

Short report

Prevalence and correlates of hepatitis C virus infection among injecting drug users in Tehran

Saman Zamani^{a,*}, Seiichi Ichikawa^b, Bijan Nassirimanesh^c, Mohsen Vazirian^d, Kazuko Ichikawa^b, Mohammad Mehdi Gouya^e, Parviz Afshar^f, Masako Ono-Kihara^a, Shahrzad Mortazavi Ravari^a, Masahiro Kihara^a

^a Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, Japan

^b Department of Infection Control and Prevention, Nagoya City University, Nagoya, Japan

^c Persepolis Society, Tehran, Iran

^d Iranian National Center for Addiction Studies (INCAS), Tehran University of Medical Sciences, Tehran, Iran

^e Center for Disease Management, Ministry of Health and Medical Education, Tehran, Iran

^f Iran Prison Organization, Tehran, Iran

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Abstract

This study aimed to investigate the prevalence and correlates of hepatitis C virus infection among injecting drug users in a community-based setting in Tehran, Iran. In October 2004, injecting drug users were recruited from a drop-in centre and neighboring parks and streets in a drug-populated neighborhood in Tehran. Participants were interviewed using a structured questionnaire, and a sample of oral mucosal transudate was collected for detection of HIV and HCV antibodies. Overall, 105 of 202 participants (52.0%) were found to be positive for HCV-antibody testing. After adjustment for the basic demographic characteristics, the prevalence of HCV infection was found to be associated with length of drug injection (more than 10 years) [odds ratio (OR), 3.25; 95% confidence interval (CI), 1.43–7.38], length of lifetime incarcerations (more than a year) (OR, 3.44; 95% CI, 1.68–7.06), and a history of being tattooed inside prison (OR, 1.96; 95% CI, 1.06–3.62). High prevalence of HCV infection and its association with incarceration-related exposures are important implications for harm reduction initiatives for drug using inmates in Iran. While prevention interventions for drug using inmates are being expanded in Iran, it is important that high prevalence of HCV infection be taken into consideration in order to control further transmission of this infection.

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Keywords: Hepatitis C virus; Substance use; Tattoo; Prison

Background

Hepatitis C virus (HCV) is a major public health problem in the world. While it is preventable, the infection can cause chronic HCV infection which may then develop into cirrhosis or hepatocellular carcinoma. Recent data shows that HCV infection is prevalent among estimated 180 million people, representing some 3% of the world's population (World Health Organization, 2006). Available evidence from Iran shows that prevalence of HCV infection ranges between

0.12% (Alavian, Gholami, & Masarrat, 2002) and 0.59% (Ghavanini & Sabri, 2000) among blood donors.

It is known that injecting drug use is a primary mode of transmission for HCV in developed countries but there is limited evidence regarding the contribution of drug injecting to HCV transmission in developing countries (Shepard, Finelli, & Alter, 2005). However, there are several studies in Iran showing that injecting drug use is one of the main factors associated with the prevalence of HCV infection (Alavian et al., 2002; Hajiani et al., 2006). Several research studies have also reported that HCV is prevalent among prisoners in Iran. Accordingly, prevalence of HCV infection among prisoners with a history of drug injecting varies between 31.5%

* Corresponding author. Tel.: +81 75 753 4350; fax: +81 75 753 4359.
E-mail address: szamani@pbh.med.kyoto-u.ac.jp (S. Zamani).

(Mohammad Alizadeh, Alavian, Jafari, & Yazdi, 2005) and 45.3% (Zali, Aghazadeh, Nowroozi, & Amir-Rasouly, 2001). In another study in Zanjan prison, it was found that more than 47% of inmates were infected with HCV infection (Khani & Vakili, 2003). These studies showed that risk characteristics including injecting drug use, homosexual sexual practice, tattooing, and length of incarceration are among potential correlates of HCV infection among prisoners in Iran. It is also predicted that prison-based sharing practices could exacerbate levels of HCV infection, given the current situation of injecting drug users (IDUs) in Iran (Alavian, Adibi, & Zali, 2005).

