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A systematic review of current knowledge of HIV epidemiology and of sexual behaviour in Nepal

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Summary

OBJECTIVE To systematically review information on HIV epidemiology and on sexual behaviour in Nepal with a view to identifying gaps in current knowledge.

METHODS Systematic review covering electronic databases, web-based information, personal contact with experts and hand searching of key journals.

RESULTS HIV-1 seroprevalence has been rising rapidly in association with high-risk behaviours, with current levels of 40% amongst the nation's injecting drug users and approaching 20% amongst Kathmandu's female commercial sex workers (FCSWs). HIV seroprevalence remains low in the general population (0.29% of 15–49 year olds). There are significant methodological limitations in many of the seroprevalence studies identified, and these estimates need to be treated with caution. There are extensive migration patterns both within the country and internationally which provide the potential for considerable sexual networking. However, studies of sexual behaviour have focused on FCSWs and the extent of sexual networks within the general population is largely unknown.

CONCLUSIONS Whilst some of the ingredients are present for an explosive HIV epidemic in Nepal, crucial knowledge on sexual behaviour in the general population is missing. Research on sexual networking is urgently required to guide HIV control in Nepal. There is also a need for further good-quality epidemiological studies of HIV seroprevalence.

keywords Asia, Nepal, HIV, epidemiology, sexual behaviour

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Introduction

The HIV/AIDS situation in Nepal has been described as an impending crisis (Seddon 1998). Concern has been fuelled by rapidly rising HIV-1 seroprevalence associated with high-risk behaviour and extensive migration patterns.

Nepal is one of the poorest nations in the world with poor health and development indicators (Table 1) and would be devastated by an extensive AIDS epidemic. Current HIV/AIDS control in Nepal focuses on risk reduction within 'high-risk groups', namely injecting drug users and female commercial sex workers (FCSWs). Drug use in Nepal is a long-standing phenomenon. Alcohol and cannabis have been used for centuries (Shrestha 1992; Dixon 1999). Their disinhibiting effects and socio-economic consequences may influence HIV spread. However, of more direct influence on HIV transmission is injecting drug use (IDU), which

rapidly increased in Nepal in the early 1980s (Shrestha 1992).

UNAIDS acknowledges that key data on HIV epidemiology, such as information on sexual networks in Nepal, are not available (UNAIDS 2000a). Such information is important in understanding the progress of an HIV epidemic in the South Asian context (Chin *et al.* 1998; UNAIDS 1998). The objectives of this paper are therefore to systematically review current knowledge of HIV epidemiology and of sexual behaviour in Nepal and to identify gaps in current understanding.

Materials and methods

A systematic review approach was used. The electronic databases Popline, Web of Science, Medline, Embase and Pubmed were searched for articles published between 1980

Table 1 Health and development data for Nepal and South Asia

Indicator	Nepal	South Asia
Population (millions) in 2000	24	1326
Gross national product per capita (US\$) in 1998	210	436
Maternal mortality ratio (per 100 000 live births) in 1990	540	405
Infant mortality rate (per 1000 live births) in 1998	72	72
Life expectancy at birth (years) in 1998	58	63
Female literacy rate (%) in 1997	21	37

Source: The Mahbub ul Haq Human Development Centre (2000).

and the end of August 2001 inclusive using the keywords *hiv**, *aids*, *sexual behaviour* and *nepal** in appropriate combinations and syntax according to the database. Web-based information was accessed through commonly used websites relating to HIV/AIDS. We personally contacted 20 experts active in work relating to HIV or sexual behaviour in Nepal and hand-searched the journals *AIDS Care*, *Social Science and Medicine* and *The International Journal of STD & AIDS*. We also examined the references cited by key papers. The two major sources of grey literature were the University of Heidelberg/Government of Nepal HIV/STD Project and the Nepal country office of Family Health International. Unpublished documents have been cited as such in the reference list.

