

SOCIAL CLASS AND HIV/AIDS PREVALENCE IN SUB-SAHARAN AFRICA

D. Buor

*College of Art and Social Sciences,
Kwame Nkrumah University of Science & Technology, Kumasi-Ghana*

ABSTRACT

The main objective of the paper is to test hypotheses on social class variables as determinants of the prevalence of HIV/AIDS in Sub-Saharan Africa, and to structure a schematic model for the relationship on the impact of social class on HIV/AIDS prevalence. World Bank data, 2002 World Development Indicators, are used for the analyses. Interactive graphs, with a combination of regression lines, are used as the main instruments of analysis. The indicators of social class used for the analysis are education, women's education, Gross National Income (GNI) per capita, level of poverty, urbanisation and contraceptive usage. Inbound tourist movement is included in the analysis, though not directly linked with social class, due to it being an emerging factor in the spread of the pandemic. Education has turned out to be the main determinant of HIV/AIDS prevalence in Sub-Saharan Africa. Inbound tourism movement has emerged as an important factor in the prevalence of the disease, after education. Defects of quality of data would not be far fetched, given the lack of logistics and financial resources of most governments for the exercise, possible political manipulations and ideological biases. It is recommended that primary research at individual country levels be carried out on the effectiveness of the use of condoms, and the social class and tourist movement factors on HIV/AIDS prevalence to confirm the sub-regional findings.

Keywords: *HIV/AIDS prevalent rate, education, female education, regression lines, social class*

INTRODUCTION

The Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) threaten the security of the existing civilisation. For Sub-Saharan Africa which has the highest prevalence rate of HIV/AIDS in the world, with 8.38% of adults infected (The World Bank,

2002), the pandemic is more alarming. Although separate research has been conducted on the determinants of the disease in some countries in the Sub-Region, a holistic study of this threatening problem in this otherwise slowly developing region is yet to be conducted.

Among the determinants of HIV/AIDS, social class has been found to be a major non-clinical factor determining the infection (Parker, 1996).

Such a finding may be intriguing, given the high rate of the infection and disease in the Sub-Region, which is plagued by poverty, ignorance, and sexually-transmitted infections which make for vulnerability to HIV/AIDS. The poverty factor could predispose, especially females, to pre-marital and extra-marital sex which have far-reaching implications for the spread of the infection. On the contrary, women of high social class have been found to have a lower prevalence rate (Meade and Piot, 1993). Such findings which were carried out at different settings of developing countries including Sub-Saharan Africa, appear conflicting and need to be reconciled through a sub-regional survey. Touching on the preventive mechanisms, especially the use of condoms, the educated are more likely to have easy access to their use. On the contrary, the argument that people with better incomes who are more likely to have a minimum level of education and the means to cope with urban life could afford the services of sex workers need not be gainsaid. In a predominately poverty stricken region with low levels of education, especially female education, to what extent will social class influence the prevalence rate of the infection? Such unanswered questions in the Sub-Region strengthen the passion for such a study.

With the HIV/AIDS having a great toll on Sub-Saharan Africa, hence, a great threat to development, a research into the factors that determine its spread is urgent. Such a study shall score certain merits. First, it shall form the basis for a more thorough study of the correlates of the problem in the regions within this major Sub-region. An emerging model shall form a strong basis for structuring more meaningful hypotheses for a more comprehensive survey. Clinical trials shall benefit from such a multivariate study. Secondly, such a survey shall also pivot mechanisms for dealing with the problem in a more pragmatic manner. Disparate studies fail to make recommendations for intervention mechanisms difficult. Thirdly, funding for interven-

tionist mechanisms of HIV/AIDS would be more organised and focused.