While it has been known that HIV infection is potentially associated with a history of shared drug injection inside prison (Zamani et al., 2005, 2006) there has been contention surrounding the possible association between incarceration-related risk behaviors and other blood-borne infections such as HCV infection among drug users in Iran. In this study, we have defined factors associated with HCV infection among a group of community-based IDUs in Tehran and provide data surrounding additional contextual factors for the risk of HCV infection that could potentially be incorporated into current and future harm reduction initiatives for IDUs in Iran.

Methods

This survey was conducted in a relatively poor residential neighborhood in south central Tehran (*Shoosh* area) which is also home to high proportions of migrants and drug users (Razzaghi & Rahimi Movaghar, 2003; Vazirian et al., 2005). In October 2004, a consecutive sample of drug users was recruited at a drop-in centre and at parks and streets in the area. Potential respondents were approached by an ex-user staff member of Persepolis NGO for recruitment into the study. After being screened by a researcher, active drug users (those who reported using drugs in the past month) were interviewed using a structured questionnaire. On completion of the interview, the trained researcher took an oral mucosal transudate (OMT) sample from consenting participants. Oral samples were obtained using the OraSure oral fluid specimen collection device (OraSure Technologies Inc., Beaverton, Ore) and were shipped to Japan to be tested for the presence of antibodies for HIV-1 and HCV. All samples were tested for anti-HCV antibodies by particle agglutination (PA) assay (Serodia-HCV, FujiRebio, Tokyo, Japan) and end-point dilution antibody titers were determined by 5- μ l PA assay (Mizui et al., 1994).

The research protocol was approved by the Ethical Committee of the Iranian National Center for Addiction Studies at Tehran University of Medical Sciences in Iran and by the Committee for Research on Human Subjects at Kyoto University in Japan. After interviewing, respondents were invited to undertake HIV and HCV testing, and were given information regarding prevention of HIV and other blood-borne infections. Statistical analysis was performed using

SPSS for Windows (Version 13.0; SPSS Inc., Chicago, IL, USA). Multivariable analysis was performed to examine the associations of variables with being HCV positive, simultaneously adjusting only for basic demographic characteristics, and to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI).

Results

Of the 302 drug users who were invited to participate in the study, two men refused to be interviewed (response rate 99.3%) and 14 cases were later excluded either because of incomplete questionnaire or insufficient oral sample. Among the remaining, 202 drug users reported ever using a drug by injection (IDUs) and their information was then considered for this report. Among 202 IDUs, 105 (52.0%) were found to be positive for HCV antibodies using oral samples. Of those infected with HCV infection, 19 (9.4%) were co-infected with HIV-1 infection.

As shown in Table 1, the majority of participants were male and were mainly recruited from a drop-in centre. The median age of drug using participants was 32.0 and 60% of them were of Fars ethnicity. Up to 75% of drug users had educational levels less than high school and about 59% had ever been married. At the time of interview, one third of the respondents were homeless and 66% had no job. None of

Table 1
Socio-demographic characteristics of injecting drug users recruited from a drop-in centre and neighboring area in Tehran in 2004 ($n = 202$)

Characteristics	Number (%)
Recruitment site	
Drop-in center	148 (73.3)
Park/street/abandoned building	54 (26.7)
Gender	
Male	196 (97.0)
Female	6 (3.0)
Age at interview	
<30 years	70 (34.7)
≥ 30 years	132 (65.3)
Ethnicity	
Fars	122 (60.4)
Others	80 (39.6)
Education	
Junior high school or less	152 (75.2)
High school or more	50 (24.8)
Marital status	
Single (never married)	83 (41.1)
Ever married	119 (58.9)
Place of residence	
Residential place	136 (67.7)
Park/street/abandoned building	65 (32.3)
Job situation	
Have a job	69 (34.2)
Jobless	133 (65.8)

Table 2
Risk characteristics of injecting drug users recruited from a drop-in centre and neighboring area in Tehran in 2004, by HCV test results ($n=202$)

