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HIV Prevalence and Risks Among Injection and Noninjection Drug Users in Northern Thailand: Need for Comprehensive HIV Prevention Programs

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Summary: The authors sought to determine sociodemographic and sexual and drug use risk factors for HIV infection among drug users in northern Thailand adjacent to the Golden Triangle. The authors enrolled patients admitted for inpatient drug detoxification at one treatment center in northern Thailand and studied HIV risks and prevalence using an interviewer-administered questionnaire and serum collection with HIV pretest and posttest counseling. Between February 1, 1999 and January 31, 2000, 1865 patients admitted for opiate and methamphetamine dependence completed study procedures. Overall HIV prevalence was 10.3%: 30.0% among 513 injection drug users (IDUs) and 2.8% among non-IDUs (OR = 14.8, 95% CI: 10.2, 21.6). HIV seroprevalence was 2.4% among exclusive methamphetamine users (98% of whom are non-IDUs) and 3.4% among opium smokers. Injection drug use was the dominant risk factor in multivariate models. Although Thailand is widely recognized as having a successful national response to the heterosexual HIV epidemic, seroprevalence in IDUs remains high. Despite a sharp increase of non-IDUs admitted to the drug treatment center, HIV infection and risks remained high among IDUs in northern Thailand. HIV prevention campaigns need to focus on IDUs and to implement harm reduction strategies to reduce transmission to IDUs and further contain the HIV epidemic in Thailand. **Key Words:** HIV-1 prevalence—Injection drug use—Ethnic minorities—Methamphetamines—Adolescents—Thailand.

The HIV epidemic among drug users in Thailand was first noted among patients treated at the Thanyarak Hospital, an inpatient drug treatment center in Bangkok. HIV prevalence among injection drug users (IDUs) increased from approximately 1% in January 1988 to more than 40% in less than 1 year (1). Sentinel surveillance of HIV seroprevalence among IDUs began in 1989 and demonstrated consistently high rates in nonrandom samples of drug users in the initial provinces selected (2). These data were concordant with results in the outpatient drug clinic operated by the Bangkok Metropolitan Administration in the capital region (3). In the next few years, the prevalence in cross-sectional samples remained steady, between 30% and 40%, although the average annual incidence was estimated to exceed 10 per 100 person-years (4).

The HIV prevalence in IDUs in Thailand stabilized nationally in the 1990s, although sentinel surveillance showed a continuing rise of HIV in IDUs in the south.

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Data throughout the country showed HIV infection in drug users in all provinces tested (in both Thai and ethnic minority populations) in northern Thailand (5,6). Administrative data from admissions records of an inpatient drug treatment center in Chiang Mai (upper northern Thailand) documented 18.6% HIV prevalence among admissions from 1993 through 1995. Risk factors included Thai ethnicity (compared with ethnic minorities), drug administration by injection, older age, being single, low level of education, and employment in the agricultural or trading sector (7). A 1994 serosurvey of HIV among 28 hill-tribe villages selected on the basis of size, ethnicity, development level, and proximity to transportation routes in the upper north showed widely varying prevalence rates in different communities (8). Prevalence ranged from no HIV in Karen and Pa-Long villages to 0.6% among Hmong, 5% among Yao and Akha, and 8.8% in Shan communities. Injection drug use was not identified as a major risk factor for HIV infection in these settings at that time, although other researchers did find IDU-related HIV problems in some minority populations, primarily among the Akha (9).

Northern Thailand and the seven upper northern provinces bordering Burma and Laos were the epicenter of the nation's early HIV epidemic (10). In recent years, the moderating heterosexual epidemic in the north (11) has led to relative equality of HIV prevalence as determined by national sentinel surveillance data and seroprevalence results from the Royal Thai Army (12,13). The most northern region is of special interest because it is the Thai border of the Golden Triangle, an area that accounts for approximately 40% to 60% of the world's annual opium production, and cultivation and distribution of end products (opium and heroin) are well established and documented (14). The successful poppy eradication effort and crop substitution programs dramatically reduced opium availability and hence led to increased heroin use (almost exclusively by injection) among populations that had previously not been identified as parenteral drug users (15). Since 1996, there has been a rapid escalation in methamphetamine availability and use in Thailand. The original source of this inexpensive drug was mobile laboratories operated by armed groups located inside Burma (16), but domestic production and trafficking have been noted as well. Drug availability and permeable borders have led to considerable public health concern regarding escalating drug use (17). To determine the magnitude of the HIV problem associated with drug use in this region, we evaluated all persons who voluntarily sought drug detoxification for opiate or methamphetamine abuse at admission to one regional treatment center between February 1999 and January 2000. We present an analysis of the risk factors associated with prevalent HIV infection in this heterogeneous population of Thai and hill-tribe drug users.