All published English-language papers available in the UK referring to sexual behaviour and/or HIV epidemiology in Nepal were reviewed. Data relating to HIV epidemiology were extracted in terms of time, place and person. Information relating to IDU behaviour and prevalence of sexually transmitted infections (STIs) were not included in the terms of the systematic review, although some information has been included in this paper to set the context.

Results

General population prevalence

The first case of HIV infection in Nepal was identified in 1988 (UNAIDS 2000a). A prior study in 1985 could detect no HIV among 460 sera taken from patients from four Kathmandu hospitals (Mertens *et al.* 1989). Government of Nepal statistics to the end of July 2001 record cumulative totals of 2024 people infected with HIV, of whom 516 have developed AIDS, and 149 AIDS-related deaths (National Centre for AIDS and STD Control 2001). In the absence of community-based HIV seroprevalence data, these figures are obtained from sentinel surveillance and Voluntary Counselling and Testing and are therefore gross underestimates of community prevalence (Chin 1999).

In order to obtain a more accurate picture of community HIV prevalence, UNAIDS employs mathematical modelling

techniques based on known cases and the stage of the epidemic. They estimated that at the end of 1999 there were 34 000 people living with HIV/AIDS (PLWHA) in Nepal and 2500 deaths from AIDS during 1999 (UNAIDS 2000a). Most (33 000) PLWHA were adults (aged 15–49 years) in whom the prevalence was calculated to be 0.29%. Women represented 10 000 of those infected and children 930.

Similarly, using the data available in September 1999, Chin (1999) estimated HIV prevalence in the Nepalese 15–49 year old population to be between 0.2 and 0.6%, i.e. between 20 000 and 60 000 infections. He uses a working estimate of 30 000 infections, which he expects to double by 2005, which would make AIDS the leading cause of adult death in Nepal by 2010, with between 10 000 and 15 000 AIDS deaths per year in the 15–49 years age group. This would clearly have an important impact on the country's disease burden. However, Chin cautions against reliance on projected figures in the context of poor epidemiological information, and in particular poor sentinel surveillance arrangements. He described the latter in 1999 as a 'non-system', lacking central co-ordination and consistency, although more recently efforts have been made to improve Nepal's sentinel surveillance (Steve Mills, personal communication, 2001). Nepal's sentinel surveillance system collects data from anonymous unlinked testing at six sites throughout Nepal. One site (in Kathmandu) only tests antenatal women whilst the remaining five only test patients presenting with symptoms of a STI (National Centre for AIDS and STD Control, personal communication, 2001).

Data on STI prevalence in the general population, or proxy groups such as antenatal women, are important indicators of increased HIV risk. UNAIDS reports a 1997 serological survey of 1802 women attending antenatal clinics 1.3% of whom tested positive for syphilis (UNAIDS 2000a). A 1999 survey confirms the low syphilis prevalence amongst antenatal clients, being only 1.8% in the 2030 women tested (University of Heidelberg 2000). There are no comparable data for adult males. Of 608 young (age 17 or 18 years) Gurkha recruits training in Hong Kong in 1974, 1.0% had positive syphilis serology, of 152 and 148 serving Gurkha soldiers from east and west Nepal,

respectively (age range 21–28 years) stationed in Britain, 1.3 and 6.8% were positive, respectively (Thin & O'Rorke 1985).

HIV seroprevalence in different population subgroups

A summary of data relating to HIV-1 seroprevalence in various population subgroups in Nepal is given in Table 2. As few details of the surveys were given it is difficult to assess comparability, bias or quality. A number of the surveys have small sample sizes: point estimates of prevalence would be expected to have wide confidence intervals, but a lack of detailed information makes it impossible to estimate them accurately. However, HIV-1 prevalence in these groups is generally low, even amongst those symptomatic for STIs. An example of this is the 1999/2000 survey of 100 patients presenting with STI symptoms to a hospital in Dharan (Eastern Nepal). None of the 96 who consented to HIV testing had a positive result (Garg *et al.* 2001). HIV-1 prevalence is increasing in TB patients, as might be expected given the association between HIV and TB. Prevalence in blood donors is likely to be greater than the general population HIV prevalence (Chin 1999) because of the over-representation of urban populations and anecdotal evidence of payment being made for donation.