Characteristics	No.	HCV positive (%)	Adjusted OR (95% CI)	<i>p</i> value
Overall	202	105 (52.0)	–	–
Time from last drug injection				
<6 months	181	93 (51.4)	1.00	
≥6 months	21	12 (57.1)	1.25 (0.48–3.25)	0.650
Length of drug injection				
<6 years	97	44 (45.4)	1.00	
6–10 years	39	20 (51.3)	1.50 (0.67–3.36)	0.327
>10 years	63	40 (63.5)	3.25 (1.43–7.38)	0.005
Ever shared a needle/syringe				
No	103	52 (50.5)	1.00	
Yes	99	53 (53.5)	1.18 (0.64–2.17)	0.660
Lifetime incarcerations				
0–6 months	61	22 (36.1)	1.00	
7–12 months	37	20 (54.1)	2.35 (0.98–5.65)	0.055
>12 months	102	63 (61.8)	3.44 (1.68–7.06)	0.001
Ever injected a drug inside prison				
No	147	74 (50.3)	1.00	
Yes	55	31 (56.4)	1.38 (0.67–2.83)	0.382
Ever had a shared drug injection inside prison				
No	157	82 (52.2)	1.00	
Yes	45	23 (51.1)	0.94 (0.44–2.02)	0.884
Ever tattooed inside prison				
No	118	56 (47.5)	1.00	
Yes	84	49 (58.3)	1.96 (1.06–3.62)	0.032

Variables shown in this table are controlled for basic demographic characteristics including gender, age, ethnicity, levels of education, marital status, job situation, residency status and recruitment site. OR, odds ratio; CI, confidence interval.

the above socio-demographic characteristics were associated with HCV infection.

Table 2 shows the association between some risk characteristics of IDUs and the prevalence of HCV infection, while being adjusted for basic demographic characteristics. Among IDUs, prevalence of HCV infection was associated with the length of lifetime injecting practice in a dose-dependent manner; the odds of being HCV positive among those IDUs who injected more than 10 years was 3.25 times (95% CI, 1.43–7.38) more than the odds of carrying the infection among IDUs who injected less than 6 years. However, HCV infection was not associated with time elapsed since last injection or a history of shared use of needle/syringe.

The prevalence of HCV infection was significantly associated with total length of incarcerations in a dose-dependent manner as the odds ratio increased from 2.35 among IDUs who had experienced incarceration of 7–12 months to 3.44 in those who had been incarcerated for more than 12 months compared with those who had never incarcerated or been in prison up to 6 months. Regarding risk behaviors inside prison, participants were asked whether or not they injected drugs, shared injecting utensils or been tattooed during any period of incarceration. Of these risk behaviors, only a history of being tattooed inside prison was significantly associated with higher prevalence of HCV infection ($p < 0.05$). This

association remained significant even when variables related to a history of ever shared drug injection or a history of shared drug injection inside prison was included into the model.

Discussion

In our previous report, we showed that the prevalence of HIV-1 infection was more than 23% and it was associated with a history of shared drug injection inside prison and that of multiple incarcerations (Zamani et al., 2006). In this report, we investigated the prevalence of HCV infection and its correlates among the same group of community-based IDUs in Tehran. These current results showed that more than half of the sample was infected with HCV and suggest that it is also associated with risk behaviors inside prison. However, unlike HIV infection, prevalence of HCV seems to be associated with being tattooed inside prison rather than shared drug injection.

The association between HCV infection and a history of being tattooed inside prison has been reported from other countries. In the United States, Samuel et al. (2001) reported that receipt of a tattoo inside prison or jail was associated with both hepatitis B and C viruses (OR 2.3 and 3.4, respectively). In Australia, it was also found that being tattooed

was an independent risk factor for being HCV positive (OR 2.7) among a group of prisoners (Hellard et al., 2004). The risk of tattooing for transmission of HCV infection has also been reported in earlier studies among IDUs in Iran (Zali et al., 2001), but our current results show contextual situations in which tattooing might have higher risk of HCV infection when practiced inside prison.

