The Continuing HIV/AIDS Epidemic in Africa 1999, 1-8

Routes to HIV transmission and intervention: an analytical framework

Kofi Awusabo-Asare[a] and John K. Anarfi[b]

[a] *Department of Geography, University of Cape Coast, Cape Coast, Ghana*

[b] *ISSER, University of Ghana, Legon, Accra*

Research and intervention strategies on HIV/AIDS in sub-Saharan Africa are increasingly recognizing the socio-cultural, economic, environmental and political dimensions of the epidemic. Gender inequality, manifesting itself in double sexual standards for males and females; the general vulnerability of women which partly accounts for a wide range of female reproductive health problems; and variation in socio-economic and political status by gender, have emerged as some of the factors increasing the spread of HIV infection in parts of Africa (Standing and Kisekka 1989; Standing 1992; Mason 1994; Caräel *et al.* 1997; Orubuloye, Oguntimehin and Sadiq 1997). Lack of male circumcision has also been suggested as a possible reason for elevated rates of female-male infection in parts of Africa (Simonsen *et al.* 1988; Bongaarts *et al.* 1989; Caldwell and Caldwell 1994; Marck 1997). Other factors such as poverty, type of residence, mobility, displacement as a result of wars and social as well as political unrest have been associated with the spread of HIV among some groups of people. Anarfi (1997:282) has noted that HIV infection in parts of sub-Saharan Africa, among for instance street children, 'may be the result of multiple infections under conditions of poor nutrition due to poverty'.

The present focus on the broad issues of HIV infection now complements earlier studies which focused mainly on biological and individual or group risk behaviour such as that of prostitutes, long distance truck drivers, homosexuals and intravenous drug users. Although these initial studies of individuals and risk groups helped in our understanding of the epidemiology of HIV, they have not been able to fully explain the variations in prevalence between and within countries. The epidemiological approach has provided information on proximate factors which predisposed individuals to infection. However, the socio-cultural, economic, environmental, political and other issues which operate through the proximate factors to either hinder or elevate the level of HIV infection in various parts of the region have not been so fully considered (Caräel *et al.* 1997).

The continuing discussions about factors accounting for the spread of HIV parallel earlier discussions about child survival in which social science research focused on the socio-cultural, economic and environmental correlates of child survival while medical science research was mostly concerned with genetic, biological and behavioural risk factors which contributed to poor survival outcomes (see Mosley and Chen 1984). Similarly, while social science research on HIV/AIDS stressed the context in which the individual and groups operate, epidemiologists focus more on 'proximal' factors. As pointed out by Mosley and Chen, each has a black box which is barely explained. Whereas epidemiologists sometimes take for granted the socio-cultural context in which individuals operate, the social scientist is not able to indicate the pathways through which factors such as gender inequalities and poverty lead to risk-taking behaviour and subsequent infection.

Given the degree to which the epidemiological and socio-cultural approaches from nearly two decades of research in HIV/AIDS complement each other, there is now a search for paradigms that capture both the contextual and the proximate factors in one model. Fontanet

and Piot (1994) provide a model of the dynamics of heterosexual transmission in three overlapping circles consisting of epidemiological variables, transmission risk factors and socio-economic variables. In a review of the approaches available so far, Caräel *et al.* (1997:29) observed three broad areas: epidemiological, cultural and socio-economic approaches; they note that another factor missing in all these approaches is the 'political determinants governing many areas of people's lives'. This paper contributes to the search for an explanation of the spatio-temporal variations in HIV infection and the responses that have emerged.

This paper proposes a proximate determinants model as a framework for analysing routes to HIV infection and intervention. The model attempts to bring together the remote and the proximate factors responsible for risk-taking behaviour and subsequent infection. With HIV infection resulting from background and proximate factors, intervention strategies that are being designed should consider the multi-layered nature of the epidemic. For instance, in dealing with guest workers, it is necessary not only to promote condom use but also to address some of the factors which dispose the workers to patronize commercial sex workers, such as separation from partners. Asking married workers to bring their wives with them could eliminate some of the factors that contribute to sexual networking and possible exposure of such people to the risk of STD infection. In effect, the model will offer the opportunity for HIV/AIDS intervention programs to tackle both the causes and their manifestations.

