12.5**	**13.0**	**13.4**	**13.0**	**10.6**	**9.0**

Source: NASCOP

Appendix 2: Gross Enrolment Rates in Primary School by Sex, 1990-2001

	1990	1991	1992				1996					
Overall	**101.8**	**91.4**	**91.0**	**87.8**	**88.5**	**86.8**	**86.4**	**87.7**	**88.8**	**94.3**	**92.3**	**91.9**
Boys	**104.0**	**93.4**	**92.0**	**88.9**	**89.1**	**87.4**	**87.3**	**88.7**	**89.4**	**92.6**	**91.1**	**90.6**
Girls	**99.6**	**89.5**	**90.0**	**86.7**	**87.8**	**86.3**	**85.5**	**86.6**	**88.2**	**93.5**	**91.7**	**91.2**

Source: Ministry of Education, Science and Technology
Data for 1999 to 2001 is revised

Appendix 3: Primary School Drop-out Rates by Sex and Province, 1999

	Coast	**Central**	Eastern	**Nairobi**	**Rift** Valley	Western	'Nvanza	-North Eastern-	Kenya
Boys	**5.2**	**3.1**	**6.4**	1.6	**4.9**	**5.1**	**5.5**	**5.5**	**5.0**
Girls	**5.0**	**2.6**	**5.7**	**1.3**	**4.7**	**5.0**	**6.2**	**6.9**	**4.8**
Overall	**5.1**	**2.9**	**6.1**	**1.5**	**4.8**	**5.1**	**5.8**	**6.0**	**4.9**

Source: Ministry of Education, Science and Technology

Appendix 4: Primary School Repetition Rates by Sex and Province, 1999

	Coast	**Central**		Nairobi	Rift	Western	Nyanza	**North** Eastern	Kenya
Boys	**14**.7	**11.6**	**13.2**	**3.0**	**15.6**	**15.4**	**12.7**	**6.5**	**13.5**
Girls	**15.1**	**10.5**	**13.1**	**2.4**	**14.9**	**13.8**	**12.2**	**9.3**	**12.9**
Overall	**14**.9	**11.0**	**13.2**	**2.7**	**15.2**	**14.6**	**12.5**	**7.4**	**13.2**

Source: Ministry of Education, Science and Technology

Appendix 5: Descriptive Statistics of the Variables in Log Form

Variable	Obs	Mean	Std. Dev.	Min	Max
log of primary school enrolment	400	2.81	0.62	0	3.81
log of school age population	400	2.90	0.62	0	4.04
log of population with HIV/AIDS	400	0.71	0.61	0	2.40
log of female proportion with HIV/AIDS	400	2.27	2.23	0	4.62
log of primary school unit-cost	400	7.39	0.96	6.0	9.41
log of non-poor population	400	3.79	1.02	0	5.02
log of days away from home	400	1.18	0.74	0	3.37
log of healthcare expenditure	400	5.78	0.93	3.2	7.48
log of under-five mortality rate	400	4.67	0.38	3.97	5.54

Appendix 6: Key Determinants of HIV Prevalence Rate, 1997

Dependent Variable: lu>g of the HIV Prevalence Rate	*Coefficient*	*t-Statistic*
Log of the Number of Phones per Person (1994)	**-0.84**	*-2.2***
Growth Rate of GDP per capita (1980-90)	**4.58**	**0.5**
Share of Female Labour in Industry (1990)	**-0.0035**	**-1.7***
Muslim (% of population)	**-0.024**	**-5.2****
Ethnic Fractionalization	**0.027**	**3.5****
Time since first HIV case was reported	**0.379**	**2.9****
Labour Migration (1990)	**0.003**	**3.2****
Secondary School Enrolment Rate (1990)	**-0.016**	**-1.2**
Constant	**-1.7**	**-0.85**
R-Squared	*0.69*	
Number oj_Countries	*59*	

Source: Bonnel (2000)

Statistically significant at 5% level of significance

Statistically significant at 10% level of significance

THE EFFECT OF HIV/AIDS ON PRIMARY SCHOOL ENROLMENT IN KENYA "

By

Titus Mbiti Kajembu
REG. NO. C/5077392/2002

SUPERVISORS

Prof. Germano Mwabu
And
Dr. Mary Mbithi

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A Research Paper Submitted to Economics Department, University of Nairobi in Partial Fulfillment of the Requirements for the Degree of Master of v\rts in Economics

September 2004

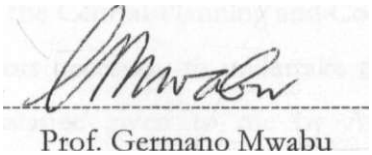
DECLARATION

This research paper is my original work and has not been presented for award of a degree in any other university.

Titus Mbiti Katembu

Reg. No. C/50/7392/2002

This research paper has been submitted for examination with our approval as university supervisors.



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Dr. Mary Mbithi

Date:

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DEDICATION

To my loving wife Faith Queen and my beautiful three daughters: Sheila Mwikali, Grace Wayua and Marionne Mueni.

ABSTRACT

The fact that HIV/AIDS, has been recognized as a human tragedy and a major health problem, which calls for urgent attention, need not be overemphasized. The scale of the disease is so large that it raises questions about its impact on the future development path of most developing countries, majority of which are in Africa. The scourge has caused untold suffering to many households and ruined lives of many young and dynamic Kenyans. The disease is caused by HIV, which acts by weakening the immune system, making the human body susceptible to other diseases. It is contracted mostly through heterosexual contact. Infected people become progressively sick and weak; they steadily lose their ability to work. Eventually, the disease kills them in their prime, thereby destroying the human capital build up in them over the years through child-rearing, formal education and learning on the job. It has affects people physically, spiritually and emotionally. As a result, many children drop out of school either due to lack of household income after the death of the breadwinner, or take care of sick parents or relatives suffering from HIV/AIDS, among others.

This sad situation justifies the need to carry out this study. The study investigates the effect of HIV/AIDS on enrolment in primary education. It employs OLS and 2SLS methods to estimate a school enrolment model. The empirical findings suggest that HIV/AIDS has a negative effect on primary school enrolment. The results indicate that a 10% increase in the population with HIV/AIDS is associated with a 2.9% decline in primary school enrolment. Gender is not identified as a significant factor in school enrolment analysis even though being female infected of HIV/AIDS reduces enrolment. Other variables found to significandy affect enrolment negatively are primary school fees and the under-five mortality rate while school age population and household wealth affect enrolment positively.

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ABBREVIATIONS AND ACRONYMS

2SLS	Two Stage Least Squares
ADF	African Development Fund
AIDS	Acquired Immune Deficiency Syndrome
CAER	Consulting Assistance on Economic Reform
CBOs	Community Based Organizations
CBS	Central Bureau of Statistics
CPI	Consumer Price Index
EFA	Education for All
GDP	Gross Domestic Product
GER	Gross Enrolment Rate
GOK	Government of Kenya
HIV	Human Immuno-deficiency Virus
IPAR	Institute of Policy Analysis and Research
IV	Instrumental Variables
KDIIS	Kenya Demographic and Health Survey
KIPPRA	Kenya Institute for Public Policy Research and Analysis
MOEST	Ministry of Education, Science and Technology
NACC	National AIDS Control Council
NARC	National Rainbow Coalition
NASCOP	National AIDS/STD Control Programme
NGOs	Non-Governmental Organizations
OLS	Ordinary Least Squares
STDs	Sexually Transmitted Diseases
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Education Fund
UPE	Universal Primary Education
WMS	Welfare Monitoring Survey

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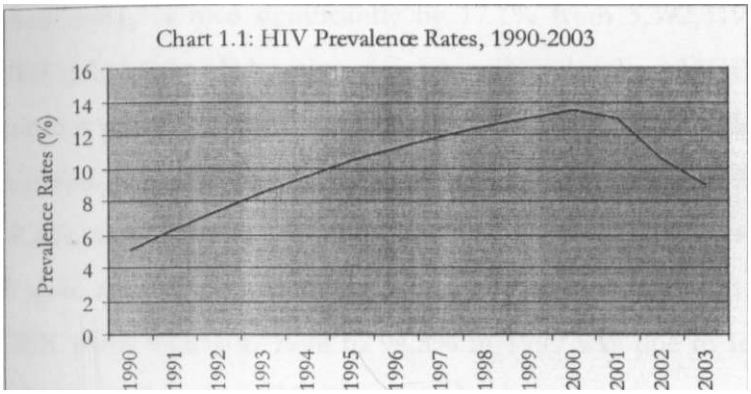
CHAPTER 1: INTRODUCTION

1.1 Background

Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV /AIDS) poses one of the greatest challenges to humanity. It is among the highest killer diseases in the world. It kills young economically productive people, brings **socio**-economic suffering to households and adversely affects economic development. The disease is rampant in most of the countries, especially in sub-Saharan Africa. In the high HIV prevalence countries, a generation of educated civil servants, teachers, health workers, and professionals is being lost at a time when the skills are still in short supply (Bonnel, 2000). It is estimated that 22 million in the world have died of AIDS; 36 million are currendy infected with HIV out of which about 70% live in sub-Saharan Africa (Republic of Kenya, 2001a). In Africa HIV is mainly spread through heterosexual relations.

