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Socio-demographic correlates, HIV/AIDS-related cofactors, and measures of same-sex sexual behaviour among Northern Thai male soldiers*

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Abstract

We use data from an anonymous self-administered 1991 survey of military personnel in northern Thailand to estimate overall levels of and socio-demographic differentials in same-sex sexual behaviour in this population. Additionally, we examine the relationship between sexual experience with another male and a variety of outcomes relevant to HIV prevention and policy. Overall, 16.3 per cent of the sexually active soldiers report ever having had anal or oral sex with other males. Same-sex sexual behaviour in this sample is positively associated with several indicators of higher socio-economic status. All of the men who report having had sex with other men report having had vaginal intercourse with females as well. Comparison of our estimate of same-sex sexual behaviour with those obtained from two similar samples drawn in 1991 suggests that the lower estimates observed in the other two studies are largely due to differences in data collection methods. Regarding the HIV/AIDS-related outcomes we examined, men who have had sex with other men are significantly more likely than those who have not to have ever injected drugs, to personally know someone with HIV/AIDS, to have had sex with a female prostitute in the last six months, and to have had a sexually transmitted disease in the last six months. In this sample, men who have had sex with other men are also less knowledgeable about HIV/AIDS than are men who have not. These results are discussed in terms of their implications for HIV-prevention policy in Thailand.

According to a report published recently by the United Nations, Thailand is the first country outside of sub-Saharan Africa with estimated national HIV seroprevalence above

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one per cent (United Nations 1995). The HIV/AIDS epidemic in Thailand has been described as a series of 'waves of infection' sweeping across various strata of the population over time (Weniger et al. 1991; *Lancet* 1994; Brown et al. 1994). The first officially reported cases of

HIV/AIDS in Thailand were diagnosed among homosexual and bisexual males, many of whom participated in prostitution (Phanuphak et al. 1985; Limsuwan, Kanapa and Siristonapun 1986; Traisupa, Chainarong, and Taylor 1987; Weniger et al. 1991). The relatively small number of cases of HIV/AIDS among men who have sex with other men reported at the onset of the epidemic was soon overshadowed by documentation of explosive growth in HIV infection rates among intravenous drug users and female prostitutes beginning in late 1987 (Vanichseni et al. 1989, 1991, 1992, 1993; Choopanya et al. 1991; Pokapanichwong et al. 1991; Weniger et al. 1991; Thanprasertsuk and Siraprapasiri 1991; Des Jarlais et al. 1992, 1994; Mann, Tarantola, and Netter 1992; Poshyachinda 1993; Mastro et al. 1994). After this rapid expansion of the epidemic, rates of HIV infection successively increased among male clients of female prostitutes, among the other female sexual partners and spouses of these men, and among infants born to infected women (Weniger et al. 1991; Brown et al. 1994). At present, the available evidence indicates that heterosexual activity is the dominant mode of HIV transmission in Thailand.

In Thailand, as in other countries, the emergence of HIV/AIDS has contributed to the expansion of data collection and research on sexual behaviour. Although considerably more is now known about sexual behaviour in Thailand than was the case a decade ago, research on the social organization of both heterosexual and homosexual behaviour in Thailand remains quite limited. Available evidence suggests that the social organization of heterosexuality in Thailand is structured by an expectation that men should be sexually experienced at marriage while women should not (Prasartkul et al. 1987; Klausner 1987; Muecke 1992), and by an emphasis on the male sexual drive (Keyes 1989; Deemar Corporation 1990; Erlanger 1991). Partly as a result of these cultural norms and beliefs, Thai male heterosexual behaviour is characterized by early and regular contact with female prostitutes. The first sex partner for most men is a female prostitute, and regular contact with prostitutes both before and after marriage is common (Swaddiwudhipong et al. 1990; Deemar Corporation 1990; Nopkesorn, Sungkorom, and Sornlum 1991; Nelson et al. 1993; Nopkesorn et al. 1993; VanLandingham et al. 1993; Beyrer et al. 1995).[1]

At present there are only a limited number of studies that report data on men who have sex with other men in Thailand (Sittitrai 1990; Pongthai 1990a, b; Weniger et al. 1991; Sittitrai, Brown, and Sakondhavat 1993; Beyrer et al. 1995; Kunawararak et al. 1995). These earlier studies have found that, compared with men who have sex with women only, men who have sex with other men have an earlier age at first intercourse, a higher total number of sex partners, and higher rates of visiting female prostitutes. Use of male prostitutes is also common. In Thailand, bisexuality, as opposed to exclusive homosexuality, appears to be the norm among men who have sex with other men.

Documented HIV infection rates are generally lower among men who have sex with other men than among injecting drug users and female prostitutes (Weniger et al. 1991; Nelson et al. 1993; Nopkesorn et al. 1993). According to Sittitrai et al. (1993), as a result of the relatively low rates of HIV infection among men who have sex with other men and a general reluctance to discuss homosexual behaviour, there has been less research attention focused on homosexual and bisexual men than on other populations at risk for HIV in Thailand.[2]

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[1]For further discussions of the social organization of prostitution and socio-cultural attitudes towards prostitution in Thailand, see Phongpaichit (1982); Truong (1990); Muecke (1990, 1992); Weniger et al. (1991); Ford and Koetsawang (1991); Napaporn, Bennett, and Knodel (1993); Maticka-Tyndale et al. (1994); and Lyttleton (1994).

[2]Other researchers have also noted that male homosexuality and bisexuality in Thailand have been under-studied (Muecke 1992, Note 21:899; Lyttleton 1994:137).

In this paper, we use data from a survey of northern Thai soldiers to estimate overall levels and socio-demographic differentials in same-sex sexual behaviour in this population, and we compare these estimates with those from other studies that investigate comparable samples but employ different means of data collection. Additionally, we directly address the paucity of data on men who have sex with other men in the literature on HIV/AIDS and Thailand by examining the relationship between sexual experience with another male and a variety of outcomes relevant to HIV prevention and policy. More specifically, we examine the relationship between same-sex sexual behaviour and the following HIV/AIDS-related outcomes: injecting drug use, personally knowing someone with HIV/AIDS, having had sex with a female prostitute in the last six months, having had a sexually transmitted disease in the last six months, and HIV/AIDS-related knowledge.

Data and methods

The analyses presented in this paper are based on data collected in September and October 1991 from a sample of military personnel stationed in Chiang Mai Province in northern Thailand. The soldiers are a subsample of a larger study that included Chiang Mai University undergraduates and semiskilled-unskilled workers employed in Chiang Mai City (for additional detail on the larger study, see VanLandingham 1993). The analyses presented in this paper are based on a subsample of 512 soldiers between the ages of 18 and 24.[3]

The military subsample consists of all available soldiers, excluding first-year recruits, who were stationed at six army and air force bases in the province. We did not survey first-year recruits because they were involved in a separate study. In this paper, we focus on the subsample of military personnel in order to facilitate comparisons with two other studies of sexual behaviour and HIV risk among northern Thai military personnel that were also conducted in 1991 (Nopkesorn et al. 1993; Nelson et al. 1993). Comparison of the results obtained from these three studies is facilitated by the similarities among the samples; all three use data collected in 1991 from military personnel selected for service at northern bases by a national lottery.