Proximate determinants framework

Conceptually, it is possible to identify a set of proximate variables through which social and economic variables operate to give rise to morbid conditions or death (Bongaarts *et al.* 1989; Mosley and Chen 1984; McCarthy and Maine 1992). As in the general proximate framework, there are proximal factors which immediately link up with exposure or non-exposure and risk-taking or non-risk-taking behaviour which lead to infection or non-infection (Table 1). These areas are identified and discussed briefly below.

Table 1
Routes to HIV infections in sub-Saharan Africa

	Background	**Intermediate/Proximal**	**Outcomes**	
Socio-cultural		**Genetic**		I
Beliefs	Ambiguity to premarital sex	HIV-1 versus HIV-2		
Practices	Age-sex interrelationship	Subtyping of the virus	Risk	N
Norms - e.g. gender inequality	Postpartum abstinence	Cellular immunity		
	Circumcision? Initiation ceremonies;	Virus-cell relationship	taking	F
	injections			
Political and Economic		**Biological**	behaviour/	E
Pattern of socio-economic	Development/unequal development	Reproductive tract infection and		
development	Enclaves: unequal access to resources, rural-	sexually transmitted diseases	exposure	C
Inequalities of power	urban gaps, migration	Homosexual/heterosexual		
	Collapse of economy and structural	Anal intercourse	to	T
	adjustment	Intercourse during menstruation		
	Different power relations: instability, open	Lack of male circumcision	risk	I
	conflict, human rights abuses			
Environmental		**Behavioural**		O
Health and nutrition	Level of health care and diseases	Multiple partnership -		
Sanitation	Presence of opportunistic infections	serial/concurrent		N
		Age at first intercourse		
		Use or non-use of condoms		
		Use of contaminated needles		

Contextual issues

Socio-cultural

Socio-cultural issues consist of the milieu at home and in the community with its associated norms and values, kinship and marriage, networks of social obligations, rewards and sanctions, signs of communication and the development of attitudes, preferences and behavioural patterns. Issues such as gender inequality, gender roles and the perception of life and death are, to a large extent, the outcome of the socialization process of the individual (Mason 1994; Caräel *et al.* 1997; Twa-Twa 1997). All these factors reinforce one another and contribute to shaping people's normative behaviour including sexual activity and risk-taking behaviour. Although 'culture' does not condemn members of a collective to a static and common way of life and although that culture may be dynamic, the institutions and the processes of socialization largely influence people's attitudes and behaviour. For instance, it is possible to identify such attitudes as respect for age, pronatalist views and belief in the extended family system and associate them with the African way of life.

Political economy

Factors under this heading include broad indicators of the political economy of a country or region which, either directly or indirectly, influence whether people live or die. First, the pattern of socio-economic development inherited from colonial governments and continued after independence has created spatial inequalities within countries. This has in turn led to migrations from the less developed to the more developed areas. Unfavourable world market prices for certain primary products have led to the near-collapse of some of the primary producer economies, resulting in a fall in the general standard of living. The spatial inequalities and declining economies in some countries have been made worse by International Monetary Fund/World Bank-led structural adjustment programs.[1] Furthermore, economic inequalities and declining economies at the subregional and global levels have contributed to large-scale migration as observed in West Africa. Poverty, both absolute and relative, has been found to influence the actions of individuals and groups. A number of researchers have alluded to the contribution of poverty to risk-taking behaviour (Anarfi 1997). On the other hand, access to high income and other resources has also been associated with such risk-taking behaviour as multiple partnerships. Political instability leading to minor wars and major upheavals as well as human rights abuses in some parts of Africa also contribute to refugee situations in some areas and collective vulnerability in others. These have in turn contributed to some degree of risk-taking behaviour. After all, travelling and getting involved in commercial sex work in order to survive may be a less traumatic experience than being brutalized by soldiers in one's own country.