Since the first case was diagnosed in 1984 in Kenya, the number of new AIDS cases reported every year stood at 12,000 on average since 1990 (Republic of Kenya, 1997). However, the reported cases are just a tip of the iceberg due to underreporting, missed diagnosis and delays in reporting. The real situation is expected to be quite alarming. Since 1984, HIV infection has spread all over the country like wildfire. By 1995, HIV cases reported had reached 63,179. This made the Government to begin taking the disease seriously. In 1997, a Sessional Paper No. 4 of 1997 on AIDS in Kenya was prepared, in 1999 HIV/AIDS was declared a national disaster and National AIDS Control Council (NACC) was established to combat the scourge. This witnessed the country mobilize available resources vigorously to fight the killer disease. The year 2003 saw the new NARC Government form a Cabinet sub-committee on HIV/AIDS to be chaired by the President (Government of Kenya, 2003). The fact that President Mwai Kibaki chairs the Cabinet committee and participates on media advertisements against HIV/AIDS shows serious Government commitment to fight the epidemic.

Trends of HIV prevalence rates in Kenya are shown in Chart 1.1 below. As shown in the Chart, it is clear from the sentinel surveillance data compiled by National AIDS/STDs Control Programme (NASCOP) that HIV prevalence in the country rose from 5.1% in 1990 to peak at 13.4% in 2000 after which it started falling steadily to reach 9.0% in 2003. The drop may be associated with the intensive campaigns against the pandemic by the Government, NGOs and the people of Kenya.



Source: NASCOP

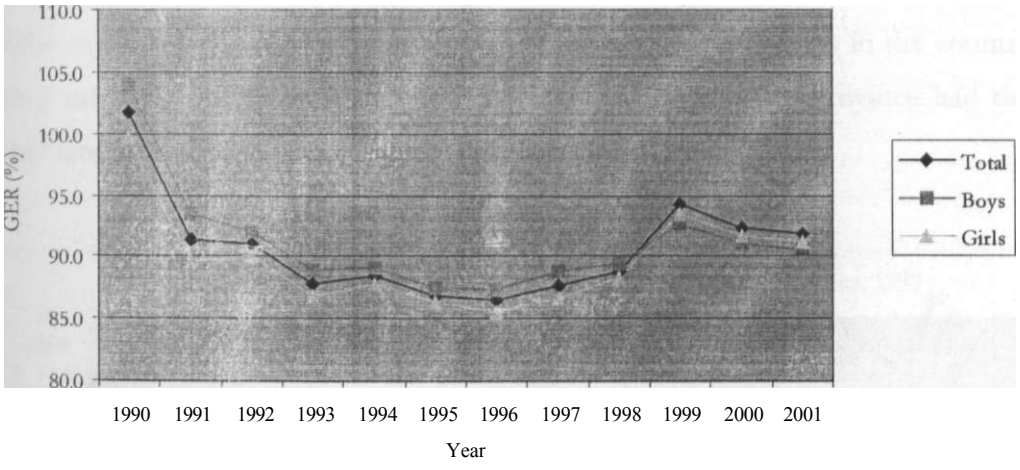
On the economic impact, AIDS kills young adults in their most economic productive life, depriving the economy of qualified and productive labor force, restricting the tax base and raising the demand for social services due to increased orphaned children, widows and health care (Republic of Kenya, 1997). The epidemic affects the demographic composition of population, social and economic structures of the country. It has negative effects on life expectancy, mortality and dependency ratios. In addition, AIDS brings hardships in families due to reduced earnings and increased health care expenditure hence adversely affecting economic development in the country. The disease is clearly a human disaster of unknown full impact, as nowhere has the epidemic run its course (World Bank).

AIDS affects demand and supply of education. It affects demand by reducing pupils' access, participation, retention and completion rates in schools. This is mosdy as a result of death of either one or both parents, which reduces household income

causing school children to either repeat or drop out of school. This **is** pardy **demonstrated** by the declining enrolment rates, and high dropout and repetition rates discussed hereafter in this proposal. On the other hand, death due to AIDS deprives the country of professionally qualified teachers adversely affecting supply of quality education.

Analysis of primary school data indicates that school enrolment in absolute terms has been rising. It rose significandy by 17.1% from 5,392,319 in 1990 to 6,314,726 in 2001 (Ministry of Education, Science and Technology-MOEST). In spite of the rising number of pupils enrolled in primary schools, the Gross Enrolment Rate (GER) has declined from 101.8% in 1990, with a GER for boys being 104.0% and girls 99.6% to 91.2%, with boys constituting 91.9% and girls 90.6% as shown in Chart 1.2. The drop in the GER was most pronounced between 1993 and 1998. The marked rise of GER from 88.8% in 1998 to 94.3% in 1999 was due to revision of the Ministry of Education, Science and Technology data.

Chart 1.2: Primary School GER by Sex, 1990-2001

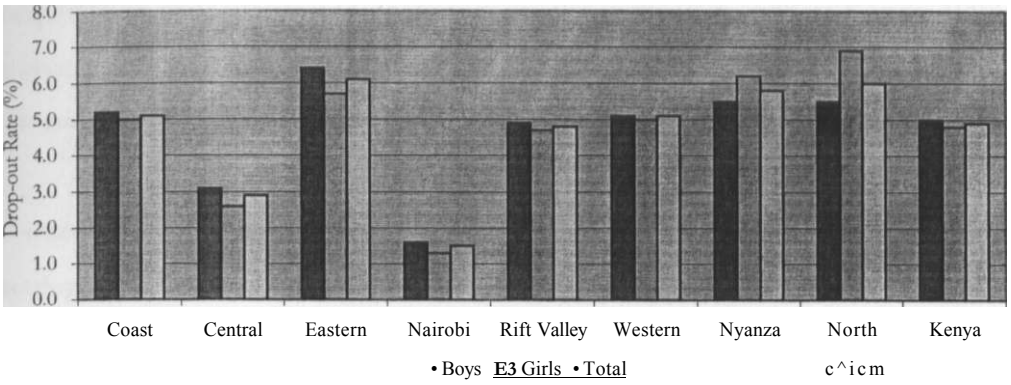


Source: MOEST data

As shown in Chart 1.3, the primary school dropout rate improved marginally from 5.4% in 1993 to 4.9% in 1999 with boys recording 5.0% drop-out rate and girls 4.8%. Regionally, Eastern province registered the highest dropout rate of 6.1% followed closely by North Eastern province with 6.0% (MOEST). Nairobi had the lowest

dropout rate of 1.5% followed by Central province with 2.9%. More boys than girls were reported to be dropping out of school in all the provinces except North Eastern and Nyanza provinces.

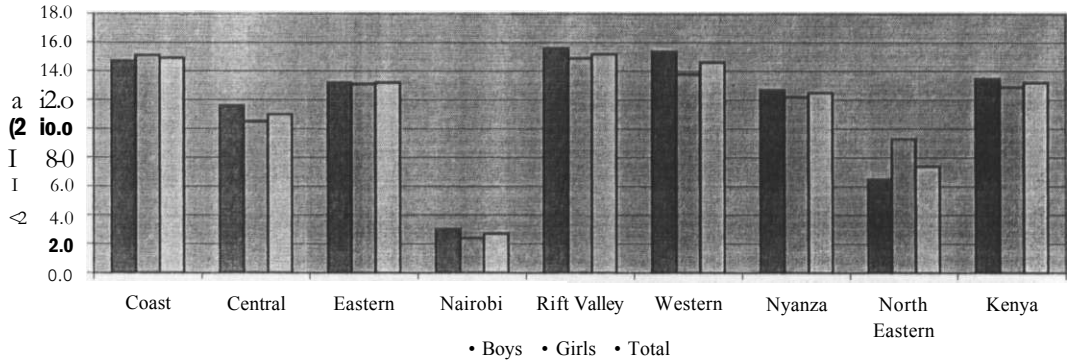
Chart 1.3: Primary School Drop-out Rates by Province and Sex, 1999



Source: MOEST data

Repetition rates improved significantly from 15.4% in 1993 to 13.2% in 1999 as shown in Table 1.4 and Chart 1.4; however, the rates are still unacceptably quite high. Boys recorded the highest repetition rate of 13.5% as opposed to 12.9% for girls. Nairobi and North Eastern provinces had the lowest repetition rates in the country posting values lower than 10%. On the other hand Rift Valley province had the highest rate of repetition with a rate above 15% (MOEST).