MATERIALS AND METHODS

Between February 1, 1999 and January 31, 2000, 2845 persons were admitted to the Northern Drug Dependence Treatment Center (NDTC) in Mae Rim, Chiang Mai province, Thailand, representing 3637 admissions. Overall, 2444 persons were admitted once and 401 persons (16% of all admitted) had between 2 (n = 268) and 11 admissions (n = 5). Eligibility requirements for this study included age older than 12 years, provision of informed consent (obtained from parents for minors, with signed informed assent obtained from youth), an admission for opioid or methamphetamine dependence, agreement to submit to pre- and posttest HIV counseling and venipuncture for antibody testing for HIV infection, and completion of a behavioral questionnaire.

Patients who were admitted to the NDTC who met the inclusion criteria were approached by a recruiter not affiliated with the treatment center, generally within 3 days after admission.

Patients admitted for heroin detoxification received a controlled methadone taper during their 21-day inpatient stay. Opium users received detoxification by administration of tincture of opium, whereas methamphetamine users were given palliative treatment as needed (generally antidepressants and tranquilizers). All patients were alert and determined to be capable of providing informed consent when approached for participation by staff. Recruiters and interviewers were fluent in 12 local languages, and potential participants were recruited and completed all study procedures in their preferred language.

A total of 2149 persons were determined eligible, of whom 1865 (1665 men and 200 women), or 87%, completed the study. Of those who did not participate, 18% declined to participate after the study was presented, 29% provided informed consent and completed the risk factor interview but failed to receive pretest HIV counseling (and the HIV blood draw), and the majority (53% of nonparticipants) completed the baseline interview and pretest HIV counseling but failed to undergo venipuncture. Most patients who declined venipuncture cited unwillingness to learn their HIV results, fear of venipuncture or voluntarily left the treatment center against medical advice.

After explaining study procedures and obtaining a signed informed consent/assent statement (approved by the institutional review boards of all Thai authorities and Johns Hopkins University), an interviewer conducted a 30- to 40-minute risk factor questionnaire in a private setting. HIV pretest counseling was then provided, followed by venipuncture for collection of serum for HIV testing. Approximately 1 week after specimen collection, participants were given their HIV test results by a trained counselor during HIV posttest counseling. All patients determined to have a prevalent sexually transmitted infection (STI) were provided treatment at no cost.

The interviews were developed after reviewing existing literature on risk factors for HIV infection in Thailand and the Southeast Asia region, from pilot studies (in-depth interviews, focus groups, and elicitation procedures), and in a formal pretest of data collection procedures. The interviews collected information on demographics (including ethnicity and languages spoken), cigarette and alcohol use, nonparenteral modes of HIV transmission, and a comprehensive drug use history. We inquired into lifetime use of marijuana, opium, heroin, methamphetamine, volatiles (paint thinner and glue), tranquilizers, and other drugs. For each drug, we assessed age at first use, recall of priority of reasons for first use, and use in the past year and past 3 months. We also determined route of drug administration (inhalation, ingestion, or injection) for each specified drug used in the past 3

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months, frequency of use, amount taken per dose, and purchase price of each drug. A history of injection was also obtained, including age and drug at first injection, source of injection equipment, sharing history, and needle and syringe disinfection practices. We also inquired about drug transition behaviors (between types of drugs and routes of administration), treatment history, and family and friends' drug use practices.

The sexual history included age at first sexual intercourse, contraception methods, types of sex partners (spouse, regular partner, steady partner, casual partners, and commercial partners), gender and numbers of partners in the past year and 3 months, and STI treatment history and any diagnosis participants may have received. Information on HIV knowledge completed the interview, with a focus on history of prior voluntary HIV testing.