Injecting drug use

There has been no national survey of the numbers involved in IDU but it has been estimated (HMG/N 2000) that there are 30 000 people involved nationally (of whom 40% may have HIV infection) and 15 000–20 000 in the Kathmandu valley (population 450 000) where 50% have HIV infection (University of Heidelberg STD/HIV Project, personal communication, 2001). Using 1994 data, other reports cite smaller numbers (25 000–40 000 drug users nationally of whom 10% are IDUs with 2000 IDUs being in Kathmandu (Crofts *et al.* 1998a,b). In Pokhara (population 200 000), Dixon (1999) identified 2700 illicit drug users of whom 44% (1200) were IDUs. Most were sharing needles and knowledge of effective cleaning methods was poor. HIV testing was not performed. The wide disparity of these estimates may reflect the difficulty of obtaining accurate information for an illegal activity, which is punishable by imprisonment in Nepal.

HIV seroprevalence amongst Kathmandu's IDUs was only 1.6% in 1991 and 0% in 1994 (Peak *et al.* 1995). The sample sizes were small (< 150) and were taken from clients of a harm reduction programme, amongst whom only 27% consented to be included over the study period. Reported sexual behaviour did not change over time. Of particular concern was the small number of female IDUs who funded

their addiction through commercial sex work, rarely using condoms.

More recent figures indicate that amongst Kathmandu's IDUs there has been an explosive rise in HIV seroprevalence to 50% in 1997 (Gurubacharya *et al.* 1998) and 40% in 1999 (University of Heidelberg 2000). The extent of high-risk behaviour amongst Kathmandu's IDUs is reflected by hepatitis C seroprevalence, which is reported to be 94% compared with 0.6% in the general population (Shrestha *et al.* 1998a).

Female commercial sex workers

A number of studies have concentrated on areas with high concentrations of FCSWs, such as the highway route of the lowland *terai* (New Era 1998, 2000a,b), and Kathmandu (SATCS 2000). STI prevalence is high with 50% of 410 FCSWs from the *terai* having at least one such infection, 20% having active syphilis and 4% being HIV positive. HIV seropositivity was strongly associated with past sex work in India, particularly Mumbai, and having untreated syphilis (New Era 2000b). In the Kathmandu valley, 19% of 300 FCSWs had active syphilis and HIV seroprevalence was 17% (SATCS 2000). A survey of 103 FCSWs in Kathmandu corroborates these findings with syphilis and HIV seroprevalences of 29 and 20%, respectively (Shrestha & Gurubacharya 1998). Ross (2000) notes that HIV seroprevalence amongst FCSWs has increased from 3% in 1996 to 17% in 2000.

Although commercial sex work is both illegal and socially unacceptable among Nepalese, significant numbers of FCSWs have been identified in Nepal's major cities and along transport routes. Seddon (1998) reports that there may be 25 000 FCSWs in the Kathmandu valley alone, although another estimate puts the number around 7500–10 000 (HMG/N 2000). This discrepancy reflects the lack of reliable data but may also indicate that there are issues around the definition of commercial sex work. This is particularly so in Nepal as most FCSWs are not brothel-based. Nepalese women living in absolute poverty may provide sex in return for money or gifts and may not consider themselves to be 'prostitutes' (Seddon 1998).