Chart 1.4: Primary School Repetition Rates by Province and Sex, 1999



Source: MOEST data

Any factor that has a negative effect on primary schooling is of a major concern since primary education plays a key role in the economy. Primary education has been found to yield higher returns to invest than post primary education. It improves economic productivity in the formal and informal sectors, reduces fertility, infant mortality and improves family health and nutrition, and increases awareness necessary for effective participation in civic affairs and economic development (Republic of Kenya, 1998a). The crucial role of primary education has led to it being declared a human right to which every child is entitled.

HIV infection also is more rampant in females than males. This is mosdy due to their physiological differences in genital tracks, which contribute to high vulnerability for females to acquire HIV and other STDs compared to males (UNICEF, 2000). Also, women are at a greater risk of HIV infection than men because of their lower socio-economic status. This makes them to be more vulnerable to HIV infection either because they lack bargaining power in sexual relationship or in marriage market (Were and Nafula, 2003). Usually, when demand for education falters, the first casualty to be negatively affected is the girl, especially in rural areas. If there are financial constraints in meeting the cost of education in the family, a boy is likely to be favoured in preference to a girl. This is because culturally girls are considered to be homemakers, hence are most likely to be deprived of educational opportunity. If there is a HIV/AIDS case in the family, the girl child may even be drawn from school to take care of the sick parent. As collaborated by Malaney (2000), studies have shown that HIV infection rate tends to be considerably higher among teenage girls than boys. This is mosdy because girls attain puberty at an earlier age compared to boys. This makes them engage m sexual activities earlier and with older men.

1-2 Statement of the Problem

lhe assertion that HIV/AIDS has become the world's most devastating epidemic does not need to be overemphasized. It has become an extremely serious problem and a major development crisis, particularly in developing countries. In Kenya, it is estimated that 2.2 million people are now living with HIV infection while 200,000 have AIDS. About 1.5 million have already died of AIDS since 1984 (Republic of

Kenya 2001a). The HIV/AIDS prevalence rate in 2000 was 13.4%, making Kenya one of the countries with high HIV/AIDS prevalence rates in Africa. It is projected that HIV positive cases will reach 3.3 million in 2010 (Ennew, 2000).

Available data from NASCOP and Central Bureau of Statistics (CBS) indicate that **HIV**/AIDS prevalence has started declining. However, this has not changed the painful effects die scourge is inflicting on the people of Kenya, and especially children and women. HIV/AIDS affects all aspects of social and economic life of the people, including education. According to the Kenya National HIV/AIDS Strategic Plan, 2000-2005 (Republic of Kenya, 2000a), education is affected by HIV/AIDS in three ways:

1. Children are kept out of school if they are needed at home, to care for sick family members or to work in the fields.

2. Children may drop out of school if their families cannot afford school fees due to reduced income as a result of HIV/AIDS death.

3. HIV/AIDS related illness and death reduce supply of experienced teachers, hence affecting deliver)' of quality education.

In general, HIV/AIDS reduces enrolments in schools as well as trained and experienced teachers. As mentioned by Njeru and Kioko (2004), one of the greatest effects of the HIV/AIDS pandemic on the education sector has to do with the increased rates of morbidity and mortality among teachers. It destroys human capital stock and reduces die incentive to invest in training and schooling (Bonnel, 2000). Since parents play a very key role on the welfare of children, it is expected that high prevalence of HIV/AIDS (especially on parents) will have significant negative impact on primary school children. The purpose of the study is therefore, to establish the impact of HIV/AIDS on primary school enrolment and propose relevant policies necessary to address the problem effectively.

1.3 Objectives of the Study

The overall objective of the study is to investigate the existence of any significant relationship between HIV/AIDS prevalence and primary school enrolment. If such a relationship is found to exist, necessary policy proposals will be made to address the situation.

To achieve the overall objective, the study pursues the following specific objectives:

1. To determine the impact of HIV/AIDS prevalence on primary school enrolment.

   To explore the gender dimension on the effect of HIV/AIDS on primary school enrolment.

3. To explore other relevant policy variables that affect demand for primary education enrolment.

1.4 Justification of the Study

It is common knowledge that HIV/AIDS is a human disaster. It threatens the very existence of humanity and affects every sector of the economy including education. As stated by Mandela (2000), AIDS in Africa is claiming more lives than the sum total of all wars, famines and floods, and ravages of such deadly diseases as Malaria. It is effectively wiping out the development gains of the past decades and sabotaging the future. Worse still, the disease hits hardest among the more-educated and skilled workers hence, threatening to reverse gains already made in developing human capital.

l he fight against HIV/AIDS demands a high investment in health. This may call for shifting of resources from productive investments in other sectors including education to health expenditures and health care. A shift of resources from other sectors means that sectors such as education will be inadequately funded hence adversely affecting delivery of quality education to our children as well as making the international goal for achieving Universal Primary Education (UPE) by the year 2015 elusive. Any adverse effect of HIV/AIDS on the education sector is serious. The

reason being that education is a key player in the development of human resource (human capital) in the country. It imparts knowledge and survival skills to people in readiness for effective participation in nation building. Investing in primary education in particular has been found to yield higher social returns in developing countries. UNDP (1999) gives some study results showing social returns of 26% for primary, 17% for secondary and 13% for higher education. It is therefore, critical to ensure that children have access to primary education without any hindrances.

Given this pathetic and worrying trend, there is need to carry out thorough empirical studies to establish the extent to which HIV/AIDS affects education in Kenya. Since the education sector is key to development of human capital necessary for economic development and a major factor in poverty reduction, policies geared towards increased access to primary school, participation and retention of children in school are crucial. The study will therefore, help in informing policy formulation process in order to assist in combating the scourge more effectively in an effort to improve enrolment rate in primary education. This study is motivated by the need to have informed and effective policies, necessary for addressing the HIV/AIDS pandemic.

1.5 Scope and Limitation of the Study

The study focuses on the entire country since it mostly uses Kenya Demographic and Health Survey (KDHS), 2003 data collected by CBS. The survey was carried out using CBS sampling frame, which has representative clusters in all the districts in Kenya. It covered 8,561 households and a total number of 8,226 respondents were tested of HIV/AIDS. The data is expected to have the usual errors caused due to sampling, questionnaire administration and editing among others. However, the data was thoroughly cleaned by CBS to improve quality and reliability.

Another limitation of the data may occur due to the fact that when collecting the HIV/AIDS data by actual medical tests as was done by CBS, people are tested of the presence of HIV vnus. If an individual tests HIV positive, it does not always imply that the person has AIDS. The person may just be having the HIV virus in its initial stages before he/she gets full blown AIDS. The two terms aie significantly different.

One can live with HIV without necessarily getting AIDS. But if an individual has **AIDS** he/she must test positive for HIV virus. Availability of data on AIDS status **would** give better results of such a study. In general HIV/AIDS data is difficult to **collect** since most people are reluctant to take HIV test and even if they are tested, they prefer to conceal their HIV status.

Availability of a more recent household **expenditure** data will be one of the **weaknesses** of the research. The most recent information is **contained** in the Welfare **Monitoring** Survey (WMS), 1997, which appears to be rather outdated. However, **due to lack** of any more current **information** on the **same,** the **study** will have **to** depend **on** the same survey data, but adjusted for the 2003 prices using the revised Consumer Price Index (CPI) computed by CBS. The CPI is made up of about 40% of Nairobi **index** and 60% of the rest of **urban** towns in Kenya (Republic of Kenya, 2004).

CHAPTER 2: LITERATURE REVIEW

2.1 Theoretical Literature

Most of the researchers such as Bennell et al. (2002); Ennew (2000); Republic of Kenya (1997) support that HIV/AIDS affects demand and supply of education services. In their unpublished report, Bennell et al. (2002) argue that, the epidemic reduces demand for schooling in three ways:

1 Smaller students' intake: lower fertility levels would lead to smaller than expected cohort of the six year olds. Also affected families will have fewer resources for education.