Political policies that enhance the common good and those that discourage or eliminate 'negative externalities' (Ainsworth and Over 1994) are known to have implications for the spread of HIV. The disruptions in Angola, Liberia and Sierra Leone are considered to have produced conditions conducive to the spread of infection. At the intervention level, the recent decline in incidence of HIV among pregnant women in Uganda has been attributed

---

[1] There is a continuing debate about the effects of structural adjustment programs on the social and economic conditions of African countries. See, for instance, Anyinam (1989).

partly to the commitment of the government of that country to tackling issues relating to HIV transmission.

Environmental factors

Environmental factors include such elements of life as sanitation, diet, available health care and malnutrition. These may contribute to the individual's vulnerability to opportunistic infections. In Africa such aspects of life and the environment are known to contribute to the high level of HIV transmission.

Proximal issues

The contextual factors do not, by themselves, lead to risk-taking behaviour but rather operate through some proximate factors to either hinder or elevate the level of HIV infection. The proximate factors are individual genetic, biological and sexual behavioural patterns that directly influence transmission and infection. These are (1) genetic factors: HIV-1 versus HIV-2, subtype of virus, cellular immunity, and virus-cell relationships; and (2) biological factors: reproductive tract infection and sexually transmitted diseases, homosexual or heterosexual relations, anal intercourse, intercourse during menstruation, male circumcision, use of vaginal products, stage of the disease of discordant partner, and level of prevalence in the community. Differences in male-female infectivity have also been observed, although the evidence is inconclusive (Fontanet and Piot 1994).

Behavioural factors

A number of studies of HIV infection have identified 'risky' behaviour, such as non-regular multiple partnerships, which may be serial or concurrent (Morris and Kretzschmar 1997); use or non-use of condoms; use of contaminated needles and skin-piercing instruments; and blood transfusion. Age at first intercourse and the related circumstances can also constitute 'risky' behaviour.

These proximate factors interact with one another to create conditions for infection. For instance, the probability of being infected will be higher for a person with multiple partners in high-prevalence areas than for another person with the same number of partners in a low-prevalence area. Similarly, the level of infectivity of an infected person has implications for the rate of transmission to the discordant partner where condoms are not used.

Outcomes

These proximate factors then lead directly to risk-taking behaviour or exposure to risk of infection. Table 2 gives some of the implications of the issues for infection, subsequent spread and exposure to risk. The social meaning of diseases, for instance, determines people's health-seeking behaviour. This can lead to exposure to risk such as the use of the services of unqualified health workers in villages, blood-letting for the cure of some diseases at fetish shrines and an inability to seek help early.

Routes to intervention

The proximate determinants framework as presented also provides a starting point for the design intervention programs. Traditionally, interventions have been geared towards addressing the proximate issues. Interventions such as condom distribution, counselling of infected persons and programs for behavioural change target the intermediate factors that

lead to risk-taking behaviour or exposure to risk. Although some of these interventions have been successful, they have not been sustained in sub-Saharan Africa partly because they did not address the basic (contextual) problems confronting individuals and groups.

Table 2
Routes to intervention

Background	Issue	Reaction
Social	Social meaning of disease ignorance Risk-taking behaviour	Stigmatization Isolation Withdrawal
Political-economic	Poverty Strategies for development (e.g. withdrawal of subsidies) Migration Risk-taking behaviour	Inability to seek help Inability to pay for health care Use of quack doctors
Other		
Health	Infectious and parasitic diseases	Existence of opportunistic diseases
Nutrition	Poor diet	Early deterioration

The implied assumption in using the model is that interventions should examine both the context and the immediate factors. Evidence from programs such as those targeting women for income generating activities have been highly successful when the concerns of men and the significant others have been considered in the design and implementation of the program. Some recent interventions have attempted to address both the context and the proximate factors. Among them are programs such as those helping prostitutes and street youth get off the street.

Table 3 gives some examples of programs targeting both the proximate and contextual issues. In a program to meet the aspirations of married women to have an improved sex life, the proximate strategic response would be to provide information and organize reproductive health services for the women. The contextual response should include assessment of marital discord and should bring the husbands together for discussion. The Planned Parenthood Association of Ghana has tried this process in the context of reproductive health in the Ashanti Region of Ghana.