CHARACTERISTICS OF SUB-SAHARAN AFRICA AND GENERAL DETERMINANTS OF THE HIV/AIDS INFECTION

Socio-demographic and economic characteristics of Sub-Saharan Africa which show clearly its low-level of development give a bases to analyse the problem of the HIV/AIDS pandemic better. Sub-Saharan Africa has a population of 659 million, covering a land area of 24,267,000 square kilometres, with a population density of 28 persons per square kilometre. It has a Gross National Income (GNI) per capita of \$470, exceeding only South Asia in all the organised geographical regions of the world (The World Bank, 2002^a). It has an average annual population growth rate of 1.9% which is the highest among the recognised regions of the world. The youth as proportion of the working population (dependency ratio) is 0.8, which is the highest in the world. The crude death rate per 1000 people is 17, which is also the highest in the world (The World Bank 2002^b). The area is also in the high health-risk factor zone. The incidence of tuberculosis, an opportunistic infection related to HIV/AIDS, which is 339 per 100000 people, is the highest in the world (The World Bank 2002^c). Yet, her health expenditure of 4.9% of Gross Domestic product (GDP) is the second least in the world coming next to East Asia and Pacific (The World Bank, 2002^d). The socio-demographic and economic indicators put Sub-Saharan Africa among the most deprived regions of the world, and, consequently, in the low status of demographic transition.

Clinical trials have given indications about the causes of HIV/AIDS. The three modes of transmission currently identified are, sexual intercourse, parenteral exposure to blood and blood products, and vertical transmission from mother to child (Meade and Piot, 1993). In Sub-Saharan Africa the main mode of transmission is heterosexual intercourse. The basic risk of acquiring

HIV infection through vaginal intercourse is ten times higher than anal intercourse (homosexuality), and prostitutes have been found to be at a higher risk of infection (Piot, *et al.*, 1987; Johnson and Laga, 1988). The comparatively higher infection among African countries could also be traced to genital ulceration STDs which are more in several African countries (Piot *et al.*, 1988 and Pepin *et al.*, 1989). Related to this are the controversial findings that lack of circumcision is a cause of HIV infection (Van de Perre *et al.* 1987; Simonsen *et al.*, 1988; Bongaarts *et al.*, 1989). Circumcision is almost absent among the ethnic groups of Africa's main AIDS belt (Caldwell and Caldwell 1996; Buve 2000; Gray *et al.*, 2000; Serwadda *et al.*, 2000; Taljaard *et al.*, 2000). Muslim Africa has generally lower HIV/AIDS rates than the rest of Africa (Caldwell 1995; Moses *et al.* 1990; Moses *et al.*, 2000).

A positive correlation exists between HIV infection and socio-economic status (social class) as measured by schooling and income (Kirunga and Ntozi 1991; Bulterys *et al.* 1994; Melbye *et al.*, 1986; Ndili *et al.*, 1986; Parker, 1996). The possibility of having a non-regular sexual partner rises with education, giving rise to higher possibility of contracting STDs including HIV (Filmer, 1998; Deneheffe, *et al.*, 1988).

Women of a higher social class however have a lower prevalence rate (Meade and Piot, 1993; US Bureau of the Census, 1991; Filmer, 1998; Deneheffe, *et al.*, 1988). Besides, prevalence rate is high where there is a small female-male ratio (US Bureau of the Census, 1991). Illiterate and poorly educated women may have low access to information on HIV prevention, and are associated with low contraceptive use (Ghana Statistical Service and Macro International, 1999). HIV infection diffuses through migration, especially urban-rural migration (Hunt, 1996; Smallman-Raynor *et al.*, 1992; Goliber, 1997), and urban areas that have a greater proportion of the population in a higher social class, have

higher rates of infection than rural areas (De Cock, *et al.*, 1989; Phanuphak *et al.*, 1989).

A critical review of the literature gives credence to the fact that multiple sexual partnership, exposure to blood and blood products, intravenous drug use, predisposition to other STDs, maternal infection, urbanisation and mass population movements, social class and political conflicts are the principal factors influencing HIV/AIDS infection. Even though education and income have generally been found to have a positive association with HIV/AIDS prevalence, high rates of infection are associated with women with low education and incomes. Whilst admitting that higher income earners could have greater access to prostitutes, and, are more likely to have multiple partners, the fact that higher income earners have greater access to contraception, cannot be denied. The argument on higher-class status having higher rate of infection however seems overwhelming. These factors therefore formed the basis of the objectives and hypotheses of this paper. Women schooling is included because women with higher social class have been found to have a lower prevalence rate (Mead and Piot, 1993) whilst, in a similar vein, the highest seroprevalence rates are observed in those countries with the poorest record of female education (US Bureau of the Census, 1991).