2 Impact on students: as the number of orphans, caregivers and children with AIDS related illnesses increase, the education of these children is likely to deteriorate. This could impact negatively on intake, repetition and dropout rates.

3. Level of poverty: parents and guardians would be poorer because of the macro-economic impact of the scourge.

1 he supply could be affected by changes in teacher requirement and productivity. The number of teachers who die of AIDS is expected to increase rapidly hence, reducing the teaching force significandy. In addition, absenteeism and morbidity among teachers would result in reduction of teacher-hours available hence compromising the quality of education.

Besides the HIV/AIDS pandemic, which has devastating effects on the education sector other factors that have adversely affected the demand for education as discussed by MOEST (2001) are:

1 • Poor economic growth and increased poverty which result in non-enrolment of school-age children, especially girls; pulling out those in school to supplement

household income; not investing in school materials, not participating actively in school affairs; marrying off girls when still young and supporting child labour.

2. Increased cost of education that lead to decline in access and enrolment to basic education, increased dropouts and repetition, inadequate and lack of teaching-learning resources, poor quality of education offered and limited investment.

3. Inappropriate policy frameworks resulting in major issues of concern including laws and regulations, which do not actively address equity issues in education; overloaded, inappropriate and gender insensitive curricula; centralization of education management; inadequate transparency and accountability within the education sector; political interference; and non-involvement of all stakeholders in policy formulation and the management of education.

4. Insecurity and social strife such as cattle rustling and banditry, and tribal clashes.

A research carried out by UNICEF (2002) found that teachers, teaching AIDS 1 xlucation are not fully equipped and were unable to respond to key questions posed by pupils hence, the need for capacity building. The findings of the study also intimated tiiat boys and girls are faced with serious challenges in their development. This is evident from the increasing number of children becoming sexually active at early ages, teenage pregnancies, school dropouts and drug abusers among others. This requires equipping the children with knowledge and life skills including communication and negotiation skills, value analysis, decision-making skills, resisting peer pressure and behaviour change among other things. This will enable them to successfully meet the challenges of growing up and help reduce the risks associated with STDs and HIV/AIDS.

2-2 Empirical Literature

Detailed analysis of the impact of HIV/AIDS on education is hampered by lack of reliable data and quantitative empirical studies. However, available information indicates that HIV/AIDS prevalence rates are falling. The intensive sensitization

campaigns against the scourge appear to have borne fruits. The HIV sero-prevalence indicated by antenatal sero-surveillance data from NASCOP and reported in the Economic Survey, 2003 shows that HIV prevalence has declined from a high 13.4% in 2000 to 13.0% in 2001 and 10.2% in 2002 (Republic of Kenya, 2003a). A more recent study (KDHS) carried out by CBS in 2003 indicates that HIV/AIDS prevalence rate stand at 6.7% with prevalence for women being 8.7% and 4.5% for men (Republic of Kenya, 2003c).

In modeling the impact of HIV/AIDS on the education sector, Malaney (2000) used an input-output model to estimate the impact of the disease on enrolment and teacher attrition. The model was a slight modification of the version developed by Al-Samarrai (1997). The estimation process begins by modeling the demographic impacts of the AIDS epidemic. This was done through the use of readily available software known as SPECTRUM System of Policy Models prepared by the Future Group International in collaboration with Family Health International.

1'he AIDS projection requires demographic projection using demographic data. The AIDS projection module, AIM, can then be used to calculate the impact of the disease, but it requires an estimate of future levels of HIV prevalence. DemProj (Demographic Projection) and AIM together allow for calculation of age-specific populations with and without AIDS to assess the burden of the epidemic. They also calculate die number of orphans, the age-specific mortality, life expectancy and other demographic variables tha: are affected by AIDS. The demographic data can then be used to calculate the flow of students and teachers based on two scenarios: in the absence or presence of HIV/AIDS. Based on the above modeling, a case study for Namibia found out that the total projected enrolment rates would decline to 86.4% in 2005 and 85% in 2010 from the overall average of 87%. In the case of teachers, it was found that with-AIDS scenario the shortfall of teachers will be 7,161 by 2010.

Bonnel (2000) used a simple semi-log regression model to study the key determinants ⊳t HIV/AIDS. The suggestion that the spread of HIV epidemic is related to various economic, sociological and cultural characteristics was explored through a cross-

country regression of HIV prevalence rate for 60 developing countries. The results **reveal** that secondary school enrolment rate has a weak negative relation with the **spread** of HIV. Although the coefficient is not statistically significant, it shows that education is likely to reduce the spread of HIV/AIDS pandemic in developing countries.

A study done by Bedi et al (2002) on the decline of primary school enrolment in Kenya estimated a probit enrolment model where the probability of attending school was expressed as: $\Pr[a=1]=\Pr[/?,Z> - fi_2 p + e_a > 0]$, with a representing a dichotomous variable, b denoting the benefits associated with attending school, p being the total cost associated with attending school, /?(being the coefficients to be estimated and $\pounds_a$ representing a composite error term assumed to be normally distributed. The above probit equation was adjusted and re-written as: $\Pr[a=1]=b'[x_{s./r}5F + y_x X + y_{,,} H + y_{s/} SI]$ where F represents the standard normal cumulative distribution function, SF denotes school fees, X is a vector of child and family characteristics that influence the opportunity cost of enrolment, H is a measure of expected human capital gains, SI is a vector of school inputs and y_t are the coefficients to be estimated.

To determine the effect of HIV prevalence on enrolment, they included HIV prevalence rates in the model as an additional regressor. Since the HIV data used was for urban areas, they decided to estimate an enrolment specification based only on the sample residing in urban areas. The results of the estimation showed a strong and clear negative effect of HIV/AIDS prevalence on enrolment in urban areas. The estimate indicated that a 10% increase in HIV prevalence results to a 2% reduction in enrolment.

As mentioned by Kelly (2000), HIV/AIDS affects the demand for education because tiiere will be fewer children: to educate, wanting to be educated, able to afford education and able to complete their schooling.

He presents population projection on a few selected countries to show the impact of HIV/AIDS on population and by extension, the demographic impact on the number **of school**-age children. At the macro level, AIDS will **have** the long-term effect of **population** being significandy smaller than they would have been in the absence of AIDS as shown in Table 2.2. This will result in the number of pupils of school-age being smaller than it would otherwise have been.

Table 2.1: Projected Demographic Impact of HIV/AIDS in Selected Countries, 2010

Country	Population (Millions)			Percentage Loss to AIDS	Life Expectancy (Years)
	Without AIDS	With AIDS	Loss to AIDS		
Botswana	2.1	1.6	0.5	23.8	33.4
DRC	74.6	69.3	5.3	7.1	51.3
Cote d' I voire	23.5	20.3	3.2	13.6	44.8
Ethiopia	87.0	81.2	5.8	6.7	51.3
Kenya	39.1	33.9	5.2	13.3	43.2
Malawi	14.1	10.7	3.4	24.1	29.5
South Africa	53.6	49.2	4.4	8.2	47.8
Tanzania	43.9	36.1	7.8	17.8	36.5
Uganda	32.7	26.4	6.3	19.3	35.2
Zambia	15.7	11.5	4.2	26.8	30.3
Zimbabwe	16.4	11.9	4.5	27.4	33.1

Source: Kelly (2000)

Carr-Hill et al. (2003) summarized the impact of AIDS in Kenya using NASCOP, 1999 data as follows:

The impact of AIDS deaths would result in 3.6 million fewer people by 2005 and the cost of health care is prohibitive and is estimated to be US$ 10,000 to 20,000 per year per patient, apart from other treatment associated with AIDS. The number of orphans was estimated to be 860,000 by 2000 and 1.5 million by the year 2005.

AIDS patients occupied more than 30% of hospital beds by 1995. In severe affected areas like Busia and Kisumu, the hospital bed occupancy rate is high as 70%. It was estimated that by the year 2000 about 50% of all hospital beds would be required for AIDS patients.

About 30-40% of babies born to infected mothers will be infected with HIV and majority will develop AIDS and ultimately die before their third birthday. It is **estimated** that child deaths because of measles and malaria are expected to range between 5,000 and 10,000 by the year 2005. In the case of child deaths due to AIDS in the same period, the number will be 40,000 to 50,000.

Infant mortality during the first year of life per 1,000 live births: because of AIDS, it will amount to 55-60 instead of 45-50 if there was no AIDS. The mortality rate for children dying before their fifth birthday per 1,000 live births may rise from the current figure of 112 to 120-125, instead of a decline to 70 if there was no AIDS.

