IPC STAFF PAPER
No. 75

SEXUALLY TRANSMITTED DISEASES

IN SUB-SAHARAN AFRICA

AND

ASSOCIATED INTERACTIONS WITH HIV

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April 1995

SUMMARY

STDs are a major cause of morbidity in Sub-Saharan Africa. Certain sociological and demographic trends have influenced the spread of STDs, including urbanization and family living patterns. In patrilineal societies, where men maintain a strong control over women, STD rates appear to be higher.

STD infections tend to persist in core groups of individuals who practice high-risk behaviors (i.e., have many partners) and serve as reservoirs of infection. Core groups can include prostitutes, male clients of prostitutes, long-haul truckers, military personnel and migrant workers. However, core group members do not restrict their sexual activities to other core group members and the extent of sexual mixing is a strong determinant of prevalence levels.

Only limited information is available on STD rates in Sub-Saharan Africa. It is difficult to ascertain consistent patterns in the STD prevalence data. Even within the same population groups, much variability was discovered. Most studies have been conducted on prostitutes and STD clinic patients, but these are not representative of the general population. More screening programs need to be developed for women, since many infected women are asymptomatic.

The interaction between STDs and HIV is complex. Both HIV and the traditional STDs share a common mode of transmission through sexual contact. They share the same behavioral risks. An array of studies is presented which shows that both ulcerative and non-ulcerative STDs increase the risk for HIV transmission. Chancroid and syphilis have clearly been implicated as risk factors for HIV transmission. Other studies are also finding an association between gonorrhea and HIV infection. Interventions which lead to the reduction of the levels and durations of these STDs should have an impact on the HIV epidemic.

There are few STD surveillance systems in Sub-Saharan Africa. Surveillance and rapid response to identify disease threats are at the core of preventive medicine. Better testing and monitoring of infection levels will lead to clearer program and control objectives. STD control is one of the key components to HIV prevention and control. Intervention programs that include condom promotion and behavior change would benefit both STD and HIV control programs. In addition, early detection and treatment of STDs would reduce the incidence and duration of STDs and, as a result, would reduce the incidence of HIV infection.

Since there are few sentinel surveillance systems in Africa reporting levels of STDs, a compilation of studies that report STD seroprevalence level into an STD database would be extremely useful for those interested in assessing the extent of STD infection in these countries. The data presented in this report will be the basis for such a database.

TABLE OF CONTENTS

VIRAL AGENTS:

Herpes simplex type 2	genital ulcer	genital cancer
Human papilloma virus (HPV)	genital warts	genital cancer
Hepatitis B virus (HBV)	acute hepatitis	chronic hepatitis cirrhosis hepatoma vasculitis

PROTOZOAL AGENTS:

Trichomonas vaginalis (trichomoniasis)	vaginitis	pelvic inflammatory disease

Chancroid is considered the most common type of genital ulceration in Africa, but there are marked geographical variations in rates. In some West African countries, herpes and syphilis may be more common [3,225]. Chancroid may constitute between 40-80% of genital ulceration, syphilis 9-17%, chlamydia 0-12% and herpes 5-15% in sub-Saharan Africa [4]. Ulcerative and non-ulcerative STDs have both been implicated in the transmission of HIV. In fact, the impact of non-ulcerative STDs on HIV transmission may be more important on a population level since their prevalence and incidence is much higher than genital ulcer disease (GUD) in many populations [8,142,235]. It is vital that the incidence of both ulcerative and non-ulcerative STDs be controlled and cases properly managed.

THE SOCIAL CONTEXT OF STDS IN AFRICA

STDs are transmitted through a complex interplay among the natural infectiousness of the pathogen, the duration of infectivity of the human host, and the rate of sexual interaction between people [2]. The rate of change in sexual partnerships is a major determinant in STD rates. It must be noted however, that sexual behavior across societies is very heterogeneous. Unfortunately, there is a scarcity of information on sexual behavior, particularly in developing countries [227].

Certain demographic and sociological trends witnessed in Africa have been linked to the prevalence of STDs. Since independence, countries in Africa have seen an increase in rural-urban migration. This creates an excess of males in urban areas and a corresponding excess demand for female sexual partners. In East and Southern Africa, this migration stream has been mostly male since few employment opportunities exist for women. The result is a reliance by women in these urban settings upon prostitution as a way to earn a living. In other cities, poverty, war and political upheaval have influenced sexual behavior patterns [226]. To a certain extent, a delay of "formalized unions" is also seen as a contributor to the spread of STDs. "Free unions" constitute approximately 10-40% of all unions in Africa while 15-20% of first marriages are broken after 5-10 years duration [17].