Tourism rate has been identified as a determinant in Africa. In Africa migrant mobility and cross border movements have been associated with the spread of diseases (Prothero, 1961; 1963). HIV-1 type has been found to be prevalent among mineworkers from Swaziland, Lesotho, Mozambique and Malawi (Smallman-Raynor, *et al.*, 1992).

OBJECTIVES AND HYPOTHESES

The objectives of the study are threefold: Firstly, it is to show the relationship between HIV/AIDS prevalence and social class factors of education, income, poverty and urbanisation. Secondly, it is to structure a model of determinants based on

social class; and, finally to recommend intervention approaches.

The following hypotheses were tested:

1. Countries with high GNI per capita and low poverty rate have high rates of HIV/AIDS infection.
2. A high level of education results in a high rate of HIV/AIDS prevalence.
3. A high level of female education has a negative effect on HIV/AIDS prevalence.
4. Urbanisation positively correlates with the prevalence of HIV/AIDS infection.

DATA AND METHODS

The independent variables used for the study, as analysed in the literature survey, are Gross National Income (GNI) per capita, poverty rate, education (years of schooling for adult population), education of women (years of schooling for female adult population), urbanisation (urban population as percentage of total population), contraceptive usage and inbound tourist movement. Urbanisation and contraceptive usage have some relationship with social class. In the urban centres are the bureaucrats, entrepreneurs, traditional elites, and all the structures of affluent lifestyle whilst contraceptive usage is associated with the educated. Contraceptive usage may however not give a clear picture of safety against the infection since it is not known which methods were largely used. The use of condoms is the most important barrier method which guarantees safety against the infection. The World Bank report however has no data on the methods of contraception. This could affect the credibility of the results. Inbound (international) tourist movement, though does not have a direct relationship with social class, is inserted as an extraneous factor since tourist movement has been found to impact on the prevalence of the disease.

The description of the variables is indicated in Table 1. The study covers 39 countries in Sub-Saharan Africa. World Bank data do not show the sample sizes used for the variables in the

various countries. Whereas the survey year for international poverty lines is 1993 and GNI per capita 2000, that of HIV prevalence is 1999. The survey year for all other variables is 2000. The GNI per capita in US dollars is converted using the World Bank Atlas method whilst the international poverty line is based on nationally representative primary household surveys conducted by national statistical offices or by private agencies under the supervision of government or international agencies and obtained from government statistical offices and World Bank country departments. The Atlas conversion factor for any year is the average of a country's exchange rate (or alternative conversion factor) for that year and its exchange rates for the two preceding years, adjusted for the difference between the rate of inflation and that in the G-5 countries (United States, United Kingdom, France, Germany and Japan). Data on average years of schooling are drawn from Robert Barro and Jong-Wha Lee's International Data on Educational Attainment Updates and Implications (Barro and Jong-Wha, 2000). Although there are some missing variables, generally, more than 80% of the data are covered. Data were analysed using interactive graphs showing regression lines and corresponding regression squares.

RESULTS

The summary of the study variables is indicated in Table 2. The prevalent rate of 9.2% for HIV/AIDS is very high in Sub-Saharan Africa, given that that for low-income countries is 2.01% (The World Bank, 2002). The economy as indicated by a GNI per capita of US\$470 is however better than the low-income economies of US\$410. There are however large disparities. For instance, whereas that of South Africa is US\$3020, that of Burkina Faso is US\$210 (Table 3). Low GNI per capita has implications for health financing, with a serious effect on HIV/AIDS patient care and prevention programmes. Poverty is predominant. Almost 40% of the population receive less than a dollar a day.

Table 1: Description o the Study Variables

	Variable	Description
1	HIV/AIDS Prevalence	The percentage of people who are infected with HIV/AIDS.
2	Poverty [International poverty line]	The population below \$1 a day, i.e. percentage of the population living on less than \$1.08 a day at 1993 international prices.
3	GNI Per Capita	The Gross National Income (in US dollars) divided by midyear population.
4	Education	Years of formal schooling received, on average, by adults ages 15 and over.
5	Education of women	Years of formal schooling of women received, on average, ages 15 and over.
6	Urbanisation [Urban population]	Urban population is the midyear population of areas defined as urban in each country and reported to the United Nations.
7	Contraceptive Prevalence Rate	The percentage of women who are practising, or whose sexual partners are practicing, any form of contraception. It is measured for women ages 15-49.
8	International Inbound Tourist Movement	These are the number of departures that people make from their country of usual residence to any other country for any purpose other than a remunerated activity in the country visited.