2.3 Overview of the Literature

As mentioned earlier, one of the problems of carrying out a study on HIV/AIDS is lack of accurate data and economic oriented empirical work. Most of the empirical literature is qualitative with no strong scientific and statistical methodological approach. The study carried out by UNICEF (2002) and Hyde et al (2002) gathered most of the information through focused group discussions, hence their usefulness, especially in modeling is limited.

Malaney (2000) concentrated his HIV impact study through using demographic projection software and input-output analysis to project school enrolment in the absence and presence of HIV/AIDS. The study already assumes HIV prevalence affects enrolment significandy, which may or may not be the case. There is need to test the assumption, after which enrolments are projected based on the two scenarios (with AIDS and without AIDS).

I he study by Bonne! (2000) is very enriching as he applied semi-log regression model for estimation. However, the study focused on the key determinant of HIV where school enrolment was part of the explanatory variables. Bedi et al. (2002) researched on the factors contributing to the declining primary enrolment in Kenya. They included HIV prevalence rates in their model to determine its effect. They estimated a ptobit enrolment model. This study is quite close to the proposed one, but it is

limited to urban areas since the HIV/AIDS prevalence data was mainly urban based. However, it is going to be a key reference material for the proposed study.

The proposed study differs from others and particularly the one done by Bedi et al. (2002) on the coverage, modeling approach and the variables included in the model. While Bedi et al. (2002) estimated a discrete choice model, the proposed study is going to use continuous consumer choice model. The study will also utilize the latest HIV data from the KDHS, 2003 which has a wider coverage (both rural and urban areas) and more accurate than the sero-surveillance data compiled by NASCOP. The **results** of the proposed study are likely to be more credible than any other findings from other studies done in the country.

CHAPTER 3: METHODOLOGY

3.1 The Model

The most appropriate economic model to analyze the problem is based on consumer choice theory where the consumer maximizes utility on primary school enrolment **subject** to a budget constraint. The consumer's utility function can be expressed as:

$$U=U(E,C) \quad \ldots\ldots 1$$

Where E is quantity of primary education (enrolment) and C is quantity for other substitute commodities, which are held constant. To maximize utility for primary education subject to budget constraint, we may write the following expression as:

Maximize $U = U(E,C)$, subject to: $P_E E + P_C C = Y$ $\ldots\ldots 2$

Solving equation 2, we get demand function for primary education. The demand function for primary school enrolment will be a function of price for primary education (P_E) and prices for other goods (P_c), particularly substitutes and complements, and income (Y) as shown by equation 3 below:

$$Q_E=f(P_E,P_c,Y) \quad \ldots\ldots 3$$

Since the study is supposed to investigate the impact of HIV/AIDS on primary school enrolment, the HIV/AIDS and other variables, which affect the demand for enrolment in primary education will be included in equation 3. In addition prices for alternatives goods will be dropped since the study is not concerned about the cross prices effects. The demand function in general form will therefore be re-written as:

$$QE = f(P_E,H_P,Y,Q) \quad \ldots\ldots 4$$

Where $P_E,H_P,Y,$ *ancl* Qare price for primary education, population infected with HIV/AIDS, household income and other factors that affect demand for enrolment in

primary school respectively. In this case, we assume a Cobb Douglas (CD) demand function expressed as shown by equation 5 below:

$$Q_E = A\ H\ \$\ Y^{h}\ P\ £\ £\ W \quad \ldots\ldots 5$$

The equation to be estimated is a double log regression model as specified in the following equation 6 in its general form. This is obtained after applying logs on both sides of equation 5.

$$lnQ_E = a + /?, h\backslash H_p + \quad \text{In } Y + fa\ \backslash nP_E + /?_4 \ln Q + // \quad \ldots\ldots 6$$

where a *and fisMc* regression parameters (coefficients), */u* is a disturbance term and other variables are as previously specified.

Specifically, the empirical model to estimate in this study is as specified by equation 7 below. To capture the gender component in the analysis, the following equation 8 is estimated.

$$'^{n}\ P\_enrol = \text{«} + /?, \text{ In } hiv + [i_2\backslash np \quad unit \cos t + /?_3 \text{ In } nonpoor + /?_4 \text{ In } schage\_pop \text{ 4- } ju \qquad 7$$

$$\text{In } p\_enrol = S + </>_l\backslash nhiv\_fp + </>_2\backslash np\ unit \cos / + fa \text{ In } nonpoor + (f>_A \text{ In } schage\_pop + e \qquad 8$$

where *a, 8, fts and (/)s* are the coefficients to be estimated while *[lands* are the error terms. Detailed descriptions of the variables being estimated are as follows:

Dependent Variable-. lnp_enrol represents the log of primary school enrolment.

Explanatory Variables

lnluv: is the log of population with HIV/AIDS, expected to have a negative effect of primary school enrolment.

lnhiv_fp: is the log of female .proportion with HIV/AIDS, expected to have a negative effect on primary school enrolment.

lnp_unitcost: is the log of primary school unit-cost, which is expected to impact negatively on primary school enrolment.

lnnonpoor: is the log of non-poor population (a proxy of household income derived from household assets index), expected to have a positive relationship with primary school enrolment.

lnschage_pop: is the log of school going age population (age group 6-13 years), which is supposed to affect primary school enrolment positively.

It is possible that HIV/AIDS explanatory variable may be highly correlated with the disturbance term hence, resulting in a likely encounter of an endogeneity problem. Bonnel (2000) found that secondary school enrolment was a weak determinant of HIV/AIDS. In this case, HIV/AIDS may be endogenous. To cater for this problem, a Durbin-Wu-Hausman Specification test is carried to test for the exogeneity of HIV/AIDS variable. If the test is negative, then an Instrumental Variables (IV)/2-Stage Least Square (2 SLS) method will be applied to estimate the specified double log regression model.

The double log regression model has been selected for estimation largely because it is simple to apply and easy to interpretation. As mentioned by Johnston and DiNardo (1997) and Maddala (2002) the log-log transformations frequently appear in applied work, mosdy because of their simplicity and ease of interpretation, since slopes in the models are direct estimates of elasticities. In addition, log-linear form is often used in models of demand and production (Greene, 1997).

3.2 Data Types and Sources

The study utilizes cross sectional secondary data mosdy obtained from the Kenya Demographic and Health Survey (KDHS) of 2003, the Welfare Monitoring Survey (WMS) of 1997 and the 1999 Population and Housing Census conducted by CBS. It gready benefits from the most recent and comprehensive data on HIV/AIDS obtained from the KDHS, 2003. The survey captured information on HIV/AIDS from the entire country including actual tests on sampled respondents to establish their HIV status.

The CBS has about 1,800 enumeration areas spread all over the country known as clusters. It is within these clusters that CBS draws household samples for carrying out national sample surveys. The study of HIV/AIDS prevalence in the KDHS of 2003 utilized 400 clusters selected at random and was representative of the entire country. Clusters are therefore, used as the units of analysis in this study.

3.3 Hypothesis Testing

The study attempts to address the following hypothetical research questions:

1. Is there a significant impact of HIV/AIDS prevalence on primary school enrolment?
2. Does gender play any role on the effects of HIV/AIDS on primary education enrolment?
3. Are there any other variables that have significant effect on primary school enrolment?

After fitting the data on the above-described model, hypothesis tests are to be carried out to assess die significance of the variables in question so as to get answers for the research questions. In order to carry out the tests of significance on the estimated coefficients (/?,), the null and alternative hypotheses (*H_0 and H_1 respectively*) were set as follows:

1. H_0 *:/3J=0=>* There is no significant impact of HIV/AIDS prevalence on primary school enrolment, against and an alternative hypothesis $//_s$: /?, * 0 diere is a significant impact of HIV/AIDS prevalence on primary school enrolment.

2. H_0 '• ft, = 0 => The gender component has no significant effect on the relation between HIV/AIDS prevalence and primary school enrolment, against and an alternative hypothesis //,:/?, ^ 0 => the gender component has a significant effect on the relation between HIV/AIDS prevalence and primary school enrolment.

The t-values helped evaluating whether to accept or reject the null hypothesis. Rejecting null hypothesis implies that the coefficient in question is significandy different from zero hence statistically significant and vice versa.

CHAPTER 4: RESULTS AND DISCUSSIONS

4.1 Descriptive Statistical Analysis

Provisional data from the Kenya Demographic and Health Survey (KDHS) of 2003 conducted by CBS reveals that the Net Enrolment Rate (NER) in primary education stands at 86.3% as shown in Table 4.1. This means that out of all the primary school going age children, 86.3% are enrolled in primary schools in the country and about 13.7% are out of school. Regionally, Central province has highest enrolment rate of 97.6% followed by Nyanza province with a rate of 96.7%. North Eastern province records the lowest enrolment rate of 39.8%.