STD infections tend to persist in core groups of individuals who practice high-risk behaviors (i.e., have many partners) and serve as reservoirs of infection. In Africa, core groups which have been identified include

INTRODUCTION

Sexually transmitted diseases (STDs) have long been a major cause of adult morbidity and mortality in Africa, resulting in serious health problems particularly for women and children. Now, with acquired immune deficiency syndrome (AIDS) causing inordinate amounts of morbidity and mortality in Africa and the implication of STDs in the transmission of the human immunodeficiency virus (HIV), it is time to readdress the STD problem with a new sense of urgency.

The actual number of persons in Africa infected with HIV, the virus that eventually causes AIDS, is not known. Neither do we know with any degree of reliability the percentage of the populace afflicted with sexually transmitted diseases because African governments have been unable or unwilling to develop disease surveillance systems which allow measurement of disease burden. STDs cause a higher incidence of long term complications and consequences in tropical regions than in any other regions of the world [8]. There is now increasing evidence that certain STDs are implicated in facilitating transmission of HIV.

This report provides an extensive epidemiology of STDs and illuminates possible interactions between them and HIV/AIDS. A number of studies are cited in support of the various hypothesized interactions. Detailed tables of STD prevalence in Africa are found in Appendix A. In Appendix B, recommendation for an STD data base, coupled with pertinent information to include in the data base, and suggestions for accompanying reports are presented. The rationale for and implications of implementing surveillance systems are explored in Appendix C. The natural history and treatment for each of the most common STDs in Africa are described in Appendix D. For more indepth clinical and treatment information on STDs, the reader is referred to several recent books and reviews: Wasserheit, Aral, Holmes, and Hitchcock [1], Piot and Holmes [8], and Piot and Tezzo [83].

The following table lists the more commonly-occurring STD pathogens with associated acute and chronic diseases which result from infection [2].

BACTERIAL AGENTS:

Pathogen	Acute Disease	Chronic Disease
Neisseria gonorrhoeae (gonorrhea)	cervicitis urethritis salpingitis	pelvic inflammatory disease ectopic pregnancy infertility
Chlamydia trachomatis (chlamydia)	same as gonorrhea	same as gonorrhea
Treponema pallidum (syphilis)	primary/secondary syphilis	neurosyphilis cardiovascular syphilis gumma
Haemophilus ducreyi (chancroid)	genital ulcer	impotence

A large percentage of the prevalence studies cited in this report are nonrepresentative of the general populations of these countries and are self-selected samples. Most of the research has been conducted amongst STD clinic patients and prostitute populations where infection rates are undoubtedly higher than in the general population. Those who do eventually participate may have certain demographic and socioeconomic characteristics not shared by those who do not participate. Generalizations of these results to the general population may be inappropriate. Nevertheless, STD patients could be considered representative of those in a population with multiple sexual partners even though the sample is self-selected. To the extent that people are reluctant to go to a clinic for treatment or self-treat, the sample is biased, and any inferences still need to be made with caution.

A number of studies have been carried out in populations of pregnant women. These women can be surrogates for a general population grouping even though the data are still subject to biases. Pregnant women tend to be at higher than average risk for sexually transmitted disease since they are sexually active. They also are younger than the overall female population, drawn from a narrow age range and overwhelmingly married. On the other hand, studies of pregnant women may actually under-estimate the prevalence of some STDs, since infertility is often a sequela of STDs in Africa.

A rigorous review of epidemiological methods used to study the interaction between STDs and HIV has been written by Mertens, *et al.* [228]. This review discusses in detail the issue of cofactors, study design and analysis in studying the association between STDs and HIV. The authors recommend the use of intervention studies to overcome many of the biases associated with observational studies.

HIV and STDs are generally both acquired through sexual activity, therefore sexual behavior is an important cofactor. The study design needs to control for the sexual behavior of the subjects, their age, the duration of any HIV infection (if a subject of the study), their baseline immune response and coinfection with other STDs. Misclassification of confounding variables may lead to either an overestimate or underestimate of the extent of the association between STDs and HIV [228]. The number of exposures to STD pathogens rather than actual presence or absence of pathogens at the time of the study may be the real risk factor for HIV infection and/or progression [16]. There is a risk of misclassification and underdetection of STDs in studies of women because women with STDs are largely asymptomatic [235]. Therefore, asymptomatic STD cases and the usual resource constraints may make it difficult to reach definitive conclusions of STD/HIV interactions under the best of circumstances.