Participants provided a blood specimen that was tested for HIV antibody by ELISA using licensed commercially available reagents (Vironostica HIV Uni-form II plus 0; Organon Teknika). Reactive ELISA specimens were tested with the gel-particle agglutination (GPA) test for antibodies to HIV (Serodia-HIV; Fujirebio, Japan). Specimens testing positive in both antibody tests were considered HIV-positive. GPA-nonreactive specimens were confirmed by Western blot analysis using licensed commercially available reagents (HIV Blot 2.2; Genelabs Diagnostics, Singapore). Syphilis antibodies were detected by a rapid plasma reagin (RPR) (SyphScreen; Shield Diagnostics, United Kingdom), and reactive specimens were confirmed by a Serodia-TP-PA (passive particle agglutination test for detection of antibodies to *Treponema pallidum*; Funirebio, Japan). *Chlamydia* and gonorrhea were detected using the PCR method (Amplicor PCR Diagnostics; Roche Diagnostics Systems).

The data were analyzed using the Mantel-Haenszel χ^2 test for trends and multiple logistic regression techniques to estimate the unadjusted and adjusted ORs and 95% CIs associated with HIV infection. Because preliminary analysis indicated that the risk factors for HIV infection varied by route of drug administration, the data were initially stratified by gender and injection and other modes of drug administration (inhalation and ingestion). Multivariate results are presented only for men, given the small number of women in the study.

RESULTS

Overall, 192 (10.3%) of 1865 participants were infected with HIV at the time of admission. Sociodemographic characteristics associated with prevalent HIV included ethnicity (where Thai citizens were significantly more likely to be HIV infected than ethnic minorities), age between 20 and 39 years, being unmarried, having more education, and being employed (Table 1). Several of these risks were confounded with age. No statistically significant difference was found in HIV prevalence by gender (although the trend for men included having a higher rate).

There were several sociodemographic differences by gender. More women than men were ethnic minorities, older, and more likely to be married, widowed, or divorced. Further, they were significantly less likely to have received any formal education (more common among ethnic minorities) and less likely to give a history of injection. Because of the limited number of women and the relative infrequency of HIV infection, we limited the remaining statistical analyses to men.

Behavioral factors associated with HIV prevalence included heavier cigarette smoking (>10 per day), being a former drinker or heavy drinker ("usually drinking until

TABLE 1. *Sociodemographic characteristics and HIV seroprevalence among admissions to the Northern Drug Dependence Treatment Center, Thailand, 1999–2000*

	M			F		
	Number tested	Number HIV-positive (%)	OR (95% CI)	Number tested	Number HIV-positive (%)	OR (95% CI)
Total	1665	178 (10.7)		200	14 (7.0)	
Ethnicity						
Hill tribe	702	56	1.0	137	8 (5.8)	1.0
Thai	963	122 (12.7)	1.67 (1.20, 2.33)	63	6 (9.5)	1.70 (0.56, 5.12)
Age (y)						
<20	386	10 (2.6)	1.0	40	4 (10.0)	1.0
20–39	930	152 (16.3)	7.35 (3.83, 14.1)	87	5 (5.6)	0.55 (0.14, 2.16)
≥40	349	16 (4.6)	1.81 (0.81, 4.03)	73	5 (5.8)	0.55 (0.17, 2.62)
Marital status						
Married	693	45 (6.5)	1.0	111	6 (5.4)	1.0
Never married	765	86 (11.2)	1.82 (1.25, 2.66)	41	2 (4.9)	0.90 (0.17, 4.64)
Other	207	47 (22.7)	4.23 (2.71, 6.59)	48	6 (12.5)	2.50 (0.76, 8.19)
Education						
None	507	25 (4.9)	1.0	131	8 (6.1)	1.0
≥ Compulsory	1158	153 (13.2)	2.9 (1.9, 4.5)	69	6 (8.7)	1.5 (0.5, 4.4)
Occupation						
Student	214	4 (1.9)	1.0	24	1 (4.2)	1.0
Farmer	685	54 (7.9)	4.5 (1.5, 14.8)	82	3 (3.7)	0.9 (0.1, 22.9)
Unemployed	315	30 (9.5)	5.5 (1.8, 18.8)	33	4 (12.1)	3.2 (0.3, 79.9)
Laborer	229	53 (23.1)	15.8 (5.6, 44.5)	44	4 (9.1)	2.3 (0.2, 21.8)
Trader	91	21 (23.1)	15.8 (5.2, 47.5)	8	2 (25.0)	7.7 (0.6, 99.5)
Other	131	16 (12.2)	7.3 (2.4, 22.4)	9	0	N/A

N/A, not applicable.