Table 2: Summary of the Study Variables

Variables	Mean	Standard Deviation
HIV/AIDS Adult Prevalent Rate (% of Adults)	9.2	8.5
GNP Per Capita	US\$470*	-
Population (%) below the Poverty Line	38.7	18.9
Average Years of Schooling (Total Pop.)	3.2	1.6
Average Years of Schooling (Female)	2.8	1.7
Urban Population as % of Total Population	34.7	15.22
Contraceptive Prevalence Rate	20.61	13.79
International Inbound Tourist Movement	434	1023

*World Bank Estimate (Not mean).

NB: Sample sizes were not indicated in the World Bank data.

SOURCE: Based on World Bank Data, 2002.

Table 3: The Research Data For Hiv/Aids And Social Class In Sub-Saharan Africa

Country	HIV/AIDS Prevalence (Percentage of Adults)	GNI per Capita (US\$)	Percentage below US\$1 a day	Education (Average No. of years of schooling)	Female Education (Average no. of years of schooling)	Urban Pop. as % of Total Pop.	Inbound Tourism Movement ('000s)	Contraceptive Prevalence Rate % of Women ages 15-49
Angola	2.78	290	Nd	Nd	Nd	34	51	.
Benin	2.45	370	Nd	2.3	1.4	42	152	16
Botswana	35.80	1230	33.3	6.3	6.3	50	843	.
Burkina Fasso	6.44	210	Nd	Nd	Nd	19	218	12
Burundi	11.32	110	Nd	Nd	Nd	9	30	.
Cameroon	7.73	580	33.4	3.5	2.9	49	135	19
Central Afr. Rep	13.84	280	Nd	2.5	1.7	41	10	15
Chad	2.69	200	1.9	Nd	Nd	24	44	8
Congo Dem. Rep	5.07	765	Nd	3.0	2.0	30	53	.
Congo Rep.	6.43	570	Nd	5.1	4.6	63	26	.
Cote d'Ivoire	10.76	600	12.3	Nd	Nd	46	301	15
Eritrea	2.87	170	Nd	Nd	Nd	19	70	8
Ethiopia	10.63	100	31.3	Nd	Nd	18	125	8
Gabon	4.16	3190	Nd	Nd	Nd	81	155	33
Gambia	1.95	340	59.3	2.3	1.6	33	96	.
Ghana	3.60	340	44.8	3.9	2.2	38	373	22
Guinea	1.54	450	Nd	Nd	0.7	33	33	6
Guinea Bissau	2.50	180	Nd	0.8	3.7	24	.	.
Kenya	13.95	350	26.5	4.2	4.8	33	943	39

Country	HIV/AIDS Prevalence (Percentage of Adults)	GNI per Capita (US\$)	Percentage age below US\$1 a day	Education (Average No. of years of schooling)	Female Education (Average no. of years of schooling)	Urban Pop. as % of Total Pop.	Inbound Tourism Movement ('000s)	Contraceptive Prevalence Rate % of Women ages 15-49
Lesotho	23.57	4010	43.1	4.2	4.8	28	186	23
Liberia	2.80	580	Nd	2.5	1.5	45		
Madagascar	0.14	250	49.1	Nd	Nd	30	160	19
Malawi	15.96	170	Nd	3.2	2.8	15	228	31
Mali	2.03	240	72.8	0.9	0.6	30	91	7
Mauritania	0.52	370	28.6	Nd	Nd	58	24	
Mozambique	13.22	210	37.9	1.1	0.8	40		6
Namibia	19.54	2030	34.9	Nd	Nd	31	614	29
Niger	1.35	180	61.4	1.0	0.7	21	50	8
Nigeria	5.06	260	70.2	Nd	Nd	44	813	15
Rwanda	11.21	230	35.7	2.2	2.2	6	2	21
Senegal	1.77	490	26.3	2.0	2.0	47	369	11
Sierra Leone	2.99	130	57.0	1.7	1.7	37	10	
South Africa	19.94	3020	11.8	6.6	6.6	55	6001	62
Swaziland	25.25	1390	Nd	6.2	6.2	26	319	
Tanzania	8.10	270	19.9	2.3	2.3	28	459	25
Togo	5.98	290	Nd	2.1	2.1	33	60	24
Uganda	8.30	300	Nd	2.7	2.7	14	151	15
Zambia	19.95	300	63.7	5.0	5.0	45	574	26
Zimbabwe	25.06	460	36.0	4.7	4.7	35	1868	54