Prevalence studies (case-control or cross-sectional studies) cannot establish causality between STD and HIV infection nor obtain true incidence rates for the various diseases. Since HIV is an STD and is transmitted in the same way, the presence of another STD could merely be a marker for high-risk behavior rather than a causal link in HIV transmission. A number of cross-sectional studies are focused on high-risk populations, reducing the number of patients that need to be studied. However, care must be taken in generalizing the results of these studies to the general population as there may be major differences in risk factors and cofactors [228].

Longitudinal studies are required in order to establish both temporality and incidence. Randomized controlled trials which include a comparison group are ideal in this regard. Unfortunately, there are few studies that utilize a comparison group for control purposes, mainly due to cost constraints. The question of including comparison groups is probably the single most important consideration for researchers when they design their studies. Two other problems which affect all longitudinal studies include: 1) the ethical issue of treating the STDs promptly as they occur therefore reducing the likelihood of detecting any association between STDs and HIV, and 2) the frequency of HIV testing and the accuracy of data on the time STDs were acquired [228].

Even prospective studies may not be able to establish a temporal sequence due to the delay between HIV infection and the development of antibodies [229]. Some researchers believe that a community intervention study is the only design that will establish a causative association between STDs and HIV. This study design is extremely complex and costly. The unit of study is the community, and a comparison community is needed to

prostitutes, male clients of prostitutes, STD patients, long-haul truckers, military personnel and migrant workers. Core groups, by definition, do not have to be large in number. Their size may be unique to each STD because some STDs require higher partner change rates to maintain their prevalence than do other STDs. For example, to sustain gonorrhea the size of the core may need to be smaller than that needed to maintain chlamydia due to the lower infectivity (per contact) of chlamydia [2].

Provided that core individuals limit their sexual interactions to other core members, the potential for epidemics of STDs outside of the core is lessened. In reality, though, we know that these individuals normally do not restrict their activities solely to other high-risk individuals. They also have relations with those not considered to be in high-risk groups. Such is the situation in many parts of the world where clients of prostitutes generally infect their spouses or long term partners. The extent of sexual mixing and behavioral characteristics of the population are strong determinants of the resultant prevalence levels. The more sexual partners one has, the greater the likelihood of encountering high frequency transmitters of STD pathogens [14].

Accurate generalizations about sexual behaviors are difficult to make. However, two major modes of sexual networking operate in Africa and may very well apply to other regions. The first is the common situation of a patrilineal society where men maintain a strong control over women. Women give up their ties to their families, while marriages are secure and divorce is rare. The majority of pre-marital and extra-marital urban sexual relations involve a small core of female prostitutes with a large and overlapping male clientele [226]. Women, on the other hand, are not granted the same amount of sexual freedom by society.

The second network finds women more independent and educated. Marital stability is weaker with both sexes having fluid sexual partnerships with others, and the role of prostitution is less clear within this pattern of behavior. What this means for STD infection levels remains uncertain. However, there is evidence that in areas where the second behavioral pattern predominates, STD levels are generally lower. For example, in Rwanda, which has a patrilineal society, STD levels are higher than in neighboring Zaire, where people carry on freer relationships with each other [176].

In general, the double standard is very strong, with many societies not even recognizing that men can commit adultery and others merely putting some limits on men's extra-marital sexual behavior [226]. Women in many regions of the world have very little control over the conduct of sexual relations. There are existing inequalities between the sexes which lead to behavioral practices that impart higher infection levels in women. If women become more equal partners in their relationships with men, we may, perhaps, witness a drop in future infection levels.

DATA QUALITY AND STUDY DESIGN CONSIDERATIONS

For epidemiological purposes, data on incidence are preferable to data on prevalence. Incidence is the number of new cases of an STD which occur during a specified time period and is the measure most useful to studies of causal factors. Prevalence rates, on the other hand, provide an estimate of the proportion of people in the community with a given disease at a given point in time. But although incidence studies are preferable, they are more difficult to implement due to field conditions and methodological difficulties. Incidence rates are dependent upon complete case reporting, and this is clearly not the case in Africa due to the lack of facilities and resources for diagnosis and treatment. Low literacy, poor communication systems, language barriers, ethnic differences and internal conflicts all impinge on the most carefully planned study. Hence, most of our knowledge about STDs in Africa is gained through ad hoc prevalence surveys.