The analyses presented in this paper are based on responses to a questionnaire that covered a variety of topics, including background characteristics; life-style factors; sexual behaviour and social influences on sexual behaviour; HIV/AIDS knowledge; attitudes toward HIV/AIDS; condom use; and drug and alcohol use. The primary objective of the study from which our data were obtained was to investigate patterns of *heterosexual* behaviour. Only one question was asked about same-sex sexual behaviour: 'Have you ever had sex (anal or oral) with another male?' Although our analysis of same-sex sexual behaviour is limited to responses to one fairly broad question, we believe that the paucity of information on men who have sex with other men in Thailand warrants careful analysis of all reliable data.

At each military camp, the soldiers completed the Thai-language questionnaires at the same time and location. All of the respondents read and completed the questionnaires themselves. Thai research assistants were available at each site to answer questions. All of the soldiers completed the questionnaire, which suggests that participation may not have been wholly voluntary. That participation was optional was emphasized in both written and verbal instructions; however, some respondents may have felt pressure to comply from their peers or superiors. Overall, response rates for individual questions were high (VanLandingham 1993).

Following a description of the sample, we begin our analysis with an examination of correlates of sexual inexperience among the soldiers. We then estimate the prevalence of same-sex sexual behaviour among the sexually active (sex with males, females, or both) and

[3]Data collected from 38 respondents aged 25 years or older were excluded from the analyses.

compare our estimates with those obtained from two other studies based on similar samples. Additionally, using descriptive statistics and multivariate logistic regression, we examine socio-demographic variation in the likelihood of ever having had sex with another male. The socio-demographic background variables included in our analyses are: age (18-21 versus 22-24 years); education (6 years or fewer versus more than 6 years); province of birth (Chiang Mai versus all others); and residence when growing up (urban versus rural).

In the second part of the paper, we use descriptive statistics and multivariate logistic and OLS regression to examine the effect of same-sex sexual behaviour on a number of HIV/AIDS-relevant outcomes. The outcome variables we consider are: injection drug use (ever versus never); personally knowing someone with HIV/AIDS (yes versus no); having had sex with a female prostitute in the last six months (yes versus no); having had a sexually transmitted disease in the last six months (yes versus no); and HIV/AIDS-related knowledge (measured by an 18-item scale; see Appendix A for details).

The sample includes 512 soldiers stationed at six different bases in Chiang Mai Province in Northern Thailand. Eighty-two cases (16%) were dropped from analysis because of missing data on one or more of the following socio-demographic and sexual behaviour variables: age, education, province of birth, residence when growing up, and ever had sex with a man. It is important to note that 50 cases were dropped because of missing data on education;[4] only seven cases were missing on 'ever had sex with a man.' Analyses presented in this paper are based on a final sample of 430 soldiers with complete data on these socio-demographic and sexual behaviour variables.

Results

The socio-demographic characteristics of the sample are summarized in Table 1. Most of the soldiers come from rural backgrounds, and nearly half were born in Chiang Mai, the province where they were interviewed.

Thirty-one of the 430 soldiers with complete data (7.2%) reported no sexual experience with either women or men. On average, soldiers who were not sexually experienced were significantly younger than those who were sexually experienced ($t = -3.52$ with unequal variances, $p < 0.01$) and had significantly higher educational attainments (chi square = 5.02, $p < 0.05$). The sexually inexperienced and experienced soldiers did not differ significantly by province of birth or urban-rural residence when growing up.

[4]The wording of this item was apparently confusing to many respondents.

Table 1
Selected socio-demographic characteristics of Northern Thai male soldiers (N=430), September-October 1991

Variable		Per cent	Number
Age	18-21 years	48.6	209
	22-24 years	51.4	221
Education	Six years or less	51.6	222
	More than six years	48.4	208
Province of birth	Chiang Mai	49.3	212
	All others	50.7	218
Residence when growing up	Urban	17.7	76
	Rural	82.3	354

Estimate of same-sex sexual behaviour among sexually experienced soldiers

By definition, sexually inexperienced men have not had sex with another man (or woman). Thus, we excluded the 31 soldiers who reported no sexual experience from the denominator of our estimate of same-sex sexual behaviour. Overall, 16.3 per cent (65/399) of sexually experienced soldiers reported ever having had sex with another man. The corresponding estimate based on the full sample, including the sexually inexperienced, is 15.1 per cent (65/430).[5] All of the sexually experienced soldiers who reported having had sex with a man also reported that they had had sex with a woman. The absence of exclusive homosexuality in this sample of soldiers is consistent with results from other studies of sexual behaviour among Thai men (Nopkesorn et al. 1993; Sittitrai et al. 1992; Pongthai 1990a, 1990b).[6] Nopkesorn et al. (1993) report a rate of 0.4 per cent sexually experienced with men only.[7] On the basis of data from the Survey of Partner Relations and Risk of HIV Infection in Thailand, Sittitrai et al. (1992) report that 0.2 per cent of males described their usual sexual experiences as involving men only. Pongthai (1990a, b) reports that 13 per cent of male Ramathibodi medical students have ever had sex with another male; however, only 0.9 per cent of the medical

[5]As noted previously, only seven soldiers failed to answer the question regarding ever having had sex with another man; however, because of missing data on other variables, we excluded a total of 82 cases from the analysis. Fifteen of the 82 soldiers dropped from the analysis because of missing data (18.3%) reported that they had had sex with another man. Thus, had we been able to keep these cases in the analysis, our overall estimate of same-sex sexual behaviour would be slightly higher than that presented in the text.

[6]The virtual absence of men who report exclusive homosexuality in these studies should not be taken to mean that exclusive homosexuality does not exist in Thailand. On the basis of a convenience sample of 157 men who have sex with other men from a municipal area of a large northeastern province, Sittitrai et al. (1993) report that 29 per cent of these men had ever had a female sexual partner, while the rest reported only male partners. Seventy per cent of these 157 men reported having had sex with a male prostitute.

[7]All of the estimates reported by Nopkesorn et al. (1993) are based on all men in their sample, including sexually inexperienced men. Adjustment of the denominators to exclude the 101 soldiers who reported being sexually inexperienced would result in somewhat higher estimates for all categories of sexual behaviour reported; however, even with such an adjustment, the rate of exclusive homosexuality would still be less than 0.5 per cent.

students were rated as having an exclusively homosexual orientation on the six-point scale developed by Kinsey, Pomeroy, and Martin (1948) to measure sexual orientation.