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drunk"), and a history of drug injection, which showed statistically significant trends with increasing consumption (data not shown). Reported drug dependence for which treatment was sought was associated with route of drug administration, because most heroin users (59%) reported injection, whereas most opium (93%) and methamphetamine users (95%) reported smoking drugs.

Among male IDUs (n = 485), most (64.3%) began injecting more than 2 years after they first used drugs. There was no difference in HIV prevalence by time from first drug use to first injection; however, duration of injection drug use was associated with HIV prevalence ($p < .01$) (Table 2). Frequency of recent (past 3 months) injection was associated with HIV prevalence (Mantel-Haenszel χ^2 test = 6.32, $p = .012$), as was self-reported sharing (data not shown). When examining the frequency of injection and needle sharing jointly among IDUs, the lowest HIV prevalence (19.5%) was found among those who reported no injection in the 3 months prior to treatment center admission; HIV prevalence was 27.7% among those who reported they injected less than daily, 29.1% in daily injectors who denied sharing, and 41.3% among those who reported both daily injection and sharing (Mantel-Haenszel χ^2 test = 8.96, $p = .003$). Finally, a lifetime history of incarceration was associated with a 2.5-fold higher rate of HIV seropositivity.

Virtually all (95%) of the prevalent infections in our study were subtype E, now called the circulating recombinant form (CRF01_AE), and 5% were subtype B in the preliminary laboratory analyses using V3 loop peptide ELISA (18). It was reported that 79% of Bangkok methadone treatment patients followed longitudinally for HIV seroconversion were also *env* subtype E, and there were no differences in risk factors for seroconversion by clade, with the exception of lower income being associated with *env* subtype E infection. For both clades, injection practices and not sexual behaviors were associated with new infection (19).

Sexual behavior risks for HIV infection showed few consistent associations even when stratifying for route of drug administration (parenteral versus other) (Table 3). No association was seen for heterosexual intercourse and HIV infection (although only half of injectors and noninjectors reported any sexual activity in the 3 months prior to admission). No statistically significant associations were found for reported history of men who had sex with men and HIV prevalence, although the OR was nearly 2.0 for both IDUs and non-IDUs. A history of visits to female sex workers was associated with prevalent HIV infection for men regardless of route of drug administration, although the association attained statistical significance only for IDUs.

A history of STI also failed to differentiate those with and without prevalent HIV infection, although those who reported a history of STI symptoms had somewhat higher odds of HIV infection. Among those with a history of STI symptoms, there was no association between history of treatment of an STI and HIV prevalence (Table 3). Condom use practices with commercial and noncommercial partners were not associated with HIV prevalence even when stratified by route of drug administration.

TABLE 2. *Risks for HIV prevalence among male injection drug users admitted to the Northern Drug Dependence Treatment Center, Thailand, 1999–2000*

	Number tested	Number HIV-positive (%)	OR (95% CI)
Time to first injection			
5+ years	175	47 (26.9)	1.0
2–4 years	137	41 (29.9)	1.16 (0.71, 1.91)
0–2 years[a]	153	52 (34.0)	1.40 (0.85, 2.31)
Started by injecting	20	7 (35.0)	1.47 (0.49, 4.25)
Years injecting			
<2 years	106	23 (21.7)	1.0
2–4 years	149	36 (24.2)	1.15 (0.63, 2.08)
5+ years	230	88 (38.3)	2.24 (1.31, 3.81)[b]
Injection/sharing (past 3 months)			
None	77	15 (19.5)	1.0
<Daily injection	112	31 (27.7)	1.58 (0.79, 3.18)
Daily injection	175	51 (29.1)	1.70 (0.89, 3.26)
Daily injection and sharing	121	50 (41.3)	2.91 (1.49, 5.69)[b]
Incarceration (ever)			
None	213	43 (20.2)	1.0
Ever	272	104 (38.2)	2.45 (1.62, 3.70)

[a] Excluding ones who started using drugs by injecting.
[b] $p < .01$ by Mantel-Haenszel χ square test.