Biases introduced into the study design -- insufficient sample size, nonrepresentative samples, geographical bias, unreliable and invalid tests resulting in misdiagnosis, nonresponse to survey questions, recall bias, self-selected samples, intentional or unintentional misclassification of responses (particularly relevant to sex-related research) -- and the extent of such biases, may invalidate study results.

High levels of chlamydial infection were found within the prostitute group and STD patients. Among men attending STD clinics, half the studies reported rates above 12.5 percent. Among prostitutes, the median rate was similar, 13 percent, with infection levels over 50 percent reported in Rwanda and Côte d'Ivoire.

Trichomoniasis infection rates were similar among all three groups. The median rate among women of reproductive age was 16 percent, among men attending STD clinics the median rate was 14.5 percent and among prostitutes, the median rate was 18.5 percent.

disentangle the effects of other factors. Several intervention and control communities are required because any difference in HIV incidence may be due to underlying differences of risk. Baseline surveys are required along with the monitoring at regular intervals. There are also the issues of contamination (people from control communities travelling to intervention communities for treatment) and compliance [228]. Some community intervention studies are currently underway [184]. In the meantime, HIV infection continues to spread.

STD PREVALENCE IN AFRICA

The STD tables found in Appendix A summarize results of an extensive literature review designed to collect prevalence figures for those STDs that cause a large proportion of morbidity in Africa. Although there are many limitations of these data as described earlier, in the aggregate, they provide valuable information.

It is difficult to ascertain consistent patterns in the STD prevalence data. Even within the same population groups, much variability was discovered. However, some patterns can be described.

Rates of gonorrhea among women of reproductive age range from one percent to as high as 33 percent. However, half of the studies report gonorrhea prevalence levels of 4 percent or less among this group. In a study of infertile women in Banjul, 65 percent of the women were found to be infected with gonorrhea. One of the major consequences of gonorrhea, however, is infertility and this study may be biased towards women with gonorrheal infection. In Nairobi, where HIV infection levels have reached 15 percent among pregnant women as of 1993, 1991 and 1992 rates of gonorrhea infection range from 6 to 10 percent (Map 1). In Senegal, where the levels of HIV infection have remained low among this population group, the rates of gonorrhea infection reported from the sentinel surveillance program have ranged from 1 to 4 percent during the early 1990's.

Higher gonorrheal prevalence was found within STD patients (the median rate was 20 percent) and prostitute populations (the median rate was 23.5 percent). The risk of infection from an STD is higher among those who have multiple sexual partners.

Looking at rates of active syphilis (positive results for both TPHA and RPR or VDRL tests), overall prevalence was fairly low among women of reproductive age (half of the studies reported rates of 6 percent or less). However, four areas reported prevalences rates over 10 per cent, Kajiado District, Kenya, 12 percent; Yaoundé, Cameroon, 15 percent; Estuaire, Gabon, 12 percent; and Blantyre, Malawi, 11 percent (Map 2). Syphilis prevalence rates in Kajiado District, Kenya, increased from 2.5 percent in 1989 to 12 percent in 1992. In Nairobi, Kenya, active syphilis rates increased from 4 percent in 1989/90 to 6 percent in 1992/93. Women run a high risk of serious consequences to their fetus if they acquire syphilis while pregnant or become pregnant in the early stages of disease.

Active syphilis infection within the STD patient group was higher than among pregnant women with a median rate of 13.5 percent. Prostitutes have the highest rates of active infection with a median rate of 22.5 percent. Among lorry drivers, a group generally associated with multiple sexual partners, active syphilis levels ranged from 4 to 14 percent with median rate of 7 percent.

Unfortunately, few studies investigating chancroid infection among women of reproductive age were located. In the STD patient group, the median rate was 15.5 percent. In the prostitute group, levels were unexpectedly low; the median rate among prostitutes was 4.5 percent. More data on chancroid levels needs to be collected, especially since it appears to be implicated in HIV transmission, before any trends can be spotted.

Among women of reproductive age several studies reported rates of chlamydial infection over 40 percent. However, some of these were studies of infertile women and women attending family planning clinics. Since chlamydia results in infertility, these studies may be biased. Excluding these studies, the median rate for chlamydia infection in this group is 7 percent.