Comparison with estimates of same-sex sexual experience from Nelson et al. (1993) and Nopkesorn et al. (1993)

Problems associated with collecting data on sexual behaviour in general, and same-sex sexual behaviour in particular, have been discussed extensively in the literature (see for example Abramson 1992; Stokes and McKirnan 1993; Billy et al. 1993b; Laumann et al. 1994). While even socially accepted modes of sexual behaviour may be difficult to assess among some populations, this does not appear to be the case for young Thai men (VanLandingham et al. 1994).[8] Queries about same-sex sexual behaviour may, however, be more sensitive than those regarding heterosexual practices, since the former is to some degree stigmatized in Thailand (Jackson 1989, 1993; Sittitrai et al. 1993). As noted by Beyrer et al. (1995) in their recent discussion of underreporting of same-sex sexual behaviour among Thai male military recruits:

> Reporting of same-sex behaviours in this population appears to vary significantly with data collection techniques. Collection of valid data on same-sex activity in this, and other Thai and Asian populations, may require particular attention to confidentiality, interviewing techniques, and data collection instruments. Self-administered questionnaires may help overcome under-reporting of same-sex behaviours, although these require literate subjects (Beyrer et al. 1995:175).

As seen in Table 2, our overall estimate of the proportion who had ever had sex with another male is substantially higher than estimates for this same population reported in two previous studies (Nelson et al. 1993; Nopkesorn et al. 1993). Given that all three of these studies collected data from similar populations in the same year, the observed variation in estimates of same-sex sexual behaviour is potentially valuable for obtaining a better understanding of how methodological factors might influence the estimation of sensitive or stigmatized behaviour in Thailand. Consideration of potential biases in estimating rates of same-sex sexual behaviour, as well as other potentially sensitive issues, is not just an academic exercise. Such estimates are sometimes used for making policy decisions regarding programs and resource allocation. Ascertaining the validity and reliability of estimates of same-sex sexual behaviour, and other stigmatized and sensitive behaviours, is of critical importance for HIV/AIDS prevention and policy.

At least two domains of factors that might contribute to variations in observed estimates can be readily identified: differences in the samples and differences in methods of measurement. As seen in Table 2, each of these three studies collected data from military personnel in northern Thailand within a six-month period in 1991. Although there is substantial similarity across these three samples, a number of differences are also notable.[9]

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[8]Among social and behavioural scientists, the high response rates obtained in recent national surveys of sexual behaviour in the United States and elsewhere have largely dispelled the notion that sexual behaviour cannot be studied systematically (for additional discussion of this issue, see Tanfer 1993; Laumann et al. 1994).

[9]To make comparisons with the other studies, we kept the sexually inexperienced in the denominators of all estimates presented in Table 2 unless otherwise noted.

Table 2
Comparison of this study with two previous studies conducted by Nelson et al. (1993) and Nopkesorn et al. (1993)

	This study	Nelson et al. (1993)	Nopkesorn et al. (1993)
Estimated proportion ever having had sex with another male:			
Excluding sexually inexperienced from denominator	16.3% (65/399)	3.3% (73/2229)	12.4% (126/1014)
Including sexually inexperienced in denominator	15.1% (65/430)	3.0% (732417)	11.3% (126/1115)
Sample description:	N=430	N=2417	N=1115
Dates of data collection	September-October 1991	May-November 1991	May 1991
Population sampled	All second-year recruits at six army and air force bases in Chiang Mai Province	Conscripts to two military training bases (one army, one air force) in Chiang Mai Province	Conscripts entering in Phitsanuloke Province in the lower north, one of several entry points for northern conscripts
Age	Mean=22.7 years Range=18-24 years	Mean=21 years Range=19-23 years	Mean=NA (about 21.2 years) Range=21-27 years (95.2% are 21 years old)
Education	48.4% had more than 6 years of school	31.4% had more than 4 years of education	29.9% had more than 6 years of education
Father's occupation	74.2% farmer or labourer	57.3% farmer or labourer	71.8% farmer
Ever injected drugs	6.7% had injected	1.2% had injected	2.3% had injected
Rates of Sexually Transmitted Disease (STD)	22.1% had STD in last 6 months	42.6% ever had STD	42.5% ever had STD
Ever visited female prostitute	86.5% had visited	81.1% had visited	74.7% had visited

Table 2 continued

Measurement issues:			
Outcome variable	Includes oral and anal sex	Not reported ('history of ever having had sex with another male')	Anal sex only
Data collection method	Anonymous, self-administered Thai-language questionnaire, completed in groups	Confidential, private face-to-face interview	Confidential, self-administered, Thai-language questionnaire, completed in groups of 100
Site of survey administration	On the military base	On the military base	NA (appears it was administered on the military base)
Serological screening for HIV antibodies	No	Yes	Yes

First, our sample consists primarily of second-year military recruits, while the other two studies are based on first-year military recruits. One effect of this difference is that the mean age of the soldiers in our sample is about one year older than the mean age in the other two samples. A second difference is that one sample was drawn at military bases in Phitsanuloke province in the lower north (Nopkesorn et al. 1993), while the other two samples were drawn in Chiang Mai Province in the upper north.

A third difference is that there appear to be some dissimilarities across the three samples with respect to education and father's occupation. Our sample appears to be more highly educated than the other two samples.[10] Our sample is similar to that of Nopkesorn et al. (1993) with respect to father's occupation, but dissimilar from that of Nelson et al. (1993), who report the lowest proportion with father's occupation being a farmer or a labourer. Since it is likely that fathers with higher occupational status (i.e., not farmers or labourers) would tend to have more highly educated children, it is unclear how to reconcile these countervailing descriptive statistics.

Estimates of other potentially sensitive or stigmatized behaviour appear to be somewhat variable across the three studies. A higher proportion of our respondents report ever having injected drugs and having had sex with a female prostitute in the past six months than is the case in the other two studies. The estimate of injecting drug use reported by Nelson et al. (1993) is the lowest. Estimates of the proportion ever having a sexually transmitted disease reported in the other two studies are similar and are substantially higher than the estimate reported for our sample; however, our estimate refers to acquiring a sexually transmitted disease in the last six months only.

[10] As noted previously, the wording of the education question appears to have confused some respondents. Overall, 50 respondents did not provide usable data on education and were dropped from the analysis. Less well-educated and less literate respondents may have misunderstood the education question. Elimination of these persons from the sample would tend to bias educational attainment upward in the remaining sample.

As can be seen from the above discussion, there are some dissimilarities in these three samples, which indicates that there is a need for caution when making comparisons of the estimates derived from them. Differences in the samples may contribute to variations in the estimates of same-sex sexual behaviour obtained from these studies; however, consideration of the methods of data collection and measurement used in the three studies leads us to conclude that these factors had a far more substantial effect than did sample differences on variation in the estimates.

Keeping in mind problems of comparability resulting from sample differences, the gradient in the proportion reporting that they had ever had sex with another man that is observed across the three studies reflects the relative invasiveness of the data collection strategy (Table 2). Our study, which used an anonymous, self-administered questionnaire and asked specifically about anal and oral sex, obtained the highest estimate (16.3%). The study by Nopkesorn et al. (1993), which used a confidential, self-administered questionnaire and a more restrictive definition of same-sex sexual behaviour (anal sex only), obtained the second highest estimate (12.4%). The study by Nelson et al. (1993), which apparently used a broad but ambiguous definition of same-sex sexual behaviour (they do not report the exact phrasing) and employed confidential face-to-face interviewing, obtained by far the lowest estimate (3.3%). These differences in data collection may also account for the observed variations reported above in other sensitive behaviours: injecting drug use and recent patronage of female prostitutes.