Facing the challenges regarding transmission of blood-borne infections, particularly HIV infection among IDUs and prisoners, authorities in the judiciary system and its Prison Organization sub-division have adopted and implemented comprehensive harm reduction policies and practices for drug using inmates. Accordingly, the Iran Prison Organization has started comprehensive HIV prevention interventions for drug using inmates in many provinces throughout the country. The main activities include epidemiological surveillance, educational programs, research activities, and prevention programs. Among HIV prevention interventions, methadone maintenance therapy is playing a key role inside prisons in Iran and being progressively expanded (Iran Prison Organization, 2006). While Iran Prison Organization is scaling up its prevention interventions for drug using inmates, it is helpful that these interventions further incorporate components such as HCV-specific educational programs and encourage inmates to avoid tattooing inside prison.

Our study had several limitations. The design of our study was cross-sectional which limits us from determining the exact temporal relationship between risk behaviors and any biological outcomes such as HCV infection. We also recruited drug users from one single drop-in centre and through outreach activities in its surrounding neighborhood, and thereby our findings may not be representative of wider drug injecting populations in Tehran. While detection of anti-HCV antibodies in oral samples has been more researched recently (De Cock et al., 2004; Judd et al., 2003), evaluation of oral samples using particle agglutination remains one of our important research questions to be investigated using both blood and oral samples.

In conclusion, our findings show that HCV is prevalent among community-based IDUs in Tehran with prison-related exposures among possible correlates of the infection. Comprehensive harm reduction programs targeting all blood-borne infections and different modes of transmission are needed for drug using inmates in Iran in order to best control further transmission of these infections.

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References

- Alavian, S. M., Gholami, B., & Masarrat, S. (2002). Hepatitis B and C virus infection: Hepatitis C risk factors in Iranian volunteer blood donors: A case control study. *Journal of Gastroenterology and Hepatology*, *17*, 1092–1097.
- Alavian, S. M., Adibi, P., & Zali, M. R. (2005). Hepatitis C virus in Iran: Epidemiology of an emerging infection. *Archives of Iranian Medicine*, *8*(2), 84–90.
- De Cock, L., Hutse, V., Verhaegen, E., Quoilin, S., Vandenberghe, H., & Vranckx, R. (2004). Detection of HCV antibodies in oral fluid. *Journal of Virological Methods*, *122*, 179–183.
- Ghavanini, A. A., & Sabri, M. R. (2000). Hepatitis B surface antigen and anti-hepatitis C antibodies among blood donors in the Islamic Republic of Iran. *Eastern Mediterranean Health Journal*, *6*, 1114–1116.
- Hajiani, E., Hashemi, J., Masjedzadeh, R., Shayesteh, A. A., Idani, E., & Rajabi, T. (2006). Seroprevalence of hepatitis C and its risk factors in Khuzestan Province, south-west of Iran: A case-control study. *World Journal of Gastroenterology*, *14*, 4884–4887.
- Hellard, M. E., Hocking, J. S., & Crofts, N. (2004). The prevalence and risk behaviours associated with the transmission of hepatitis C virus in Australian correctional facilities. *Epidemiology and Infection*, *132*, 409–415.
- Iran Prison Organization, Health and Treatment Headquarter. (2006). An overview on HIV/AIDS in prisons of Islamic Republic of Iran (In Persian).
- Judd, A., Parry, J., Hickman, M., McDonald, T., Jordan, L., Lewis, K., et al. (2003). Evaluation of a modified commercial assay in detecting antibody to hepatitis C virus in oral fluids and dried blood spots. *Journal of Medical Virology*, *71*, 49–55.
- Khani, M., & Vakili, M. M. (2003). Prevalence and risk factors of HIV, hepatitis B virus and hepatitis C virus infections in drug addicts among Zanjan prisoners. *Archives of Iranian Medicine*, *6*, 1–4.
- Mizui, M., Moriya, T., Yoshizawa, H., Kondo, M., Saito, T., Imai, M., et al. (1994). A novel agglutination method for screening of HIV and HCV antibody testing with 5-microliters reagents: reduction of cost and time with high sensitivity. *VoxSang*, *67*, 315–316.
- Mohammad Alizadeh, A. H., Alavian, S. M., Jafari, K., & Yazdi, N. (2005). Prevalence of hepatitis C virus and its related risk factors in drug abuser prisoners in Hamedan-Iran. *World Journal of Gastroenterology*, *11*, 4085–4089.
- Razzaghi, E. M., & Rahimi Movaghar, A. (2003). *Rapid assessment and response: Multi-center project on injection drug use*. Tehran: WHO.
- Samuel, M. C., Doherty, P. M., Bulterys, M., & Jenison, S. A. (2001). Association between heroin use, needle sharing and tattoos received in prison with hepatitis B and C positivity among street-based injecting drug users in New Mexico, USA. *Epidemiology and Infection*, *127*, 475–484.
- Shepard, C. W., Finelli, L., & Alter, M. J. (2005). Epidemiology of hepatitis B and hepatitis B virus infection in United States children. *Lancet Infectious Disease*, *5*, 558–567.
- Vazirian, M., Nassirimanesh, B., Zamani, S., Ono-Kihara, M., Kihara, M., Mortazavi Ravari, M., et al. (2005). Needle and syringe sharing practices of injecting drug users participating in an outreach HIV prevention program in Tehran, Iran: A cross-sectional study. *Harm Reduction Journal*, *2*, 19. doi:10.1186/1477-7517-2-19
- World Health Organization. (2006). Hepatitis C. Retrieved 30th September 2006 from http://www.who.int/immunization/topics/hepatitis_c/en/print.html.