Gender disparity with respect to primary school enrolment is generally not a serious problem. At the national level, enrolment rate for boys is higher (87.4%) than that of girls (85.1%) by 2.3 percentage points. At the regional level, most of the provinces except North Eastern province have nearly achieved gender parity. In North Eastern province, enrolment rate for boys stands at 48.5% compared to 29.4% rate for girls giving a remarkable gender gap of 19.1 percentage points. The low enrolment rate in North Eastern province and especially the wide gender gap is an area of major concern. The low enrolment of 39.8% in the province is quite glaring as it implies that 60.2% of children in the province who are eligible to be in primary school are not enrolled, with majority of them being girls.

Table 4.1: Primary School Enrolment Rate by Sex and Region

	Boys		Girls		Total	
Region	No. Enrolled	NER (%)	No. Enrolled	NER (%)	No. Enrolled	NER (%)
Nairobi	242	92.7	249	90.5	491	91.6
Central	595	97.9	585	97.3	1,180	97.6
Coast	445	87.1	392	85.8	837	86.5
Eastern	522	94.2	513	94.3	1,035	94.3
Nyanza	540	96.8	522	96.7	1,062	96.7
Rift Valley	691	83.0	661	80.3	1,352	81.6
Western	553	96.8	480	95.0	1,033	96.0
North Eastern	226	.48.5	113	29.4	339	39.8
Total	3,814	87.4	3,515	85.1	7,329	. 86.3

Source: KDHS 2003

Provisional data for HIV/AIDS prevalence by sex and region is shown in Table 4.2. The Table reveals that the HIV/AIDS prevalence in the country stands at about 7.0% with the prevalence for males being 7.2% and 6.9% for females. Coast province leads by recording the highest prevalence rate of 8.5% followed closely by Nyanza province with 8.0% prevalence rate. Central province has the lowest prevalence of 5.5%. The gender gap is less than 1 percentage point in most of the provinces except for Nyanza, Rift Valley and Coast provinces. In Nyanza province exhibits a wide gender gap of 3.3 percentage points with males being affected more than females while Rift Valley and Coast provinces registers gender differential of 2.1 and 1.1 percentage points respectively, where in both cases females are affected more than males.

Table 4.2: **HIV/AIDS Prevalence by Sex and Region**

Region	Male		Female		Total	
	Number HIV+	HIV Prevalence	Number HIV+	HIV Prevalence	Number HIV+	HIV Prevalence
Nairobi	24	7.1	53	6.4	77	6.6
Central	26	5.9	53	5.4	79	5.5
Coast	21	7.7	59	8.8	80	8.5
Eastern	21	6.5	45	6.5	66	6.5
Nyanza	33	10.3	49	7.0	82	8.0
Rift Valley	22	5.6	70	7.7	92	7.0
Western	24	7.8	51	7.2	75	7.4
North Eastern	9	8.0	22	7.7	31	7.8
Total	180	7.2	402	6.9	582	7.0

Source: KDHS 2003

More descriptive statistics for the variables utilized in the study are presented in Table 4.3 in their level form. The total observations are 400 in number, which equals to the number of clusters included in the KDHS sample. The mean (average) primary school enrolment per cluster is estimated at 19.3 while that of population with HIV/AIDS is 2.5. Their standard deviations stand at 9.0 and 1.6 respectively. The standard deviations, which measures variables dispersion from the mean are fairly small hence, an indication of data reliability. The unit cost for primary education and healthcare expenditure variables whose cluster means records 2845.7 and 497.6, have

high standard deviations of 3706.1 and 483.9 respectively. Descriptive statistics of the variables in log form are shown in Appendix 5.

Table 4.3: Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Primary school enrolment	400	19.3	9.0	1	45
School age population	400	21.3	10.7	1	57
Population with HIV/AIDS	400	2.5	1.6	1	11
Female proportion with HIV/AIDS	400	45.1	46.0	1	101
Primary school unit-cost	400	2845.7	3706.1	402.7	12194.3
Non-poor population	400	59.7	32.5	1	152
Days away from home	400	4.3	3.8	1	29
Healthcare expenditure	400	497.6	483.9	24.5	1780.2
Under-five mortality rate	400	114.5	48.3	53	254

4.2 Regression Analysis

4.2.1 The Effect of HIV/AIDS on Primary School Enrolment

The estimation results of the double log regression model are reported in Table **4.4.** Column (1) gives Ordinary Least Squares (OLS) reduced model estimates where the log of population with HIV/AIDS is treated as dependent variable and other variables as exogenous including the Instrumental Variables (IV) namely: log of healthcare expenditure, log of healthcare expenditure squared, log of under-five mortality rate and log of under-five mortality rate squared; but excluding log of primary school enrolment.

Column (2) also presents OLS reduced model estimates with log of primary enrolment taken as dependent variable. All other variables are taken as explanatory variables except for log of population with HIV/AIDS, which is treated as potentially endogenous and excluded from the model. Column (3) shows OLS structural regression results with log of primary school enrolment remaining as dependent variable, while others including log of population with HIV/AIDS are treated as exogenous variables, **but** excluding instrumental variables. Column **(4)** reports the log of primary school enrolment equation estimated using the IV (2SLS) method with log of population with HIV/AIDS taken as endogenous. Finally, column (5) reports the

same estimates as column (4) but includes the residuals from prediction equation for the log of population with HIV/AIDS, which provides the basis for performing the Durbin-Wu-Hausman (1987) specification test for exogeneity of log of population with HIV/AIDS variable (Schultz and Mwabu, 2003).

The Durbin-Wu-Hausman specification test results reported in column (5) indicates that log of population with HIV/AIDS is rejected as an exogenous variable since the coefficient for residuals of the prediction equation of log of population with HIV/AIDS is significant at 5% level of significance (p-value=0.017) with t-statistic of 2.40. This implies that the variable log of population with HIV/AIDS is endogenous hence, the OLS estimates reported in column (3) are biased. The IV (2SLS) estimates reported in column (4) or (5) are therefore, the preferred estimates in this study.

Estimates in column (5) confirm the intuitive expectation of the negative effect of HIV/AIDS on primary school enrolment. The effect is found to be significant at 10% level of significance (p-value=0.087) with t-statistic of -1.72. The results reveal that a 1% increase in the number of HIV/AIDS cases reduces enrolment in primary schools by 0.29%. In other words, a 10% rise in HIV/AIDS infection results in a 2.9% decline in primary school enrolment. This closely agrees with the findings of Bedi et al. (2002) who found that a 10% increase in HIV prevalence is associated with a 2% reduction in enrolment.

Other variables that affect enrolment significandy are unit cost of primary education, number of non-poor population and the school going age population as shown in column (4) and (5) of Table 4.4. According to the results, a 10% increase in cost of primary education per pupil reduces enrolment by 1%. On the other hand, a 10% rise in the number of the non-poor population and the number of children of the school going age would result in a 2.5% and 7.9% rise in primary school enrolment respectively. All these variables are significant at 1% level of significance. An increase in the number of school age children obviously has more positive impact on enrolment compared to a rise in the wealth index of the community. Conversely, an

increase in HIV/AIDS has a more severe effect on enrolment compared to the rise in the cost of primary education.

It is worth noting that about 60.9% of the variations in primary school enrolment are explained by the independent variables in the model as indicated by the R-squared. The R-squared is fairly high given that the data utilized in this study is cross sectional; hence the model has high explanatory power. In addition, the variable parameters are jointly significant (p-value=0.000) with F-statistic of 349.63.

The equation for estimating the log of population with HIV/AIDS reported in column (1) shows that only two HIV/AIDS identifying variables (instrumental variables): log of under-five mortality rate and log of under-five mortality rate squared are individually statistically significant. Log of healthcare expenditure and log of healthcare expenditure squared are not individually significant in the reduced model, though they demonstrate the expected signs. An increase in healthcare expenditure is expected to reduce HIV/AIDS prevalence, which is confirmed by the model. After subjecting the identifying variables to the test of multiple linear restrictions to check whether they are useful or they should be excluded from the model, the variable parameters are found to be joindy significant (p-value=0.0635) with F-statistic of **2.25.** The instruments therefore, qualify to be included in the estimation for HIV/AIDS.