The difference between the estimates obtained from our study and the Nopkesorn et al. (1993) study may be partly explained by differences in the questions regarding same-sex sexual behaviour in these two studies. According to Sittitrai et al. (1993), oral sex appears to be somewhat more frequent than anal sex among men who have sex with other men in Thailand: 74.8 per cent had ever received anally, 60.6 per cent had inserted anally, 83.9 per cent had received orally, and 73.5 per cent had inserted orally.[11] The low estimate obtained by Nelson et al. (1993) appears to be a function of using a face-to-face interview as opposed to a self-administered questionnaire to collect the data. This low estimate suggests that using a broad definition of same-sex sexual behaviour, as apparently was done by Nelson et al. (1993), is insufficient to counteract the dampening effect of a face-to-face interview format on the willingness of Thai male respondents to disclose sensitive behaviour.[12]

The degree to which same-sex sexual behaviour is stigmatized in Thailand is the subject of continuing debate. While many observers of Thai culture perceive a relatively high degree of tolerance for male homosexual relations, some researchers have suggested that estimates of same-sex sexual behaviour among Thai men 'must be interpreted with caution since there are social pressures to keep same-sex behaviour secret, especially in rural areas where 80% of the Thai population lives' (Sittitrai et al. 1993:262). Jackson (1989, 1993) argues that homosexuality is stigmatized in Thailand despite the fact that there are no legal or formal sanctions against it; evidence in support of his argument is derived both from a review of

[11]The most frequent behaviour reported by the men surveyed by Sittitrai et al. (1993) was masturbation with a male partner (88.4% masturbated a partner and 75.5% were masturbated by a male partner). If some men who have sex with other men only engage in masturbation, the estimates of same-sex sexual behaviour obtained from our sample and from Nopkesorn et al. (1993) are conservative. It is unclear whether Thai men would report this behaviour in response to a general question about having sex with another man, as was asked in the study by Nelson et al. (1993).

[12]For further discussion of these methodological issues, see Stokes and McKirnan 1993; Billy et al. 1993b; Laumann et al. 1994:57-63.

traditional Buddhist scriptures and from contemporary responses to the emergence of the HIV/AIDS epidemic. In discussing the possibility of underreporting of same-sex sexual behaviour in their study of male military recruits, Nelson et al. (1993:958) stated:

> In addition, a history of contact with another male is not considered grounds for disciplinary action nor is it a stigmatized behaviour in this population. Therefore, there may be less stimulus for under-reporting such activity in our subjects than might be the case in military recruits in the United States or other Western countries.

Subsequent work by some members of this group indicates a changing view of the potential influence of stigma and data collection methods on reporting of same-sex sexual behaviour (Beyrer et al. 1995). Importantly, this recent work illustrates how concerns over confidentiality and the military context might influence reported behaviour. In the study by Beyrer et al. (1995), use of civilian interviewers appears to have elicited much higher reports of same-sex sexual behaviour than was the case in the study by Nelson et al. (1993) (6.5 versus 3.0%). Moreover, discharged recruits followed up by civilian interviewers reported higher rates than those still in the military (9.3 and 6.5%, respectively).

The observed gradient in the estimates of same-sex sexual behaviour obtained from the three studies compared above is consistent with the view that this behaviour is fairly highly stigmatized among Thai soldiers. Researchers seeking to measure same-sex sexual behaviour in Thailand must take into account special sensitivities attached to this behaviour when designing their studies.

Socio-demographic correlates of same-sex sexual behaviour

A number of recent studies of male sexual behaviour in the United States and other developed nations have demonstrated that the likelihood of ever having had sex with another male is influenced by a number of socio-demographic characteristics, such as age, education, and location of residence (Fay et al. 1989; Rogers and Turner 1991; Billy et al. 1993a; Wellings et al. 1994; Laumann et al. 1994). To the best of our knowledge, the question of whether particular socio-demographic characteristics are differentially associated with same-sex sexual behaviour has not been addressed in the Thai context. Although we have only a limited number of socio-demographic background variables available for analysis, we examined the effects of these variables on the likelihood of ever having engaged in same-sex sexual behaviour.[13] As seen in Table 3, education and urban residence when growing up each have a significant bivariate association with ever having had sex with a male. Once other variables are taken into account, males who grew up in an urban area are twice as likely to report that they have ever had sex with another male than are those who grew up in rural areas; education becomes insignificant.

In preliminary analyses (not shown), we also examined the effect of father's occupation on ever having had sex with another man. Father's occupation is significantly associated with ever having had sex with another male at the bivariate level. Males who have fathers with higher-status occupations are twice as likely to have ever had sex with another male as are males whose fathers are farmers or labourers. We did not include father's occupation in our analyses because it is too highly correlated with urban residence (r = 0.47), and inclusion of this variable did not significantly improve the fit of the model.

[13] A correlation matrix with each of the socio-demographic and HIV/AIDS-relevant variables considered in the remainder of this paper is presented in Appendix B. The correlations presented in Appendix B refer to the sexually experienced only (N=399).

Table 3
Logistic regression analysis of socio-demographic correlates of ever having had sex with a male, sexually active Northern Thai male soldiers (N=399), September-October 1991

	Ever had sex with a male			
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Age				
22-24 years	18.8	0.40	0.39	1.5
		(0.28)	(0.28)	
18-21 years	13.4	R.C.	R.C.	
Education				
More than six years	20.3	0.56*	0.38	1.5
		(0.27)	(0.29)	
Six years or less	12.7	R.C.	R.C.	
Province of birth				
Chiang Mai	17.9	0.23	0.25	1.3
		(0.27)	(0.28)	
All others	14.8	R.C.	R.C.	
Residence when growing up				
Urban	27.5	0.85**	0.71*	2.0
		(0.31)	(0.33)	
Rural	13.9	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001 Note: R.C. is Reference Category.

The pattern of bivariate results observed in our data suggests that there is an association between higher socio-economic status and ever having had sex with another male; males whose fathers had higher-status occupations, males who grew up in urban areas, and males who have more than six years of education are more likely to have ever had sex with another male than are men in the respective reference categories. Each of these three indicators of socio-economic status has moderate to high correlations with the others. In another preliminary analysis not shown here, we scaled these three variables (scale range 0-3). Factor analysis indicated that these three variables load onto a single factor. Cronbach's alpha for the scale is 0.60, which represents acceptably high reliability for a scale with three component items. Controlling for age and province of birth, the socio-economic status scale is significantly associated with ever having had sex with another male (beta = 0.40, standard error = 0.13). Each unit of increase in the socio-economic status scale results in a 50 per cent increase in the likelihood of ever having had sex with another male. Men who have fathers with higher-status occupations, who grew up in urban areas, and who have more than six years of education are 3.3 times more likely to have ever had sex with another male than are men with none of these socio-demographic characteristics.