- Zali, M. R., Aghazadeh, R., Nowroozi, A., & Amir-Rasouly, H. (2001). Anti-HCV antibody among Iranian IV drug users: Is it a serious problem? *Archives of Iranian Medicine, 4*, 115–119.
- Zamani, S., Kihara, M., Gouya, M. M., Vazirian, M., Ono-Kihara, M., Razzaghi, M. E., et al. (2005). Prevalence of and factors associated with HIV-1 infection among drug users visiting treatment centers in Tehran, Iran. *AIDS, 19*, 709–716.
- Zamani, S., Kihara, M., Gouya, M. M., Vazirian, M., Nassirimanesh, B., Ono-Kihara, M., et al. (2006). High prevalence of HIV infection associated with incarceration among community-based injecting drug users in Tehran, Iran. *Journal of Acquired Immune Deficiency Syndrome, 42*, 342–346.

Prevalence and Correlates of Sexual Behaviors Among Karen Villagers in Northern Thailand

Eiko Kobori · Surasing Visrutaratna ·
Akiko Kada · Siriporn Wongchai ·
Masako Ono-Kihara · Masahiro Kihara

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Abstract A cross-sectional survey was conducted in two mountainous villages of the Karen, a major ethnic minority in Thailand. The participants were 566 villagers aged 15–54 years (371 in Village A, 195 in Village B; response rate=81.9%). Premarital/extramarital sex was experienced by 10–20% of the sexually active respondents and sex with a female sex worker (FSW) by 12.6% of males. Premarital sex was independently associated with being a Christian and occupational experience in town; extramarital sex was associated with Village A and drug use; sex with a FSW was associated with being unmarried, a nonfarmer, and occupational experience in town. Approximately 80% of the married participants never used a condom with their spouse, and nearly one-third never did so with a boy/girlfriend or a FSW. A history of sexually transmitted infections (STIs) was associated with sex with a FSW. These findings suggest that nontraditional sexual practices are prevalent and could potentially threaten Karen communities with the spread of HIV.

Keywords HIV · Sexual behaviors · Risk factors · Karen · Thailand

Introduction

Upper northern Thailand is one of the epicenters of HIV infection in Southeast Asia, although the new infection rate has declined in recent years (Torugsa et al., 2003; UNAIDS, 2004). The concentration of HIV prevalence in the region is often explained by the high infection rates of sexually transmitted infections (STIs) and HIV among female sex workers (FSWs; Limpakarnjanarat et al., 1999) and men's frequent visits to FSWs as clients (Celentano et al., 1996; Nopkesorn et al., 1993).