SOURCE: World Bank, 2002. Nd-----No data

Fig. 1 GNI Per Capita and HIV/AIDS Prevalence

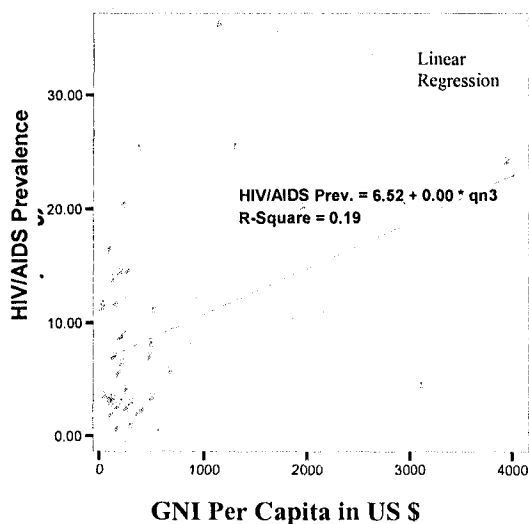


Fig. 2 Poverty and HIV/AIDS Prevalence in Sub-Saharan Africa

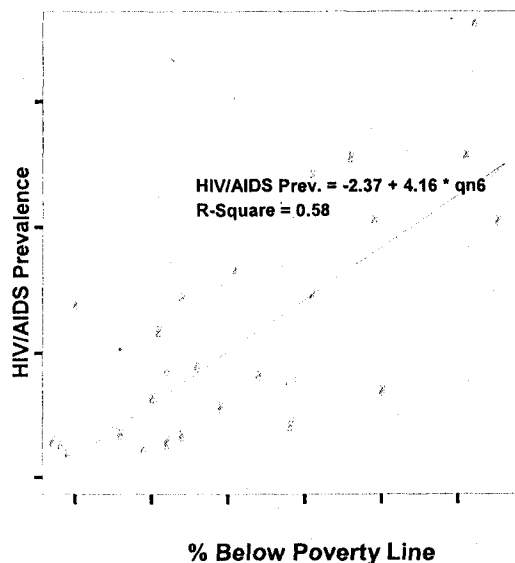


Fig. 3: Education and HIV/AIDS Prevalence

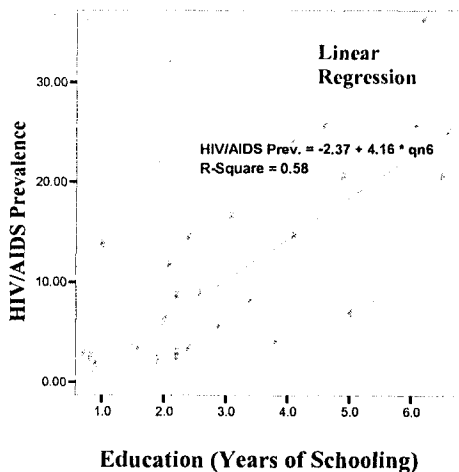


Fig. 4: Women's Education and HIV/AIDS Prevalence

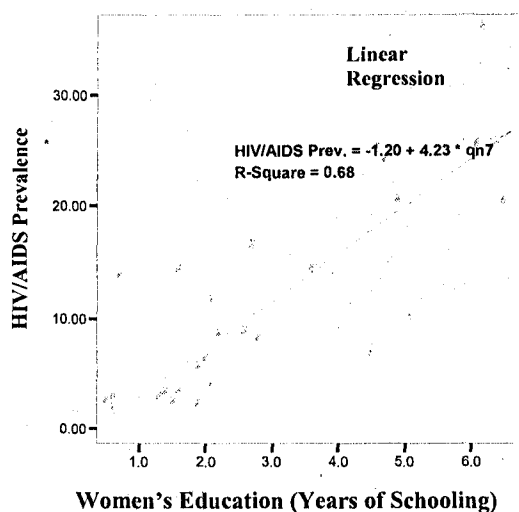


Fig. 5 Urbanisation and HIV/AIDS Prevalence in Sub-Saharan Africa

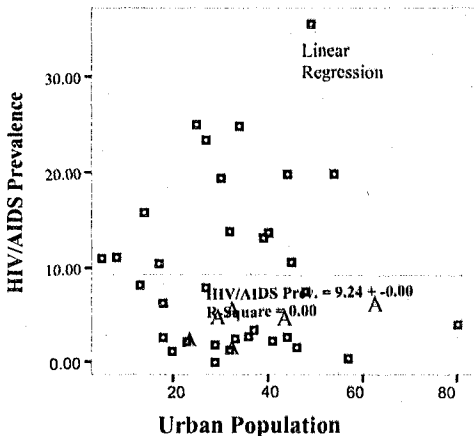