Two studies of same-sex sexual behaviour based on data from a sample of urban medical students indicate that among male medical students who had ever had same-sex sexual contact, most report that their first sexual contact with another male was 'incidental' rather than 'intentional' (62.9% versus 25.7%) (Pongthai 1990b),[14] and that their first experience

[14]Approximately 11 per cent of respondents gave responses that were coded as 'other'. It is not clear what these responses were; however, it is probable that forced sex was included in this 'other' category.

with another male occurred by the age of 20: 86.2 per cent by age 20, 36.2 per cent by age 16, and 18.9 per cent by age 13 (Pongthai 1990a). Of those who had ever had sex with another male, 32.4 per cent had done so in the current year (Pongthai 1990a, b). Taken together, the results reported in this paper and other available evidence suggest that one direction for future research is to investigate in more detail the effects of age, urban residence, socio-economic status, and other socio-demographic and social context variables on the initiation and maintenance of same-sex sexual behaviour among Thai men.

Men who have sex with other men and HIV/AIDS-related outcomes

One of the primary reasons for undertaking this study was to examine the relationship between same-sex sexual activity and other variables that are known to be related to the risk of HIV infection in Thailand or that are relevant for policy and planning. In this section of the paper, we examine the effect of same-sex sexual activity on the likelihood of ever having used intravenous drugs, the likelihood of knowing someone with HIV/AIDS, the likelihood of visiting a female prostitute in the last six months, and the likelihood of having had a sexually transmitted disease in the past six months.[15]

Tables 4, 5, 6, and 7 present descriptive statistics and the results of four separate logistic regression analyses, each with a different HIV/AIDS-related outcome. Each outcome is regressed on a variable measuring same-sex sexual activity (versus none) and the four socio-demographic background variables: age, education, province of birth, and residence when growing up.

Injecting drug use

Considerably more is known about injecting drug users in Thailand than is known about men who have sex with other men. (For a historical overview of opium use in Southeast Asia, see Poshyachinda 1993.). To date, we are not aware of any study that has systematically examined the interrelationship between same-sex sexual behaviour and injecting drug use. One paper comparing condom use with primary partners among injecting drug users in Bangkok and New York City reported that the number of injecting drug users with same-sex primary partners in both cities was too small to allow for meaningful analysis (Vanichseni et al. 1993).

Overall, 5.3 per cent of the sexually active men reported that they had ever injected drugs. As seen in Table 4, same-sex sexual activity and urban residence when growing up are significantly associated with the likelihood of ever having used intravenous drugs at the bivariate level; however, only same-sex sexual activity is significant in the adjusted model. Controlling for other variables, men who report having had sex with other men are 8.5 times more likely to have ever used intravenous drugs than are men who have never had sex with other men. The strong association between same-sex sexual behaviour and injecting drug use in this sample suggests the need for additional research on the intersection of these two populations.

In a different paper based on the same sample, 11.1 per cent of male medical students who had ever had sex with another male indicated that the motive for their first experience was 'being forced' (Pongthai 1990a).

[15]In the multivariate analysis, the cases that had missing data for the outcome variables were coded in such a way as to bias the results toward the null hypothesis.

Table 4
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of ever using intravenous drugs, sexually active Northern Thai male soldiers (N=399), September-October 1991

	Ever used intravenous drugs			
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	20.0	2.32*** (0.47)	2.13*** (0.49)	8.5
No	2.4	R.C.	R.C.	
Age				
22-24 years	6.1	0.37 (0.46)	0.19 (0.49)	1.2
18-21 years	4.3	R.C.	R.C.	
Education				
More than six years	7.5	0.86 (0.47)	0.30 (0.55)	1.3
Six years or less	3.3	R.C.	R.C.	
Province of birth				
Chiang Mai	5.6	0.14 (0.45)	0.10 (0.48)	1.1
All others	4.9	R.C.	R.C.	
Residence when growing up				
Urban	13.0	1.38** (0.46)	0.96 (0.54)	2.6
Rural	3.6	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001. Note: R.C. is Reference Category.

Personally knowing someone with HIV/AIDS

For a variety of reasons, consideration of social networks is fundamentally important for understanding sexual behaviour and the transmission of HIV (for a discussion of these issues see Laumann et al. 1993, 1994). Epidemiologically, personally knowing someone with HIV/AIDS may increase, decrease, or be unrelated to risk for HIV. On the one hand, if the known person is a sex or needle-sharing partner, engaging in *any* unsafe behaviour with that person increases risk. Owing to condom slippage and breakage, even safer sexual practices with an HIV-infected partner carry some risk (for a detailed discussion of this issue, see Laumann et al. 1994:391-396; Weller 1993). Because of selectivity related to risk for HIV infection and to the formation of social relationships, social networks that include one person with HIV/AIDS are likely to include others, only some of whom may be known to particular individuals. Thus, this variable may represent a proxy for closer proximity to persons with HIV/AIDS and increased risk for those who engage in unsafe behaviour. On the other hand, knowledge of another's HIV serostatus may reduce risk by promoting changes in behaviour with that person as well as with others. Participating in social networks that include people with HIV/AIDS may also increase access to information about HIV/AIDS, thereby reducing

risk. From a more social perspective, personally knowing someone with HIV/AIDS has implications for social support and caregiving during illness.

Overall, ten per cent of the sexually active soldiers reported that they personally knew someone with HIV/AIDS. At the bivariate level, same-sex sexual activity, having more than six years of education, and urban residence when growing up are each associated with personally knowing someone with HIV/AIDS; however, after taking other variables into account, urban residence when growing up becomes non-significant (Table 5). In the adjusted model, men who have had sex with other men are 3.1 times more likely to personally know someone with HIV/AIDS than are men who have not had sex with men. Men with more than six years of education are 5.7 times more likely to personally know someone with HIV/AIDS than are men with lower educational attainments.

Having had sex with a female prostitute in the last six months

Numerous studies document high rates of contact with female prostitutes among Thai males (Swaddiwudhipong et al. 1990; Deemar Corporation 1990; Nopkesorn et al. 1991, 1993; Nelson et al. 1993; VanLandingham et al. 1993). Men who have sex with men in Thailand are among those who visit female prostitutes (Sittitrai et al. 1993), and in fact, they may do so even more than do men who have sex with women only. Beyrer et al. (1995) report that men who have sex with other men are significantly more likely to have ever had sex with a female prostitute than are men who only have sex with women (95.5 versus 84.9%).[16]

Among soldiers in our Chiang Mai study, 67.7 per cent reported having had sex with a female prostitute in the last six months. At the bivariate level, same-sex sexual activity and age are significantly associated with having had sex with a female prostitute. Both of these remain significant in multivariate analysis, and once other variables are taken into account, education also becomes significant (Table 6). In the multivariate model, men who have had sex with other men are 1.9 times more likely to have had sex with a female prostitute in the past six months than are men who have never had sex with another male. Men who are 22-24 years old are 2.3 times more likely to have had sex with a female prostitute in the last six months than are men who are 18-21 years old. Higher educational attainment significantly reduces the likelihood of having had sex with a female prostitute in the past six months. Compared with men with six or fewer years of education, men with more than six years of education are about 40 per cent less likely to have had sex with a female prostitute in the past six months.