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TABLE 3. *Sexual risks for HIV prevalence among male drug users admitted to the Northern Drug Dependence Treatment Center, Thailand, 1999–2000, by route of drug administration*

	IDU			Non-IDU		
	Number tested	HIV positive number (%)	OR (95% CI)	Number tested	HIV positive number (%)	OR (95% CI)
Heterosexual sex past 3 months						
None	247	78 (31.6)	1.0	581	30 (2.6)	1.0
Any	238	69 (29.0)	0.88 (0.60, 1.30)	599	12 (2.0)	0.60 (0.29, 1.26)
Male homosexual sex						
None	463	137 (29.6)	1.0	1160	30 (2.6)	1.0
Any	22	10 (45.4)	1.98 (0.84, 4.70)	20	1 (5.0)	1.98 (0.26, 15.3)
History of CSW visits						
None	195	45 (23.1)	1.0	837	18 (2.2)	1.0
Ever	290	102 (35.2)	1.81 (1.20, 2.73)	343	13 (3.8)	1.79 (0.87, 3.70)
History of STI						
No/don't know	299	84 (28.1)	1.0	1007	25 (2.5)	1.0
Yes	186	63 (33.9)	1.31 (0.88, 1.94)	173	6 (3.5)	1.41 (0.57, 3.49)
History of STI treatment						
Not treated	27	10 (37.0)	1.0	29	0	1.0
Yes	159	53 (33.3)	0.85 (0.36, 1.98)	144	6 (4.2)	NA

IDU, injection drug user; CSW, commercial sex worker; STI, sexually transmitted infection.

Multivariate Analysis Results

The multivariate results (Table 4) for male patients demonstrated that the ethnic difference in HIV seroprevalence was not significant after adjusting for sociodemographics, drug use, and sexual risks, although the trend was toward protection from infection. Injection was the leading risk factor for HIV prevalence and was somewhat dampened in comparison to its univariate result (OR = 8.91 in adjusted analysis versus 16.1 unadjusted). Compared with those who gave their occupation as "student," traders and laborers had significantly elevated risks (approximately sevenfold), whereas farmers had a slightly increased risk. No other drug use behavior (e.g., duration of drug use, time from first drug use to injection, frequency of use) was significant in other models examined (data not shown).

TABLE 4. *Adjusted ORs for HIV prevalence among male drug users admitted to the Northern Drug Dependence Treatment Center, Thailand, 1999–2000*

Characteristic[a]	OR	95% CI
Ethnic minority	0.77	(0.47, 1.27)
Never married	1.66	(1.06, 2.61)
Previously married	2.46	(1.48, 4.10)
Compulsory education	2.40	(1.28, 4.50)
Farmer[b]	3.03	(1.03, 8.90)
Laborer	6.43	(2.11, 19.7)
Trader	7.07	(2.16, 23.1)
Other occupation	2.77	(0.83, 9.20)
Ever incarcerated	1.95	(1.34, 2.85)
Had sex with men	1.29	(0.55, 3.02)
Female sex worker visit	1.32	(0.89, 1.96)
Injector	8.91	(5.73, 13.9)

[a] Reference group consists of Thai citizens, married, no education, students, never incarcerated, no history of male sex, never visits commercial sex workers, and noninjectors.
[b] Unemployed and farmers were combined together.

Several sociodemographic factors were significantly associated with HIV seroprevalence in multivariate analysis. Compared with those who reported themselves as married, men who were never married or who were separated, divorced, or widowed were more likely to be HIV infected. Those who completed Thai compulsory education had an HIV prevalence greater than twice that of men who reported no formal education. This reflects the fact that older ethnic minority opium smokers without Thai compulsory education are less likely to acquire HIV parenterally.

None of the sexual risks examined were significant in a number of models tested. In the final model (Table 4), self-reports of men who had sex with men, although uncommon, failed to attain statistical significance nor did reports of visits to female sex workers, regardless of condom use practices. Other models replaced these variables with history of STI symptoms, treatment of STI, trading drugs or money for sex, and frequency of sex with female commercial partners. None of these variables attained statistical significance in multivariate analysis (data not shown).

Because age was confounded with occupation and ethnicity, we conducted an analysis in which age was included in the model and occupation was excluded. The HIV risk in the age group of those between 20 and 39 years old was significantly elevated compared with that in adolescents, whereas it was not different in the oldest group (≥40 years). Separate models stratified by ethnic-

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ity (Thai versus minority) also showed increased risk among the younger age groups, reflecting differences in modes of drug administration. Finally, we conducted an exploratory multivariate analysis of risks for HIV infection among female drug users (n = 200). After controlling for ethnicity, age, and trading sex for money, the only significant predictors were route of drug administration by injection (OR = 8.47, 95% CI: 2.30, 31.15) and history of sexual abuse (OR = 7.54, 95% CI: 1.15, 49.40).