A good example of the need to understand local socio-cultural issues is the case of the low caste *Badi* people. The inadequate income provided by their traditional caste occupation of entertainment has led to extensive involvement of *Badi* women in commercial sex work (Pike 1999). In a 1993 survey of *Badi* women who consented to anonymous testing, 70% of 228 women were found to be Venereal Disease Research Laboratory test (VDRL) positive but none of 250 were HIV positive

Table 2 HIV-1 seroprevalence in population subgroups in Nepal

Group	Date of survey	Source	Sample size	Survey site	Sampling and testing method	HIV-1 seroprevalence	Source
Antenatal clients	1996		1802	Four urban sites	Consecutive attenders, unlinked anonymous	0.2%	University of Heidelberg (2000)
	1999		2030	Seven hospital sites across country	Consecutive attenders, unlinked anonymous	0.2%	University of Heidelberg (2000)
Family planning clients	1999		300	Bir Hospital, Kathmandu	Consecutive attenders, unlinked anonymous	0.3%	University of Heidelberg (2000)
Male patients symptomatic for STI	1996		199	Hospital sites in Nepalgunj and Kathmandu	Consecutive attenders, unlinked anonymous	0.6%	University of Heidelberg (2000)
Female patients symptomatic for STI	1996		268	Hospital sites in Nepalgunj and Kathmandu	Consecutive attenders, unlinked anonymous	0.6%	University of Heidelberg (2000)
TB patients	1993		300	National Tuberculosis Centre	Unlinked anonymous	0%	National Tuberculosis Centre
	1996		750	National Tuberculosis Centre	Unlinked anonymous	0.8%	National Tuberculosis Centre
	1996		471	Palpa mission hospital	Unlinked anonymous	3.6%	National Tuberculosis Centre
	1998/99		938	Five diagnostic centres across four regions	Voluntary counselling and testing	1.5%	National Tuberculosis Centre
Blood donors	1999		59 740	Not known	Not known	0.32%	Nepal Red Cross Society
Female commercial sex workers	1999		410	East-West Highway (Terai)	Purposive sampling, unlinked anonymous	3.9%	New Era (2000b)
	1999/2000		300	Kathmandu valley	Random sampling unlinked anonymous	17.3%	University of Heidelberg (2000)
Injecting drug users	1999		564	Sites covered all five development regions	Not known	40.4%	University of Heidelberg (2000)
Transport workers	1999		400	East-West Highway (Terai)	Consecutive arrivals, unlinked anonymous	1.5%	New Era (2000b)

(Bhatt *et al.* 1993). Condom use with clients was unusual. Marital status and the extent of non-commercial sexual relationships were not described.

Transport workers

From a sample of 400 transport workers (drivers and their helpers) recruited on the *terai*, HIV seroprevalence was 1.5% with 5% having untreated syphilis and 10% having at least one STI amongst the 376 (94%) who had ever had sex with a woman (New Era 2000b).

Sexual networks

The extent of the AIDS epidemic in Nepal will depend upon the largely unknown issues of:

- the sexual partner exchange rates between FCSWs and the men who regularly visit them; and
- the proportion of the general population who have multiple and concurrent sex partners, and the sexual networks of those people (Chin *et al.* 1998; UNAIDS 1998).

The effects of sexual partner exchange rates between IDUs and the general population is thought to have less influence (Chin 1999), although evidence on this point is scarce. A detailed understanding of sexual networks is important in order to identify 'bridge populations' through whom HIV may be transmitted to the general population (UNAIDS 1998).

Sexual behaviour in the general population in Nepal

Little published literature was found relating to sexual behaviour in the general population in Nepal. Using ethnographic methods, Butcher and Kievelitz (1997) demonstrated that Nepalese men and women were willing to talk publicly in groups about their sexual behaviour. Challenging cultural stereotypes, wives described how husbands would, when drunk, demand sex even during the menstrual period, when the wife is considered to be ritually 'polluted'. Young men claimed to have seduced married women whose husbands worked away from the village. The study did not provide any quantitative estimation of high-risk behaviour. The behaviour of certain groups, notably sexually active unmarried women and PLWHA, was not addressed, as the authors felt that it was felt inappropriate to identify such people in public discussion. This willingness of Nepalese to discuss their sexuality in small groups was confirmed in focus group discussions in nine different population groups (Shrestha *et al.* 1998b). These indicated that traditional gender roles

might prevent women from protecting themselves against HIV/STIs.