Table 5
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of knowing someone with HIV/AIDS, sexually active Northern Thai male soldiers (N=399), September-October 1991

		Know someone with HIV/AIDS		
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	23.1	1.31***	1.12**	3.1

[16]Pongthai (1990b) reports data on sex with prostitutes among homosexual men (51.96% ever and 33.33% in current year); however, it is unclear whether these estimates refer to male prostitutes, female prostitutes, or both.

		(0.36)	(0.38)	
No	7.5	R.C.	R.C.	
Age				
22-24 years	12.2	0.54	0.44	1.6
		(0.35)	(0.37)	
18-21 years	7.5	R.C.	R.C.	
Education				
More than six years	17.7	1.84***	1.74***	5.7
		(0.43)	(0.45)	
Six years or less	3.3	R.C.	R.C.	
Province of birth				
Chiang Mai	10.2	0.04	0.05	1.1
		(0.33)	(0.35)	
All others	9.9	R.C.	R.C.	
Residence when growing up				
Urban	17.4	0.82*	0.09	1.1
		(0.37)	(0.41)	
Rural	8.5	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001. Note: R.C. is Reference Category.

Sexually transmitted disease in the last six months

Although recent data indicate that sexually transmitted disease rates may be declining among Thai men (Hanenberg et al. 1994), rates of ever having had a sexually transmitted disease are high in this population.[17] As previously noted, two other studies of military recruits reported that approximately 43 per cent had ever had a sexually transmitted disease (Nopkesorn et al. 1993; Nelson et al. 1993). The suspected source of infection most frequently reported by heterosexual male STD clinic patients is female prostitutes (Suwangool et al. 1992). One recent study systematically examined the association between same-sex sexual behaviour and sexually transmitted diseases among northern Thai military conscripts. Univariate comparisons indicate that men who have sex with men are significantly more likely than are men who have sex only with women to have ever had a sexually transmitted disease, and to have had gonorrhoea, syphilis, non-gonococcal urethritis, penile discharge with pus, watery penile discharge, or dysuria (Beyrer et al. 1995).

Table 6
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of having had sex with a female prostitute in the last six months, sexually active Northern Thai male soldiers (N=399), Setember-October 1991

	Had sex with a female prostitute in last six months			
Variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	78.5	0.65*	0.66*	1.9

[17]For a historical overview of public and official responses to sexually transmitted diseases in Thailand from the 1930s to the present, see Bamber, Hewison, and Underwood (1993).

		(0.32)	(0.33)	
No	65.6	R.C.	R.C.	
Age				
22-24 years	76.1	0.83***	0.82***	2.3
		(0.22)	(0.22)	
18-21 years	58.1	R.C.	R.C.	
Education				
More than six years	63.1	-0.39	-0.50*	0.6
		(0.22)	(0.23)	
Six years or less	71.7	R.C.	R.C.	
Province of birth				
Chiang Mai	65.3	-0.21	-0.25	0.8
		(0.21)	(0.22)	
All others	70.0	R.C.	R.C.	
Residence when growing up				
Urban	68.1	0.02	0.12	1.1
		(0.28)	(0.31)	
Rural	67.6	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001. Note: R.C. is Reference Category.

In our Chiang Mai sample, 23.6 per cent of sexually active soldiers reported having had a sexually transmitted disease in the last six months. Ever having had sex with another male and age are significantly associated with having had a sexually transmitted disease in the past six months (Table 7). After adjusting for other variables, men who report having had sex with other men are 4.8 times more likely to have had a sexually transmitted disease in the past six months than are men who have not had sex with other men. Compared with 18-21 year old men, those who are 22-24 years old are twice as likely to have had a sexually transmitted disease in the past six months.

Table 7
Logistic regression analysis of the relationship between same-sex sexual activity and the likelihood of having a sexually transmitted disease in the last six months, sexually active Northern Thai male soldiers (N=399), Setember-October 1991

	Had sexually transmitted disease in last six months			
Independent variable	Per cent yes	Unadjusted beta (standard error)	Adjusted beta (standard error)	Adjusted odds ratio
Ever had sex with male				
Yes	50.8	1.53***	1.56***	4.8
		(0.29)	(0.30)	
No	18.3	R.C.	R.C.	
Age				
22-24 years	29.6	0.74**	0.71**	2.0
		(0.25)	(0.26)	
18-21 years	16.7	R.C.	R.C.	
Education				
More than six years	22.5	-0.12	-0.25	0.8
		(0.24)	(0.27)	

Six years or less	24.5	R.C.	R.C.	
Province of birth				
Chiang Mai	25.5	0.21	0.18	1.2
		(0.24)	(0.25)	
All others	21.7	R.C.	R.C.	
Residence when growing up				
Urban	23.2	-0.03	-0.21	0.8
		(0.31)	(0.36)	
Rural	23.6	R.C.	R.C.	

Significance levels: *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001

As discussed above, men who have sex with other men in our sample are more likely to have had sex with a female prostitute in the six months before the survey than are men who have sex with women only. This finding, in conjunction with results reported by Beyrer et al. (1995), suggests that the observed association between same-sex sexual behaviour and the likelihood of acquiring a sexually transmitted disease may be due to more frequent contact with female prostitutes among men who have sex with men. However, a supplemental analysis (not shown) indicates that this is not the case in our data. We re-estimated the model presented in Table 7, controlling for having been to a female prostitute in the past six months. Having been to a female prostitute (beta = 2.21, SE = 0.45, $p < 0.0001$) and ever having had sex with a man (beta = 1.48, SE = 0.32, $p < 0.0001$) were independently associated with having had a sexually transmitted disease in the past six months. It remains unclear how patterns of partnering with male prostitutes and sexual partners who are not involved in prostitution influence the likelihood of sexually transmitted disease acquisition in this population.

Men who have sex with other men and HIV/AIDS-related knowledge

Numerous studies of HIV/AIDS knowledge in Thailand have been reported in the literature (Swaddiwudhipong et al. 1990; Shah et al. 1991; Maticka-Tyndale et al. 1994; VanLandingham et al., 1997).[18] One study documented substantial HIV/AIDS knowledge deficits among men who have sex with other men (Sittitrai et al. 1993). Although we measure HIV/AIDS knowledge in 1991, and knowledge levels may have changed substantially since then in this population, we believe this analysis contributes a useful baseline against which more current data might be compared.