DISCUSSION

Among drug users in northern Thailand, HIV is essentially confined to IDUs. At the treatment center, however, admissions for opiate dependence have decreased from 82% in 1996 to 36% in 2001, reflecting the national furor over methamphetamine abuse among adolescents and young adults. HIV infection among methamphetamine users admitted for drug treatment, however, is much lower than among IDUs. A number of other studies in Thailand have demonstrated that injection practices are associated with both prevalent (20) and incident (21–23) HIV infection, as is the case in Southeast Asia (24–27).

In a longitudinal study of HIV-negative IDUs attending methadone maintenance treatment programs in Bangkok screened in 1995 through 1996, the overall HIV incidence was 5.8 (95% CI: 4.8–6.8) per 100 person-years of follow-up. HIV seroconversion was associated with frequency of injection, sharing injection equipment, and incarceration, whereas sexual behavior was not found to be associated with risk for HIV infection (28). We also found incarceration to be a significant risk factor in multivariate analysis. Although drugs may be obtained in jails and prison, sharing of injection equipment is widespread, leading to high rates of HIV transmission.

Sexual risks among male drug users appear to play only a minor role in HIV infection in the 1990s in this setting. None of the models examined showed any sexual risks to be significantly associated with HIV seroprevalence in this cross-sectional study. These data held for both men and women, and there was no association between trading sex for drugs or money and HIV infection among women. The low rate of infection among the adolescent methamphetamine abusers reflects the current population prevalence of HIV in the general population in the north. Smoking methamphetamine does not directly lead to risk of HIV acquisition in this setting, and sexual risks for HIV are low in the study population. Rates of reported sexual activity and trading sex for drugs or money are low among adolescents and young adults; however, the reliability of self-report among this population is not known.

The associations of higher education and specific occupations (traders and laborers) with HIV seroprevalence among our participants are similar to early reports in the African HIV epidemic (29,30), where higher economic resources reflected greater access to HIV risks. In the Thai context, this reflects increased economic resources to acquire heroin on a daily basis. In addition, these factors reflect some residual confounding with age and ethnicity, which was associated with type of drug abused and parallel route of administration (opium and methamphetamine smoking compared with heroin injection). Traders and day laborers are paid on a daily basis, providing a consistent income stream that allows for frequent drug purchases and use. Alternatively, these day laborers may not have been able to hold regular permanent jobs because of their drug dependence

Several reports from Thailand have shown that a national effective control program for HIV has led to a significant decline in the rate of new infections. Male patronage of female sex workers in Thailand, especially in the upper north, was common when the HIV epidemic was first documented (31). In 1991, the Prime Minister and his National AIDS Prevention and Control Committee laid the groundwork for an aggressive public health response to the HIV epidemic, implementing the "100% condom program" by the Thai Ministry of Public Health (MOPH) to decrease risks of HIV infection inherent in commercial sex. The impact of this campaign has been well demonstrated by serial cohorts of young Thai military conscripts, where both the prevalence and incidence of HIV infection have been shown to have declined precipitously over the decade of the 1990s (11,32).

The vigorous public health response to the heterosexual HIV epidemic in Thailand has not extended to the dual epidemics of injection drug use and HIV infection. Drug treatment services in Thailand are quite limited outside the capital region. The Bangkok Metropolitan Administration is justifiably proud of its integrated system of outpatient drug treatment clinics with support from Thanyarak Hospital of the MOPH, providing both methadone-assisted detoxification services and inpatient care. Outside Bangkok, there are regional comprehensive substance use treatment centers available; however, they seem not to be adequate for the growing substance abuse problem in the country. In the northern 17 provinces, there are only two comprehensive inpatient drug detoxification and rehabilitation centers operated by the MOPH. There are a few hospitals and district health centers that provide treatment of drug dependence as a part of the general health care system, but their capacity

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is quite limited. In northern Thailand, these centers are responsible for the drug treatment of a population of more than 12 million inhabitants, where drugs are readily available. This area is also home to important drug trafficking routes of heroin into the country. Although the Thailand MOPH has increased its budget for drug dependence treatment and rehabilitation recently, funds are still insufficient to meet the sharp increase in the number of drug users seeking treatment.