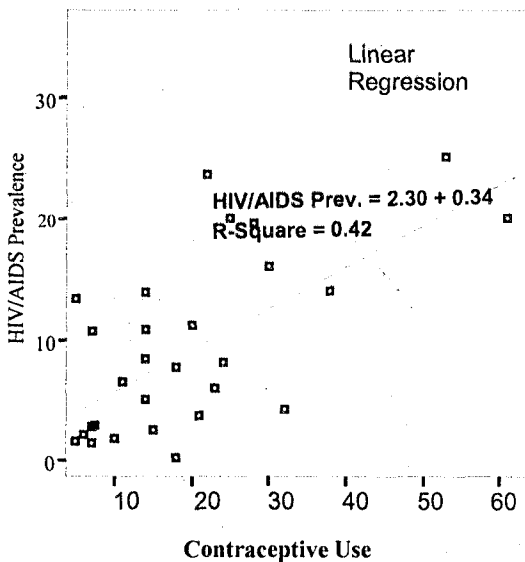


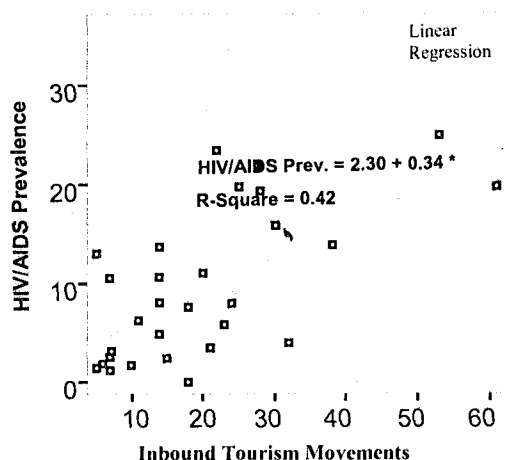
Fig. 6: Contraceptive Use and HIV/AIDS Prevalence in Sub-Saharan Africa



Mass poverty could induce practices like prostitution that could result in the infection.

The status of education as indicated by the average number of years of schooling is low when compared with that of low-income countries. Whereas it is 3.2 years for Sub-Saharan Africa, it is 4.4 for low-income countries. Low level of