Table 8 presents descriptive statistics and the results of an ordinary least squares regression analysis of correlates of HIV/AIDS-related knowledge. An HIV/AIDS knowledge scale was constructed using 18 items from the questionnaire (see Appendix B). Cronbach's alpha for the knowledge scale is 0.72. The knowledge scale was regressed on a set of dummy variables measuring ever having had sex with another male, the four socio-demographic variables described above, and the four HIV/AIDS-relevant outcomes considered previously.

On average, respondents correctly answered 11 of the 18 questions (standard deviation = 3.4). At the bivariate level, HIV/AIDS-related knowledge is significantly lower among men who have ever had sex with other men, men who have ever used intravenous drugs, men who personally know someone with HIV/AIDS, men who have had sex with a female prostitute in the past six months, and men who have had a sexually transmitted disease in the past six

[18]For overviews of AIDS education campaigns in Thailand, see Ford and Koetsawang (1991) and Lyttleton (1994). For a news report on how the Thai government restricted the scope of its AIDS education efforts in 1992, see Clements (1992).

months. HIV/AIDS-related knowledge is significantly higher among men with more than six years of education.

After adjusting for the socio-demographic variables only (Model 1), the strength of the association between men who have ever had sex with other men and HIV/AIDS-related knowledge increases slightly and remains significant. Inclusion of the four other HIV/AIDS-related variables reduces the strength of the association substantially (Model 2), although it remains marginally significant ($p < 0.06$). In Model 2, HIV/AIDS knowledge is also associated independently with education, knowing someone with HIV/AIDS, and having had a sexually transmitted disease in the past six months. Overall, Model 2 explains 13.5 per cent of the variance in HIV/AIDS knowledge scale scores.

Discussion

We focus on men who have sex with men in Thailand in order to broaden our understanding of an under-studied group that appears to be at substantial risk for HIV infection. Overall, we find that 16.3 per cent of our soldier sample ever had anal or oral sex with another male. Comparison of this estimate with estimates derived from two other samples of northern Thai military recruits drawn in 1991 (Nopkesorn et al. 1993; Nelson et al. 1993) indicates that same-sex sexual behaviour may be far more common among Thai men than was previously believed. The lower rates observed by Nopkesorn et al. (1993) and Nelson et al. (1993) appear to be related to the use of a more restrictive definition of same-sex sexual behaviour in one study, and the use of more invasive data collection methodologies in both studies. Empirical experimental investigations of the effect of the interview administration method would be the ideal approach for clarifying the extent of problems associated with face-to-face interviews regarding sensitive and stigmatized behaviour in Thailand. In the absence of such data, our analysis strongly suggests that future studies should employ anonymous, self-administered questionnaires to gather data on sexual behaviour and other stigmatized behaviours whenever possible.

Table 8
Ordinary least squares regression analysis of correlates of HIV/AIDS knowledge, sexually active Northern Thai male soldiers (N=399), September-October 1991

AIDS knowledge scale (range 0-18; high knowledge =18)				
Independent variable	Group mean	Unadjusted beta (standard error)	Model 1 Adjusted beta (standard error)	Model 2 Adjusted beta (standard error)
Ever had sex with male				
Yes	10.0	-1.26**	-1.46**	-0.51#
		(0.46)	(0.46)	*0.48)
No	11.2	R.C.	R.C.	R.C.
Age				
22-24 years	11.1	0.11	0.16	0.45
		(0.34)	(0.33)	(0.33)
18-21 years	11.0	R.C.	R.C.	R.C.
Education				
More than six years	11.7	1.36***	1.48***	1.61***
		(0.33)	(0.35)	(0.35)
Six years or less	10.4	R.C.	R.C.	R.C.

Province of birth				
Chiang Mai	10.9	-0.21	-0.09	-0.11
		(0.34)	(0.46)	(0.32)
All others	11.1	R.C.	R.C.	R.C.
Residence when growing up				
Urban	11.3	0.30	-0.14	-0.01
		(0.45)	(0.33)	(0.45)
Rural	11.0	R.C.	R.C.	R.C.
Ever use IV drugs				
Yes	9.0	-2.19**		-1.46
		(0.76)		(0.76)
No	11.1	R.C.		R.C.
Know someone with HIV/AIDS				
Yes	9.9	-1.31*		-1.54**
		(0.56)		(0.56)
No	11.2	R.C.		R.C.

Table 8 continued

Sex with prostitute in past 6 months			
Yes	10.7	-0.92*	-0.29
		(0.36)	(0.37)
No	11.7	R.C.	R.C.
Had STD in last 6 months			
Yes	9.6	-1.90***	-1.49***
		(0.39)	(0.42)
No	11.5	R.C.	R.C.

Significance levels: #=p ó 0.06; *=p ó 0.05; **=p ó 0.01; ***=p ó 0.001

The studies by Nelson et al. (1993) and Nopkesorn et al. (1993) were seroprevalence studies in which blood samples were drawn for HIV-antibody testing. We are aware that our recommendation would make it more difficult to link survey data with blood tests; however, through *a priori* labelling of blood collection vials and questionnaires with unique codes, it is possible to collect data anonymously in these kinds of studies. As has been noted in policy debates regarding blinded (anonymous) versus un-blinded (confidential) testing of all newborns in the United States and elsewhere, the disadvantage of anonymous data collection in seroprevalence studies is that persons who test positive cannot be informed for the purposes of medical treatment or prophylaxis. The ethical and policy issues related to the question of whether it is ever appropriate to collect blinded seroprevalence data have not been fully resolved at this time. These trade-offs must be kept in mind when designing future studies that obtain blood samples for HIV-antibody testing and collect data on stigmatized behaviour; however, when no blood collection is involved, our results strongly suggest that estimates of sensitive behaviour will be seriously biased if confidential, rather than anonymous, instruments are used.

Examination of socio-demographic correlates of same-sex sexual behaviour reveals a pattern of associations indicative of a positive association between higher socio-economic status and same-sex sexual behaviour among Thai soldiers. To the best of our knowledge, this is the first study to investigate socio-demographic variation in same-sex sexual behaviour in Thailand. Further investigation of the influence of socio-economic status and other social context variables on the initiation and maintenance of same-sex sexual behaviour is warranted. Future research should investigate these and other issues related to sexual behaviour in contexts other than the military. Studying military recruits is advantageous because it is a relatively easy population to locate and includes a broad spectrum of Thai men. However, there are a number of reasons to be cautious about generalizing findings from military recruits to the broader Thai male population. First, many men from privileged backgrounds can opt out of military service. Second, there may be special circumstances associated with military life that are conducive to same-sex sexual behaviour. The most obvious feature is the absence of women in the camps, although bases typically have brothels nearby that the men can patronize while on leave. Ethnographic studies would be extremely valuable for obtaining more contextualized understandings of the social organization of same-sex sexual behaviour in various segments of Thai society.