In this region, approximately 500,000 people belong to ten ethnic minorities that densely populate the mountainous areas (Department of Public Welfare, 1997). Each minority group has a different origin, culture, and language (Lewis & Lewis, 1998). These minorities have been left behind during the social and economic development that lowland Thais have enjoyed over the last 30 years, as a consequence of historical, cultural, linguistic, and geographical barriers, including political reasons. In recent years, however, following the increasing involvement of their societies with Thai society, the HIV infection risk of the ethnic minorities has begun to be studied.

Studies in the late 1990s compared the HIV prevalence, sexual attitudes, and behaviors of the villagers among several ethnic minorities (Beyrer et al., 1997; Omori, 1999). These studies demonstrated the presence of a major risk factor for HIV infection: contact with Thai society. Other studies have reported on HIV

E. Kobori (✉) · M. Ono-Kihara · M. Kihara
Department of Global Health and Socio-Epidemiology,
Kyoto University School of Public Health,
Yashida-konoe-cho, Sakyo-ku,
Kyoto 606-8501, Japan
e-mail: kobori@pbh.med.kyoto-u.ac.jp

S. Visrutaratna · S. Wongchai
Chiang Mai Provincial Health Office,
Chiang Mai, Thailand

A. Kada
General Clinical Research Unit,
National Cardiovascular Center, Osaka, Japan

prevalence and high-risk behaviors associated with drug use in patients admitted to a drug treatment center in northern Thailand (Celentano, Jittiwutikorn, Hodge, Beyrer, & Nelson, 1998; Celentano et al., 1999; Razak et al., 2003; Wiewel et al., 2005). One study showed that contact with Thai society was a strong predictor of injection drug use. Although these studies provided important information regarding the risks for HIV infection among ethnic minorities, updated quantitative information on these risks and their social correlates are needed to develop appropriate HIV prevention programs for these populations.

In 2003, we conducted a cross-sectional survey of the Karen population, who comprise the largest ethnic minority in Thailand, to evaluate the prevalence and social correlates of sexual behaviors. The Karen have a unique, conservative sexual norm. They maintain their traditional sexual culture, including sexual sanctions based on animism, which regards premarital or extramarital sex as a transgression that is resolved in communal rituals. However, the communal ritual has declined gradually, not because there are no breaches of sexual sanctions, but with the influence of Christianity. Therefore, Christianity is thought to have weakened the sexual sanctions based on rituals (Hayami, 2003), which could make people vulnerable to STI/HIV infection.

We surveyed two Karen villages located in northern Thailand: a developed village and a less developed village. This was based on the assumption that social development contributed to high-risk sexual behavior because it facilitated contact with Thai society.

Method

Participants and Procedures

Villages in mountainous areas are classified into five categories from Category 1 to Category 5, depending on the level of social and economic development. Villages in Category 1 are the most developed, and those in Category 5 are the least developed (Department of Public Welfare, 1997). Since more than 90% of the Karen villages in the districts containing the two study sites are classified in Categories 1 to 3, we selected Village A from Category 1 as a developed village, and Village B from Category 3 as a less developed village. Village A, located 48 km from the nearest town, was first introduced to electricity in 1985, and a paved road linked it to the center of the province in 1995. Village B, located 43 km from the nearest town, has no such infrastructure.

All the male and female inhabitants (age range, 15–54 years) of both villages were recruited at their homes between 24 February and 26 March 2003. Six Karen health workers, three per village, interviewed candidates after explaining the study purpose, guaranteeing that there would be no consequences for refusing participation, and obtaining written informed consent. For adolescents, informed consent was also obtained from the parents. People who were illiterate were asked to give a mark for consent. Gender-matched interviewers conducted interviews when possible at an appropriate location near each respondent's home to protect privacy. Potential participants who were absent during three household visits were not recruited. Data were collected during a face-to-face interview using a structured questionnaire, with a separate self-administered answer sheet for sensitive questions. No names or other identifiers were collected. The consent form, questionnaire, and answer sheet were placed in an envelope and sealed in front of the participant.