A cross-sectional survey using open-ended questionnaires and confidential interviews found that 24% of males and 15% of females reported having pre- or extramarital sex (Gurubacharya & Suvedi 1994). No details of sample size or population characteristics are provided. The authors conclude that 'high-risk' sexual behaviour in Nepal is more prevalent than commonly perceived.

Interviews conducted in 1997 with 500 resident and 300 non-resident men in five towns bordering with India also indicated high levels of sexual activity (WHO 1999). Over a quarter of the men had had sex with a non-regular partner in the preceding 12 months. High-risk sexual behaviour was associated with mobility, age less than 25 years, being unmarried and alcohol consumption. Knowledge of condoms was high but use was low. The study also noted that some Nepalese men travel to India for commercial sex because of the more clearly defined 'red light districts' across the border. The towns used in this study are not typical of most of Nepal and therefore the results cannot be generalized to non-border areas.

In a survey of military recruits, 8.1% reported having multiple sexual partners in the preceding 3 months (Upadhyay *et al.* 1998). Similarly 10% of 74 male students interviewed in Kathmandu reported visiting FCSWs (Shrestha & Gurubacharya 1996). However, sexual behaviour amongst students and the military cannot be generalized to other groups.

Surveys of sexual behaviour are prone to methodological problems and are consequently difficult to validate. Socio-cultural norms and the manner in which the study was conducted will influence the results (Mertens *et al.* 1994). In many of the studies cited above, inadequate information is available on methodology to assess the validity of the results.

Men who have sex with men

Apart from one report describing condom distribution in a Kathmandu prison with the explicit purpose of harm reduction from homosexual acts (Upadhyay 1998), no other reports were found describing men who have sex with men (MSM) in Nepal. This is perhaps surprising, as MSM are well described in the subcontinent (Baqi *et al.* 1999; Gibney *et al.* 1999; Shah *et al.* 2000; Asthana & Oostvogels 2001), and it is therefore likely that MSM are also present in Nepal.

Sexual networks of FCSWs and their clients

Female commercial sex workers in Nepal are not brothel based but highly mobile, particularly on highway routes. In

the *terai* FCSWs averaged 1.7 clients per day and around half reported having concurrent non-commercial sex during the previous year. Only one-third of FCSWs used condoms for non-commercial sex whilst two-thirds reported using a condom for their last client. Condom use has reportedly increased in response to targeted interventions (New Era 2000a). It is important to note that this is what respondents said they did, which may differ from actual practice. It is also important to note that the Behavioural Surveillance Surveys (New Era 1998, 2000a) are part of an intervention programme and may therefore relate to more active FCSWs. In the study of 300 FCSWs in Kathmandu, 47% of the sex workers had two to three clients per week, only 10% had five or more clients per week (SATCS 2000). Most (63%) clients of FCSWs are married but only a minority (4%) report regular use of a condom with their wife (New Era 2000b).

Migration

Migration patterns both within Nepal and internationally provide opportunities for extensive sexual networking, both in terms of distance and frequency. The seasonal nature of subsistence agriculture and the opportunities for cash income from industries such as tourism encourages movement between districts, particularly for men. In a survey of school adolescents, 41% of the 986 participants reported having a family member leave their home district to work (Thapa & Devkota 2001). A random sample survey in 11 districts of Mid and Far West Nepal indicated that 15% of the adult population migrate seasonally (Suvedi *et al.* 1994). Nearly half of the male migrants and 40% of the female migrants said they had non-marital sex during migration.