The positive relationship between log of die under-five mortality rate and log of the population with HIV/AIDS may be mostly explained by the fact that an increases in child mortality motivates parents to give birth to more children (seeking to replace the dead or in anticipation that some might die) leading to increased probability of getting infected with HIV/AIDS. The OLS results indicate that a 1% increase in the under-five mortality rate is associated with about 3% rise in HIV/AIDS infection and the variable parameter is significant at 10% level of significance. It is clear from the analysis that die under-five mortality rate has a strong positive effect on the determination of the spread of IIlV/AIDS hence should be treaded as key policy variable. Another variable reported to have a positive effect on HIV/AIDS is the

school age population. The variable appears to be a factor in increasing HIV/AIDS prevalence probably because as the school going age population increases, the probability of having children mosdy born with HIV virus increases resulting in high cases of HIV/AIDS infection.

Table 4.4: Estimate of the Effect of HIV/AIDS on Primary School Enrolment

Dependent Variable	(1)	(2) I	(3)	(4)	(5)
	Log of hiv/Aids*	**Log of primary school enrolment**			
Estimation Method	**OLS Reduced Form**	**OLS Reduced Form**	**OLS Structural Form**	**IV (2SLS) Structural Form**	**IV (2SLS) Hausman Specification Test Form**
Potentially Endogenous Explanatoiy Variable					
Log of population with HIV/AIDS			**-0.2013 (-1.19)**	**-0.2905 (-1.72)**	**-0.2905 (-2.35)**
Exogenous Explanatory **I** *'ariable*					
Log of primary school unit-cost	**0.0215 (0.46) ,**	**-0.0807 (-2.66)**	**-0.1183 (-5.07)**	**-0.1059 (-4.18)**	**-0.1059 (-4.71)**
Log of non-poor population	**0.0495 ' (1.59)**	**0.2354 (5.54)**	**0.2469 (5.68)**	**0.2530 (5.76)**	**0.2530 (5.87)**
Log of school age population	**0.1889 (3.41)**	**0.7387 (18.15)**	**0.6838 (8.91)**	**0.7900 (16.27)**	**0.7900 (19.53)**
Interaction of log of HIV/AIDS and log of school age population			**0.0769 (1.24)**		
Log of healthcare expenditure	**-0.0476 (-0.14)**	**-0.1124 (-0.62)**		**...**	
Log of healthcare expendimre squared	**0.0070 (0.24)**	**0.0067 (0.42)**		**...**	
Log of under-five mortality rate	**2.9537 (1-77)**	**-2.1234 (-3.52)**			**...**
Log of under-five mortality rate squared	**-0.2924 (-1.66)**	**0.2259 (3.58)**			
Constant	**-7.5226 (-1.91)**	**5.7522 (3.64)**	**0.7484 (2.54)**	**0.5517 (2.32)**	**0.5517 (2.65)**
R-Squared	**0.043**	**0.708**	**0.704**	**0.609**	**0.704**
F-Statistic (p - value)	**2.77 (0.008)**	**379.39 (0.000)**	**565.20 (0.000)**	**349.63 (0.000)**	**543.77 (0.000)**
Durbin- Wu-I lausman Testfor Exogeneity of log ofpopulation with HIV/AIDS					
Log of population with I IIV/AIDS Residuals					**0.3223 (2.40)**
Sample Size (Clusters)	**400**	**400**	**400**	**400**	**400**

Note: Numbers in parenthesis are absolute values of robust t - statistics
** I j)g of hiv/Aids stands for Log ofpopulation with HIV/AIDS*

An examination of the reduced form equation for estimating primary school enrolment shown in column (2) confirms the expected high correlation between the

dependent variable and the following explanatory variable: primary school unit-cost (per pupil cost of primary education), household income (proxied by non-poor population derived from the assets index) and the school going age population. All the explanatory variables including the under-five child mortality are individually statistically significant at 1% level of significance and exhibit the expected signs, consistent with theory, except the healthcare expenditure variable. From the results, a 1% rise in the under-five mortality rate leads to a 2.1% reduction of primary school enrolment. The death of a child reduces the number children expected to enroll in school at one time or another, which eventually reduces enrolment.

4.2.2 The Gender Dimension of HIV/AIDS on Primary School Enrolment

Estimation of the gender effects of HIV/AIDS on enrolment involves replacing the log of population with HIV/AIDS variable by die female proportion with HIV/AIDS variable in the model and performing the same estimations and tests as previously described in Table 4.4. The estimated results are presented in Table 4.5 and the descriptions of the columns are the same as in Table 4.4. However, the instruments used for estimating the log of female proportion with HIV/AIDS vary slighdy. Healthcare expenditure instrument has been replaced with the days away from home (the mean number of days an individual is away from home in the last one year) instrument. Frequent field trips, touring places and working away from home among other things is associated with increased probability of getting HIV infection.

According to the Durbin-Wu-Hausman specification test reported in column (5), log of female proportion with HIV/AIDS cannot be rejected as an exogenous variable. Therefore, the 2SLS results are biased hence, the preferred results are the OLS structural model estimates reported in column (3) in Table 4.5. The OLS estimates reveal that, although the proportion of female population infected of HIV/AIDS coefficient has the expected negative sign, it is not significandy different from zero. Therefore, the hypothesis that the gender perspective of HIV/AIDS infection has no effect on enrolment cannot be rejected. The study therefore, concludes that the

decline of primary school enrolment due to a rise in the proportion of female population with HIV/AIDS, though expected is not supported by empirical evidence.

Table 4.5: The Gender Effect of HIV/AIDS on Primary School Enrolment

Dependent Variable	(1)	(2)	(3)	(4)	(5)
	Female with hiv/Aids*	Log of primary school enrolment			
Esumation Method	**OLS Reduced Form**	**OLS Reduced Form**	**OLS Structural Form**	**IV (2SLS) Structural Form**	**IV (2SLS) Hausman Specification Test Form**
Potentially Endogenous Explanatory Variable					
Log of female proportion with HIV/AIDS			**-0.0066**	**-0.0485**	**-0.0485**
			(-0.15)	**(-1.11)**	**(-1.25)**
Exogenous Explanatory **I** *ciriable*					
Log of primary school unit-cost	**0.0873**	**-0.0958**	**-0.1161**	**-0.1120**	**-0.1120**
	(0.60)	**(-4.36)**	**(-5.13)**	**(-5.01)**	**(-5.12)**
Log of non-poor population	**0.0555**	**0.2376**	**0.2461**	**0.2446**	**0.2446**
	(0.47)	**(5.39)**	**(5.72)**	**(5.75)**	**(5.66)**
Log of school age population	**0.6548**	**0.7436**	**0.7356**	**0.7650**	**0.7650**
	(3.34)	**(17.10)**	**(13.00)**	**(19.34)**	**(20.58)**
Interaction log female population with hiv/Aids and log school age population			**0.0023**		
			(0.14)		
Log of days away from home	**-0.7278**	**0.0291**			**…**
	(-1.48)	**(0.33)**			
Log of days away from home squared	**0.3441**	**-0.0126**			**…**
	(1.96)	**(-0.46)**			
Log of under-five mortality rate	**9.7543**	**-2.3514**		**…**	**…**
	(1.48)	**(-3.99)**			
Log of under-five mortality rate squared	**-0.9738**	**0.2508**			**…**
	(-1.41)	**(4.03)**			
Constant	**-24.4682**	**5.9297**	**0.6041**	**0.6051**	**0.6051**
	(-1.58)	**(4.11)**	**(2.47)**	**(2.70)**	**(2.79)**
R-Squared	**0.039**	**0.706**	**0.702**	**0.672**	**0.702**
F-Statistic	**2.54**	**416.33**	**501.08**	**510.86**	**541.63**
(p - value)	**(0.014)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Durbin-Wu-Hausman Test for Exogeneity of log offemale proportion with HIV/AIDS					
Log of Female proportion with HIV/AIDS residuals					**0.0496**
					(1.19)
Sample Size (Clusters)	**400**	**400**	**400**	**400**	**400**

Note: Numbers in parenthesis are absolute values of robust t - statistics
** Female with hiv/ Aids stands for Log of female proportion with HIV/AIDS*

The regression results of the other explanatory variables namely: unit cost, non-poor population and school age population give nearly the same coefficients as reported in Table 4.5 and are statistically significant at 1% level of significance. It is clear from

column (3) that a 10% increase in primary school unit-cost will reduce enrolment by 1.2%. On the contrary, a 10% increase in non-poor population and school going age population is associated with a 2.5% and 7.4% rise in primary school enrolment. The coefficient of the interaction variable between log of female proportion with HIV/AIDS and log of school age population, though positive is not statistically different from zero.