Currently, there is a major epidemic of methamphetamine abuse occurring in Thailand. Methamphetamine users admitted to drug dependence treatment centers have increased from 1.7% of all inpatients in 1996 to 42.5% in 1999 nationally (33). The NDTC has also experienced a sharp increase of methamphetamine users admitted as inpatients for drug dependence treatment from 142 in 1996 to 1743 in 2000, whereas the number of heroin users decreased from 1553 in 1996 to 730 in 2001 (34). Given the stable high rate of HIV seroprevalence among IDUs and the dramatic decline of admissions of IDUs, HIV prevention for IDUs has become even more challenging.

In March 2001, the Prime Minister declared a "national priority agenda" with respect to both drug trafficking and use of methamphetamine, and interdiction and control activities as well as a stepped-up response by drug treatment authorities have commenced. On February 1, 2003, a "national war on drugs" was announced, with national directives to purge the country of all drugs and drug dealers with 3 months. In the first two months, over 2,000 suspected drug users were murdered and over 135,000 persons nationwide were identified to public health authorities as suspected drug users.

A public health concern has been raised that as larger numbers of youth start using drugs, especially such neurotoxic compounds as methamphetamine, transition to other methods of drug use, especially parenteral administration, may follow. Although the methamphetamine users in our study have a relatively low rate of HIV infection to date, as they age and progress to other drugs (particularly heroin), the HIV incidence rate may accelerate.

The Thailand government considers "drug users" as "patients" who need treatment and rehabilitation. Drug dependence treatment services are being expanded and strengthened. Other harm reduction approaches have not yet been fully debated and implemented, however. In one trial of methadone maintenance reported in Thailand (1), participation was associated with reduced relapse to heroin use. Methadone treatment of ethnic minorities and needle exchange programs have been tested among the ethnic minority drug-using population in northern Thailand, and acceptance of these harm reduction programs was excellent (9,35). The Thailand MOPH has recently allowed the implementation of methadone maintenance programs in drug dependence treatment clinics that previously provided only methadone detoxification.

Thailand has had a considerable drug abuse problem for many years, in part, arising from a long history of production and consumption of opium in the Golden Triangle. During the 1980s, a successful poppy eradication and crop substitution effort decreased production to minimal levels. One consequence has been the trafficking of opiates from Burma and Laos into Thailand. Because the source is close for many users, the high purity and relatively low cost have led to an increase in heroin use over the past several decades. As opium has become less available for use by addicted hill tribes because of diminished local production and little external supply of raw opium, there has been a transition to the use of heroin by injection, especially in the ethnic minority populations (9). One result has been a rapidly increasing rate of HIV transmission among drug users in northern Thailand.

Because drug use is illegal and socially stigmatized, especially among those living in remote mountainous areas, drug use is clandestine, outside the purview of the health authority, and difficult to control. Rapidly increasing drug-related arrests and incarcerations have contributed more challenges to provide drug dependence treatment and HIV prevention and control for those who have higher risks for both drug use and HIV infection. As a result of the limited response of the public health community to lobby for increased funding for drug treatment at a time of constrained central budgets and the need to use a significant proportion of the HIV budget for other interventions such as "essential antiretroviral" medications, the outlook for control of the HIV epidemic among IDUs and other drug users appears to be a major challenge to the national AIDS control program for years to come. IDUs are currently the focus of the first phase III HIV prophylactic vaccine trial being conducted in Bangkok by VAXGEN. If the vaccine is shown to have efficacy, this may be widely applied as a prevention tool to control the continuing drug-related HIV epidemic in Thailand.

In the late 1990s, the pattern of the type of drug use in northern Thailand has changed from almost exclusive opiate use to methamphetamine use, but HIV prevalence is still high in IDU compared with non-IDU methamphetamine users. Thus, IDUs remain an important reservoir of infection, which may be sufficient to maintain the Thai HIV/AIDS epidemic for many years to come without comprehensive and effective HIV prevention and

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control programs for IDUs. The current emphasis on the treatment of methamphetamine users is a logical response, but it might have the unintentional impact of decreasing admissions of IDUs into treatment, presumably leading to continuing sharing of injection equipment and transmission of HIV to their needle-sharing networks and sexual partners. Therefore, a renewed prevention initiative is essential in effectively promoting HIV prevention programs for IDUs and their networks.

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