An estimated 1.0–1.3 million Nepalese males (4–6% of the male population) migrate annually (Dickinson 2001), of whom 350 000 go to India (Dahlburg 1994). Data from Doti district (Far West Nepal) indicate that 83% of households had at least one family member working outside the district and for 94% of them the destination was India (Dickinson 2001). Most (84%) of these migrant workers were married. An estimated 90 000 Nepalese men work in Mumbai (Dahlburg 1994). India has one of the fastest growing HIV/AIDS epidemics in the world (Schwartlander *et al.* 1999). An estimated 3 500 000 Indian adults are living with HIV/AIDS, comprising 0.7% of the 15–49 year old population (UNAIDS 2000b).

Between 5000 and 7000 girls from Nepal are said to be 'trafficked' (transported for commercial gain) every year to India (Seddon 1998; Poudel & Carryer 2000) with estimates ranging from 100 000 to 200 000 Nepalese girls

involved in the Indian sex trade. Some of these girls will return to Nepal when found to be infected with HIV (McGirk 1997; Seddon 1998), especially if no longer able to support themselves through commercial sex work.

The greatest concentration of Nepalese FCSWs in India is in Mumbai where their estimated numbers range between 40–45 000 (Seddon 1998) and 60 000 (Dahlburg 1994) and where HIV prevalence amongst all FCSWs is more than 50% (UNAIDS 2000b). Significant numbers of Nepalese FCSWs have been reported in many Indian cities (Seddon 1998). In a random sample of 450 FCSWs in 1992 in Calcutta, 15% were found to be from Nepal (Chakraborty *et al.* 1994). There is evidence of Nepalese FCSWs in Thailand, Philippines and Hong Kong, although the numbers involved are much smaller. Many Nepalese women are coerced into commercial sex work in India and there is evidence of 'organized crime' (Seddon 1998). However, some women have 'chosen' to work in the Indian sex trade 'voluntarily', albeit out of economic necessity. Amongst the 300 FCSWs surveyed in Kathmandu, nine women had worked in India but only four of them said that they had been coerced into doing so (SACTS 2000). Similarly, of the 410 FCSWs interviewed in *terai* locations, only 21 of the 70 women who had worked in India said they had been coerced (New Era 2000b). However, these figures may be subject to bias. FCSWs who have returned to Nepal from India but continue to undertake sex work may differ from those who remain in India or resettle in their own communities.

Discussion

Nepal currently appears to be undergoing a 'concentrated' HIV epidemic, with prevalence exceeding 5% in at least two risk groups; namely commercial sex workers and injecting drug users. HIV prevalence in these groups appears to have been rising rapidly over recent years. However, the quality and relevance of these reports varies enormously, both in terms of the original study and the information made available through publication. The poor quality of many of the studies in Nepal is reflected in, for example, apparently inconsistent HIV prevalence results and wildly varying estimates of the number of IDUs and FCSWs. Caution needs to be exercised in interpreting their results. The true extent of Nepal's HIV epidemic will remain unclear until further good-quality epidemiological studies of HIV seroprevalence can be undertaken.

During the information gathering process it became apparent that dissemination of knowledge relating to HIV epidemiology in Nepal was not co-ordinated. There is no central point of reference for such material. Given the number of agencies involved, formal co-ordination and

dissemination of information is required. Similarly, the recent improvements in HIV sentinel surveillance need to be continued to ensure co-ordination and consistency (Chin 1999).

FCSWs have been the focus of many of the HIV prevention programmes in Nepal. Rising HIV seroprevalence in this group is a cause for concern. However, FCSWs are not brothel-based, often mobile and, in rural areas especially, may be hard to define (Seddon 1998). The number of Nepalese FCSWs in India, and the high HIV prevalence in Mumbai in particular, could mean that there are as many Nepalese women living with HIV/AIDS in India as in Nepal. Should these women be deported or choose to return home over a short period of time, Nepal's HIV prevalence might rise steeply. The situation needs to be monitored in order to assess the need for future AIDS care and to reduce the exploitation of Nepalese women in the first place. Such monitoring may not be easy because, as is the case for male migrant workers, cross-border collaboration will be required.