The OLS results reported in column (1) is against the expectation that being away from home increases the chances of contracting HIV/AIDS, as it has taken a negative sign though not statistically significant. However, the square of the variable takes a positive sign and it is significant at 10% level of significance. The results from the reduced form equation for estimating primary school enrolment shown in column (2) does not differ significandy from those reported in same column by Table 4.4.

CHAPTER 5: CONCLUSIONS, POLICY RECOMMENDATIONS AND AREAS OF FURTHER RESEARCH

5.1 Conclusions

The main objective of the study was to investigate the existence of any significant relationship between HIV/AIDS and enrolment in primary education. Further, it intended to examine whether gender dimension on HIV/AIDS infection has any effect on primary school enrolment. Other determinants of primary school enrolment were to be examined as well, in the process of pursuing the main objective.

From the study findings, it has been established that HIV/AIDS infection does affect primary school enrolment significandy (i.e. at 10% level of significance). Perhaps the level of significance could not improve to at least 5% since quite a number of the infected people are still actively involved in their daily operations and are able to fend for their families. All the same the findings that a 10% increase in HIV/AIDS cases reduces enrolments by 2.9% is an issue of major concern. Serious steps towards slowing and reversing the spread of I IIV/AIDS in the country is important. It is also necessary to maintain the infected population strong and healthy before they get full-blown AIDS.

It has also been established that the effect of gender dimension of HIV/AIDS infection on enrolment is not significant. The findings are surprising since it is expected from the literature that women and girls are more susceptible to contraction of the HIV virus. From the findings, although it is necessary to be gender responsive when addressing HIV/AIDS and education, it should not be the core issue. Emphasis should be put on the spread of HIV/AIDS on all the Kenyans, as it is a key determinant of pnmary school enrolment.

Other major determinants of enrolment in primary school are the per pupil cost (unit cost) of education, non-poor population (household income proxy) and the school going age population. The cost of education is currendy being addressed by the free primary education policy. However, this should not be taken too far as it is likely to compromise on quality. From the findings of the study, HIV/AIDS is reducing

enrolments with a higher percentage as compared to the unit cost. Following this argument, the country should increase her spending on HIV/AIDS campaign by a higher percentage than for free primary education.

As expected an increase in the number of the non-poor people (i.e. a rise in the wealth index) in the country, increases the number of pupils enrolled in primary schools significandy. A poor household will not be able to take its children to school since education may not be a priority. There is need therefore to explore ways and means of empowering the people economically so that they can be able to afford any education cost. Although, there is free primary education policy, primary education is not totally free. Parents and communities are still participating in meeting some indirect costs. Programmes geared towards poverty alleviation are likely to improve access, retention and completion rates in school.

5.2 Policy Recommendations

According to the study findings, it is imperative to address effectively the issue of H1V/A1DS, cost of primary education and poverty reduction so as to improve primary school enrolment in the country. In order to address the above issues, the following policy recommendations need to be explored:

1. The Government, NGOs, CBOs and other organizations should intensify HIV/AIDS awareness campaigns. The campaigns should be intensified through mass media, schools, churches, mosques, all community gatherings, drama and music festivals, etc. Since the scourge is a threat to the very existence of Kenyans, no resources should be spared in fighting HIV/AIDS epidemic.

2. Availability and access to free or subsidized drugs for HIV/AIDS treatment is key to reducing the virus infection. Currently, the cost for anti-retroviral drugs is beyond the reach of majority of Kenyans, especially the poor. The Government and development partners have done a commendable job in trying to avail the drugs in public health institutions. This effort needs to be intensified.

3. There is need to intensify and diversify guidance and counseling programmes of HIV/AIDS mfected cases. This will help people living with HIV/AIDS to live positively, be productive and have a longer live, hence being able to fend for themselves and their families. This m-turn will help retain children in school who would otherwise have dropped out of school due to lack of food and school indirect fees among other necessities.

4. The government should continue to offer free primary education, as it will reduce the negative impact AIDS is likely to cause in education. Currendy, the Government has implemented free primary education programme but it's yet to make it compulsory. There is need to make primary education legally compulsory. However, this endevour is quite cosdy since the Government should pay for all the costs in primary education including school uniforms, school feeding programs and all infrastructure development.

5. There is need to intensify the poverty alleviation programmes in order to economically empower the people to improve their standard of living. More emphasis should be laid on the small-scale enterprises/Jua Kali sector since this is the sector, which accommodates majority of the poor Kenyans.

5.3 Areas of Further Research

The data used in this study is provisional hence there is need to get the final data from CBS and confirm the findings of the study. One important variable to verify is the gender component, which has not been found significant contrary to other studies.

Lack of time and funds forced this study to be limited to investigating the effect of HIV/AIDS on primary school enrolments and the gender dimension alone. There is need to study more on the effect of the pandemic on other sectors in the economy such as agriculture, labour force, health, Jua Kali sector among many other things. This will help formulate informed policies and strategies to revive die economy despite the harm the disease is causing to the people.

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APPENDICES

Appendix 1: Trends in National HIV Prevalence Rates, 990 - 2003

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Prevalence Rates	5.1	6.3	7.4	8.5	9.5	10.4	11.2	11.9	12.5	13.0	13.4	13.0	10.6	9.0

Source: NASCOP

Appendix 2: Gross Enrolment Rates in Primary School by Sex, 1990-2001

	1990	1991	1992			1995	1996					
Overall	101.8	91.4	91.0	87.8	88.5	86.8	86.4	87.7	88.8	94.3	92.3	91.9
Boys	104.0	93.4	92.0	88.9	89.1	87.4	87.3	88.7	89.4	92.6	91.1	90.6
Girls	99.6	89.5	90.0	86.7	87.8	86.3	85.5	86.6	88.2	93.5	91.7	91.2

Source: Ministry of Education, Science and Technology
Data for 1999 to 2001 is revised

Appendix 3: Primary School Drop-out Rates by Sex and Province, 1999

	Coast	Central	Eastern	Nairobi	Rift Valley	Western	Nyanza	N - h Eastern	Kenya
Boys	5.2	3.1	6.4	1.6	4.9	5.1	5.5	5.5	5.1)
Girls	5.0	2.6	5.7	1.3	4.7	5.0	6.2	6.9	4.8
Overall	5.1	2.9	6.1	1.5	4.8	5.1	5.8	6.0	4.9

Source: Ministry of Education, Science and Technology

Appendix 4: Primary School Repetition Rates by Sex and Province, 1999

	Coast	Central	T> ..... ii^stem	Nairobi	Rift Valley •	Western	Nyanza	North Eastern	Kenya,;
Boys	14.7	11.6	13.2	3.0	15.6	15.4	12.7	6.5	13.5
Girls	15.1	10.5	13.1	2.4	14.9	13.8	12.2	9.3	12.9
Overall	14.9	11.0	13.2	2.7	15.2	14.6	12.5	7.4	13.2

Source: Ministry of Education, Science and Technology

Appendix 5: Descriptive Statistics of the Variables in Log Form

Variable	Obs	Mean	Std. Dev.	Min	Max
log of primary school enrolment	400	2.81	0.62	0	3.81
log of school age population	400	2.90	0.62	0	4.04
log of population with HIV/AIDS	400	0.71	0.61	0	2.40
log of female proportion with HIV/AIDS	400	2.27	2.23	0	4.62
log of primary school unit-cost	400	7.39	0.96	6.0	9.41
log of non-poor population	400	3.79	1.02	0	5.02
log of days away from home	400	1.18	0.74	0	3.37
log of healthcare expenditure	400	5.78	0.93	3.2	7.48
log of under-five mortality rate	400	4.67	0.38	3.97	5.54

Appendix 6: Key Determinants of HIV Prevalence Rate, 1997

Dependent Variable: lu>g of the HIV Prevalence Rate	*Coefficient*	*t-Statistic*
Log of the Number of Phones per Person (1994)	**-0.84**	*-2.2***
Growth Rate of GDP per capita (1980-90)	**4.58**	**0.5**
Share of Female Labour in Industry (1990)	**-0.0035**	**-1.7***
Muslim (% of population)	**-0.024**	**-5.2****
Ethnic Fractionalization	**0.027**	**3.5****
Time since first HIV case was reported	**0.379**	**2.9****
Labour Migration (1990)	**0.003**	**3.2****
Secondary School Enrolment Rate (1990)	**-0.016**	**-1.2**
Constant	**-1.7**	**-0.85**
R-Squared	*0.69*	
Number ofCountries	*59*	

Source: Bonnel (2000)

** *Statistically significant at 5% level of significance*

* *Statistically significant at 10% level of significance*