More detailed specification of patterns of same-sex sexual behaviour is another important direction for future research; this would broaden our understanding of Thai male sexual behaviour and contribute to our understanding of HIV risk in this population. It is interesting to note that Nopkesorn et al. (1993) find that none of the 46 men who reported receptive anal

intercourse was HIV-antibody positive, while eight of the 80 men who reported insertive anal intercourse were seropositive. If preferences for sexual roles are relatively stable in Thailand, those who usually engage in insertive anal intercourse with another male may be at greater risk for HIV infection because they may be more likely to visit female prostitutes than are those who usually engage in receptive intercourse. Further specification of the sexual behaviour patterns of men who have sex with other men may have significant implications for HIV prevention policy and program development.

We find that men who have ever had sex with other men are significantly more likely to have ever injected drugs, to personally know someone with HIV/AIDS, to have had sex with a female prostitute in the last six months, and to have had a sexually transmitted disease in the last six months. At the bivariate level and with socio-demographic controls in the model, men who have had sex with other men had significantly lower HIV/AIDS knowledge scale scores than did men who have not had sex with other men. This effect became marginally significant when controls for the other HIV/AIDS-related outcomes were introduced into the model. These results suggest that men who have sex with other men in Thailand are at substantial risk for HIV infection through both sexual and drug use behaviour, and that they have substantial knowledge deficits. Taken together, our findings indicate the need for targeted efforts to reach subgroups within the population of men who have sex with other men, in order to provide these men with HIV/AIDS prevention and treatment information.

Social desirability bias may partly account for the associations we observe between same-sex sexual behaviour and these other HIV-related outcomes. Persons who are more willing to report truthfully about same-sex sexual behaviour may also be more willing to report other illegal, stigmatized, or deviant behaviours. While we believe it is important to consider the influence of social desirability bias, we also believe it is important not to overstate its potential to account for our results. The data in our study were collected by means of an anonymous, self-administered questionnaire. This mode of data collection removes the key influences on social desirability bias: an interviewer and a means to identify the respondent. Thus, the incentive to underreport illegal, stigmatized, and deviant activity is reduced for all respondents in our study, not just for those who have engaged in same-sex sexual behaviour.

Although HIV seroprevalence appears to be relatively low among men who have sex with other men in Thailand (Weniger et al. 1991; Nelson et al. 1993; Nopkesorn et al. 1993; Sittitrai et al. 1993), the results reported in this paper suggest that there is great potential for the rapid spread of HIV in this population. Additionally, given that all of the men who report having sex with other men also report having sexual contact with women, a rapid increase in the incidence of HIV infection among men who have sex with other men has the potential to bridge the epidemic between other populations and social networks or to contribute to already expanding epidemics. For the purposes of both primary prevention of HIV infection among men who have sex with other men and secondary prevention with respect to their male and female sexual partners, it is important that additional research be conducted for the purposes of obtaining a better understanding of the social organization of sexual activity among men who have sex with other men.

The epidemiological significance of bisexuality in Thailand is different from that in more developed countries. In more developed countries with a high prevalence of HIV among men who have sex with other men, there is concern that bisexual males may serve as a bridge to spread HIV to low-prevalence female populations. In Thailand, available evidence suggests that HIV prevalence is still relatively low among men who have sex with other men. Concern about bisexuality must be focused on preventing the spread of HIV from high-prevalence populations of female and male prostitutes, their clients, and intravenous drug users, to men who have sex with other men, as well as from these men to other female and male subpopulations. It may still be possible in Thailand to prevent an explosive epidemic of HIV

infection transmitted through social networks of men who have sex with other men; this must be considered a public health priority.

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Appendix A

This appendix presents the 18 items used for constructing the HIV/AIDS knowledge scale, the choices that were considered by us to represent accurate responses, and the percentage responding accurately, i.e., in a way that suggests high rather than low level of knowledge about HIV/AIDS. Percentages are based on the full sample with complete socio-demographic and sexual behaviour data, including the sexually inexperienced (N=430). Missing responses for a given item were coded as inaccurate responses for that item.

Knowledge scale items	**Accurate response**	**Per cent accurate**
Have you heard of AIDS?	Yes	97.0
Are the following statements correct or not?		
A person can be infected with the AIDS virus and not have symptoms of the disease.	Definitely or probably true	68.0
There are drugs available to treat AIDS that can lengthen the life of an infected person.	Definitely or probably true	44.7
There is a drug available to the public that protects a person from contracting AIDS.	Definitely or probably false	45.8
There is no treatment/cure/recovery for AIDS at present.	Definitely or probably true	71.4
How likely do you think it is that a person will contract the AIDS virus from….		
Working near someone with the AIDS virus?	Definitely or probably not possible	48.6
Sharing needles for drug use with someone who has the AIDS virus?	Great possibility or could be possible	88.8
Attending school with students who have the AIDS virus?	Definitely or probably not possible	72.6
Mosquitoes or other insect?	Definitely or probably not possible	64.2
Sharing a comb with an infected person?	Definitely or probably not possible	58.1
How effective would you say the following are in reducing the chances of contracting the AIDS virus?		
Not having sexual intercourse.	Very effective	55.8

Appendix A continued

Using condoms during sexual intercourse.	Very effective	54.7
Urinating after sexual intercourse.	Not effective	19.8
Having sexual intercourse with only one person who is not infected with the AIDS virus.	Very effective	54.0
Please indicate whether you agree or disagree with the following statement.		
I can tell by looking at a female prostitute whether she has the AIDS virus or not.	Strongly disagree or disagree	47.2
It is safe to have sex with female prostitutes without using condoms if one goes only to the clean and disease-free brothels.	Strongly disagree or disagree	62.1
It is safe to have sex with female prostitutes without using condoms if one goes only to high-class prostitutes in the expensive brothels.	Strongly disagree or disagree	75.6
It is safe to have sex with female prostitutes without using condoms if one goes only to brothels where only Thai men go (and not foreigners).	Strongly disagree or disagree	74.7

Appendix B

Correlation Matrix (Sexually Active Soldiers Only / N=399).

	1	2	3	4	5	6	7	8	9	10
1. Age 22 or more years	1.00									
2. >6 years education	0.02	1.00								
3. Chiang Mai Province	-0.01	-0.02	1.00							
4. Urban residence	0.02	0.30***	0.00	1.00						
5. Ever sex with male	0.07	0.10*	0.04	0.14**	1.00					
6. Ever inject drugs	0.04	0.09	0.02	0.16**	0.29***	1.00				
7. Know person with HIV	0.08	0.24***	0.01	0.11*	0.19***	0.15**	1.00			
8. Prostitute last 6 months	0.19***	-0.09	-0.05	0.00	0.10*	0.04	0.09	1.00		
9. STD last 6 months	0.15**	-0.02	0.05	0.00	0.28***	0.19***	0.07	0.31***	1.00	
10.HIV/AIDS knowledge	0.02	0.20***	-0.03	0.03	-0.14**	-0.14**	-0.12*	-0.13*	-0.24***	1.00
Mean	0.53	0.47	0.49	0.17	0.16	0.05	0.10	0.68	0.24	11.15
Standard deviation	0.50	0.50	0.50	0.38	0.37	0.22	0.30	0.47	0.42	3.39

* p ó 0.05
** p ó 0.01
*** p ó 0.001