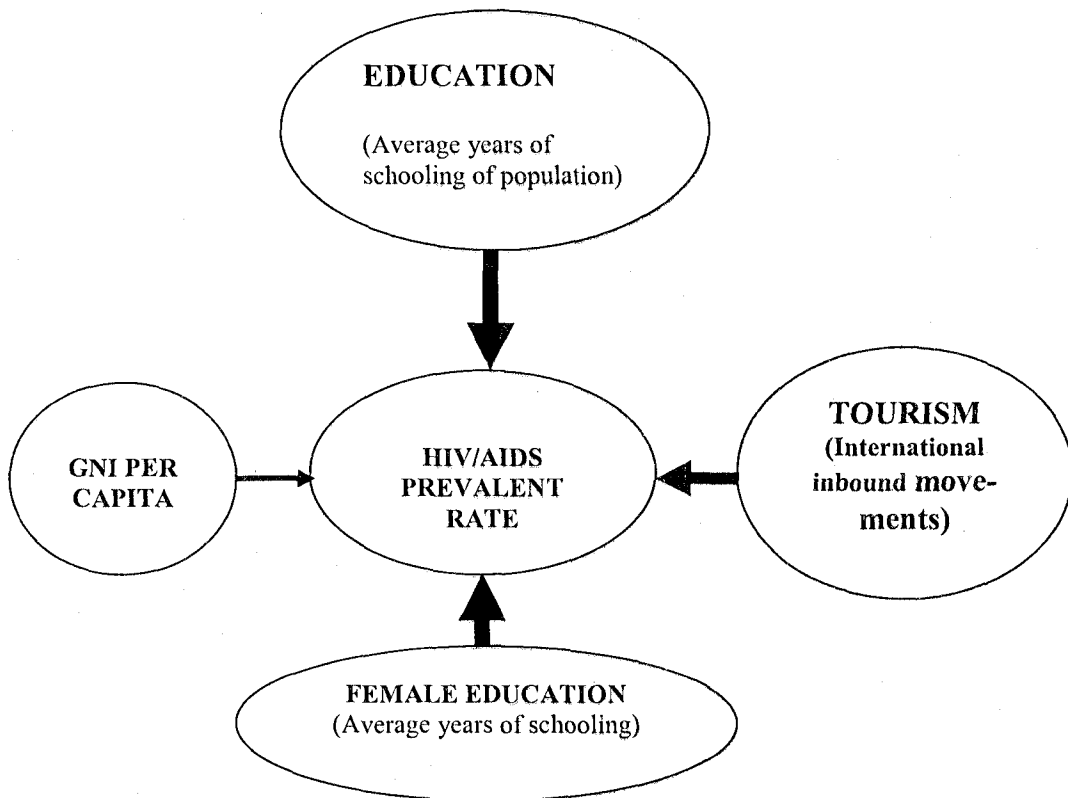
Fig. 7 Inbound Tourism Movements and HIV/AIDS Prevalence in Sub-Saharan Africa



education, as indicated in the literature, has the potential of affecting accessibility of information on HIV/AIDS, a factor that could influence the infection. The same is the picture for female education. Given the vulnerability of females to the infection, and, as indicated by the literature, education of females showing an inverse relationship with their getting the infection, their poor access of education facilities does not augur well for any meaningful programme against the infection. There is just about parity between male and female population, so would not be a serious variable factor. Inbound tourism movement is quite high for Sub-Saharan Africa, compared with low-income economies. Urban population is quite significant, about 34% of the total population, which is higher than that of low-income countries. The mean for contraceptive usage is 20.6% of women ages 15-49 whilst for tourism movement it is 434,000 with a standard deviation of 1,023, implying wide disparities among countries.

Interactive graphs with regression lines show clearly the relationships between the social indicators and HIV/AIDS prevalence (Figs. 1-7). Women's education and education in general

Fig.8 A Schematic Model Showing the Determinants of HIV/AIDS Infection in Sub-Saharan Africa



SOURCE: Based on World Bank Data, World Development Indicators, 2003

have been found to have an impact on HIV/AIDS prevalence, with regression squares of 0.68 and 0.58, respectively. Increase in adult women's and adult population years' of schooling results in an increase in HIV/AIDS prevalence. Urban population has no influence on HIV/AIDS prevalence. An increase in GNI per capita results in an increase in HIV/AIDS prevalence whilst an increase in poverty reduces the prevalence rate of HIV/AIDS. Besides, a high contraceptive usage results in high HIV/AIDS prevalence whilst a high inbound tourist movement exhibits a positive association with HIV/AIDS prevalence.

DISCUSSION

The social class factor of education has emerged as the most important determinant of HIV/AIDS infection. High education correlates with high prevalence rate. The income factor however did not show clearly. Even though there is a positive association between GNI and HIV/AIDS prevalence and an inverse relationship between poverty rate and HIV/AIDS prevalence, the statistical significance for each of the relationships is low. Nevertheless, this gives some indication of the impact of social class variable of income on the prevalence rate of the pandemic. Inbound tourism movement follows education closely as

an important factor influencing the prevalence of the infection.

These findings confirm a study of urban areas of Butare, Rwanda which found that HIV incidence was lower among women in low-income households. It is also established that in Brazil, one-third of AIDS cases had a secondary or university education (Parker, 1996). It further gives credibility to the studies that the probability of having non-regular sexual partners, which is a risk factor of HIV infection, rises with education (Filmer, 1998; Deneheffe, et al., 1998). This fact is however uncorroborated by studies by the US Bureau of the Census (1991), which observed that the highest seroprevalence rates are observed in those countries with the poorest record of female education.