Conclusion

Although researchers have recognized the various factors contributing to HIV/AIDS infection and the epidemiology of its transmission and spread, we have yet to provide a single framework for analysing the interface between the remote and the proximate factors. This paper provides a broad framework for HIV/AIDS transmission and intervention. It provides a paradigm for examining the routes to infection and to intervention.

Most interventions to date have concentrated on the proximate factors. Although helpful, they have not been able to address the contextual problems which are more difficult to trace and deal with in those programs. The argument is that HIV/AIDS interventions will be more successful if they incorporate both the context and the immediate factors that predispose people to infection.

Table 3
Intervention strategies

Issue	Individual (proximal)	Collective (contextual)
Hiring male migrants at construction sites (workers to live at site away from home)	Providing HIV/STD prevention information and services	Migrant male labourers to move to work site with wife/girlfriend
Aspiration for increased and better health care among commercial sex workers	Providing reproductive health information and information about where to obtain services	Assess possible sources of health care; determinants of self-esteem and factors contributing to physical and mental well-being. Creation of effective and sustainable referral system.
Aspiration for improved sex life for married women	Organizing and providing reproductive health information and services to married women	Assess issues of marital discord in home. Bring husband into group to discuss sex.

References

Ainsworth, M. and A.M. Over. 1994. The economic impact of AIDS on Africa. Pp. 559-588 in *AIDS in Africa*, ed. M. Essex, S. Mboup, P.J. Kanki and M.R. Kalengayi. New York: Raven Press.

Anarfi, J.K. 1997. Vulnerability to sexually transmitted disease: street children in Accra. *Health Transition Review* 7(Supplement):281-306.

Anyinam, C.A. 1989. The social costs of the International Monetary Fund's adjustment programs for poverty: the case of health care development in Ghana. *International Journal of Health Services* 19,3:531-547.

Bongaarts, J., P. Reining, P. Way and F. Conant. 1989. The relationship between male circumcision and HIV infection in African populations. *AIDS* 3(6):373-377.

Caräel, M., A. Buve and K. Awusabo-Asare. 1997. The making of epidemics: what are the driving forces? *AIDS* 11(Supplement B): S23-S31.

Fontanet, A. and P. Piot. 1994. State of our knowledge: the epidemiology of HIV/AIDS. *Health Transition Review* 4(Supplement):11-22.

Marck, J. 1997. Aspects of male circumcision in sub-equatorial African culture history. *Health Transition Review* 7(Supplement):337-360.

Mason, K.O. 1994. HIV transmission and the balance of power between women and men: a global view. *Health Transition Review* 4(Supplement):217-240.

McCarthy,J. and D. Maine. 1992. A framework for analyzing the determinants of maternal mortality. *Studies in Family Planning* 23,1:23-33.

Mosley, H. and L.C. Chen. 1984. *Child Survival: Strategies for Research*. *Population and Development Review* 10(Supplement). New York: Population Council.

Orubuloye, I.O., F. Oguntimehin and T. Sadiq. 1997. Women's role in reproductive health decision making and vulnerability to STD and HIV/AIDS in Ekiti, Nigeria. *Health Transition Review* 7(Supplement):329-336.

Simonsen, J., D. Cameron, M. Gakinya *et al.* 1988. Human Immunodeficiency Virus infection among men with sexually transmitted diseases. *New England Journal of Medicine* 319,5: 274-278.

Standing, H. 1992. AIDS: conceptual and methodological issues in researching sexual behaviour in Sub-Saharan Africa. *Social Science and Medicine* 34,5:475-483.

Standing, H. and M.N. Kisekka. 1989. *Sexual Behaviour in Sub-Saharan Africa: A Review and Annotated Bibliography*. London: Overseas Development Administration.

Twa-Twa, J.M. 1997. The role of the environment in the sexual activity of school students in Tororo and Pallisa districts of Uganda. *Health Transition Review* 7(Supplement):67-81.