Sexual behaviour in the general population has been inadequately researched in Nepal. The risk of an AIDS epidemic will depend on the extent and type of heterosexual networking (Chin *et al.* 1998; UNAIDS 1998). Figure 1 indicates some of the important sexual links between different subgroups and also indicates the areas where data are insufficient. Whilst current concepts of Nepalese society would indicate that an AIDS epidemic might not be sustained, the studies undertaken so far indicate that there may be surprising levels of sexual networking. This mirrors the situation in Bangladesh, where a study of sexual networking was used to clarify whether Islamic Bangladeshi society could sustain an AIDS epidemic (Caldwell *et al.* 1999). Similar research in Nepal might help assess the risk of a sustained AIDS epidemic in the general population as well as identifying the 'bridge populations' which might benefit from HIV prevention programmes, although this latter approach might have unintended consequences such as stigmatization.

Male-male sexual activity and its relevance to HIV transmission has been described in India (Asthana & Oostvogels 2001), Pakistan (Baqi *et al.* 1999) and Bangladesh (Gibney *et al.* 1999; Shah *et al.* 2000) but not in Nepal, even though such activity almost certainly occurs (Upadhyay 1998). Sexual norms are culturally determined: South Asian MSM are often married and draw fewer distinctions between homosexuality and heterosexuality than might be the case in western cultures (Asthana & Oostvogels 2001). An understanding of the sexual networks of MSM may therefore be important, even though globally 95% of HIV infections are the result of heterosexual sex (Chin *et al.* 1998). The exclusive identi-

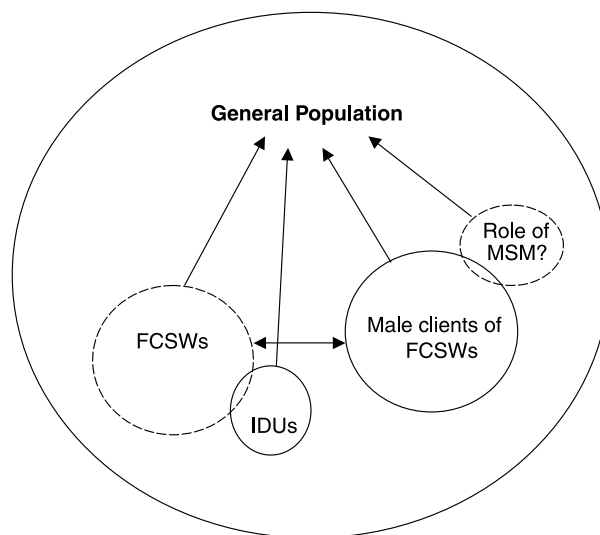


Figure 1 Sexual networks in HIV transmission in Nepal. *Legends:* MSM, men who have sex with men; FCSWs, female commercial sex workers; IDUs, injecting drug users. *Notes:* size of circles indicates the relative size of the population group but is not to scale; arrows indicate probable direction of HIV transmission; dashed lines around population groups indicate the difficulty of defining membership of that group; overlapping circles indicate that the subgroups have shared membership.

fication of HIV/AIDS with heterosexual activity has been seen as a political description (Chan *et al.* 1998) and AIDS prevention programmes may reflect the 'invisibility' of South Asian MSM.

The description of Nepal's HIV/AIDS situation as an impending crisis (Seddon 1998) may or may not be true. There have been rapid rises in HIV prevalence among those involved with IDU and commercial sex work, but there are also significant gaps in knowledge that make it difficult to assess the risk for the general population. In particular, a better understanding of sexual networking is needed. Better co-ordination in the collection of HIV-related epidemiological information will be important to avoid duplication of effort and ensure that new knowledge is appropriately disseminated. Only in this way will HIV intervention programmes be in a position to avert the possible 'crisis'.

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