That urbanisation corresponds positively with the infection could not be justified. A high contraceptive usage rate shows a positive association with the rate of infection. The reason to assign, as indicated above, could be the probability of a low usage of condoms. The hypothesis that a lower female education corresponds with a high infection rate could not be supported by this research. A survey to show the relationship between the various levels of education and the rate of infection may bring out the reality of the relationships than aggregated data.

Whilst accepting that the quality of the data is generally guaranteed since most of the statistics are the product of national statistical agencies, one would admit that there could be limitations and weaknesses. Sources of weakness could be under-funding of the various agencies that could affect the procurement of the requisite logistics for quality work. Lack of training of staff is also another possible source. One could also not rule out possible pressures from political authorities to modify the statistics for political reasons. The World Bank however goes beyond the presentations by various agencies by establishing standards, sharing knowledge, and coordinating the

collection and dissemination of international statistics (The World Bank, 2002). Failure of some variables that have theoretical significance as determinants of HIV/AIDS may not have emerged in the Sub-Saharan African situation due to some of such possible weaknesses.

Certain policy issues emerge from the study. Education, as a national policy, should run concurrently with sex education, especially, education on HIV/AIDS. Sex education should be integrated in the school curricula. For the illiterate adults a Non-Formal Educational programme that has sex education as a key component must be introduced. There must also be an aggressive programme to sensitise the educated elite against the dangers of the infection and its implications for development. Since the educated are more likely to have access to the print and electronic media, education on the reality of HIV/AIDS must be grafted into their daily programmes and print pages. The use of condoms must be made mandatory for commercial sex practitioners, and sanctions must be enacted against violators. Since religion and chieftaincy are intrinsic in the culture of the people, religious leaders and chiefs must be made part of the counselling process. The research finding that contraception use shows a strong positive association with the prevalence of the infection gives an indication that the use of condoms is low. There should be national policies on the effective use of condoms. The sale of condoms on the open markets must be encouraged, and there must be a thorough education on their use. Inbound tourist movements have been found to show a positive association with HIV/AIDS prevalence. There must therefore be a strict immigration policy to screen international tourists to Sub-Saharan African countries to identify the infected.

A schematic model emerges from the study (Fig.8). Education in general, and female education in particular, make the most significant impact on HIV/AIDS infection. GNI per capita and tourism (international inbound) however show a

weak positive association with the HIV/AIDS prevalence rate.

Further research directions are recommended. Contraceptive usage showed a positive association with HIV/AIDS prevalence. The conclusion is that there might be a very low usage of condoms. It is thus recommended that individual country studies, using sample sizes with insignificant sample errors, be carried out on the effect of condom use on the prevalence rate. Secondly, the positive association between education and GNI per capita and HIV/AIDS prevalence confirms the hypothesis that social class is positively associated with the prevalence. Yet, there is the conviction that the educated and wealthy have easy access to information on protective mechanisms, and would also have the financial means to purchase condoms. Some studies, as indicated in the literature survey, have shown that education shows an inverse relationship with HIV/AIDS prevalence rate. There is therefore the need for further research at the country level to clear the hypothetical confusion.

CONCLUSIONS

Education in general, and, especially, female education has emerged as the most important determinant of HIV/AIDS infection. The impact of the economy and poverty on HIV/AIDS prevalence rate is however negligible statistically. Therefore, whereas education as a social class factor affects HIV/AIDS prevalence rate, income (economy) has an insignificant impact on it. The hypothesis that social class has a positive influence on HIV/AIDS prevalence cannot be nevertheless negated, given that education is a strong social factor. The effect of contraception usage has no effect on the prevalence of the pandemic. Data did not show the type of contraception. Data on the use of condoms, which is the most effective strategy to avert the spread of the pandemic, are not available in the World Development Indicators. Even though the data used may suffer from defects like sample errors, underestimation and overestimation, the results

nevertheless express the significant variables, especially education, influencing HIV/AIDS prevalence as indicated in the literature survey. Primary prevention strategies, as recommended, could help reverse the upward trend of the prevalence rate. The study has structured a schematic model on the correlates of the HIV/AIDS prevalence that could form the basis for an empirical survey in the respective countries in Sub-Saharan Africa.

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