Measures

Mini-focus group interviews were conducted for the participants from a developed and a less developed Karen village, which were distant from the study villages. Four focus groups were organized by gender (male or female) and age (15–34 or 35–54 years) in each village, with each group including four to five participants. A questionnaire was then developed in Thai based on the results of the mini-focus group interviews; it was pilot-tested outside the study sites, revised, and then translated into Karen. The questionnaire was translated from Thai into Karen after discussion with the Karen interviewers, who were bilingual in Karen and Thai. The questions covered basic demographics, experience in town, knowledge related to HIV and STIs, risk perception, attitudes toward nontraditional sexual practices, sexual behaviors, and drug use. There were 17 questions about HIV/STI knowledge, of which seven questions asked about the possibility of transmitting HIV by living together, eating food, having sex, or sharing a needle with people with HIV/AIDS (PWA), via mosquitoes or mother-to-child, or whether having a STI stimulated the transmission of HIV; five questions about prevention asked whether HIV could be prevented by using a condom correctly, sterilizing needles, having only one, healthy-looking, or faithful partner; and five questions about treatment asking if symptoms could indicate HIV status, whether a vaccine existed for preventing HIV/AIDS or a medicine that enabled complete recovery or prolonged the life of

PWA, or whether some STIs lacked symptoms. Self-risk perception was measured by asking whether it was possible that the respondent was infected with HIV. Concerning sexual attitude, five nontraditional sexual practices were presented and the respondents were asked if they found them agreeable: premarital or extramarital sex by males or females and sex with a FSW by males. A separate self-administered answer sheet for sensitive questions was also prepared. Considering illiterate respondents, illustrations and geometric patterns were used to indicate question numbers and selection numbers for answers instead of using Arabic numerals. Animals, insects, or plants commonly observed in the villages were used for illustrations; and white or black circles, triangles, and squares were used for geometric patterns.

Data Analyses

The χ^2 -test and Fisher's exact test were used to compare proportions, and a multiple logistic regression analysis was used to identify variables independently associated with outcomes. Variables that showed a correlation of $P < .1$ with at least one of the nontraditional sexual practices in the bivariate analyses were introduced in the multivariate analyses.

Results

Of 691 eligible inhabitants, 70 (15.9%) and 55 (22.0%) in Villages A and B, respectively, were excluded from the analysis due to their absence during the study

Table 1 Sociodemographic characteristics of Karen survey participants by village and sex (%)

	Village A			Village B		
	Male (n = 177)	Female (n = 194)	Total (n = 371)	Male (n = 102)	Female (n = 93)	Total (n = 195)
Age group (years)						
15–24	44.6	44.8	44.7	35.3	34.4	34.9
25–34	26.6	26.3	26.4	27.5	36.6	31.8
35–44	20.3	24.7	22.6	24.5	21.5	23.1
45–54	8.5	4.1	6.2	12.7	7.5	10.3
Missing data	0.0	0.0	0.0	0.0	0.0	0.0
Marital status						
Single	44.6	24.2	34.0	36.3	22.6	29.7
Married	55.4	75.3	65.8	62.7	77.4	69.7
Other	0.0	0.5	0.3	1.0	0.0	0.5
Missing data	0.0	0.0	0.0	0.0	0.0	0.0
Religion						
Christianity	28.2	21.1	24.5	83.3	80.6	82.1
Buddhism	62.1	68.0	65.2	8.8	14.0	11.3
Animism	6.8	7.2	7.0	6.9	4.3	5.6
Missing data	2.8	3.6	3.2	1.0	1.1	1.0
Education						
No formal education	30.5	40.7	35.8	30.4	55.9	42.6
Not graduated from primary school	4.0	6.2	5.1	6.9	5.4	6.2
Primary school	22.6	17.5	19.9	39.2	18.3	29.2
Junior high school	22.6	21.1	21.8	12.7	9.7	11.3
High school or higher	19.8	12.4	15.9	10.8	9.7	10.3
Missing data	0.6	2.1	1.3	0.0	1.1	0.5
Primary occupation						
Farmer	61.6	72.2	67.1	81.4	86.0	83.6
Daily wage laborer	13.6	8.2	10.8	2.9	7.5	5.1
Student	12.4	10.3	11.3	14.7	5.4	10.3
Other	7.9	9.3	8.6	1.0	0.0	0.5
Missing data	4.5	0.0	2.2	0.0	1.1	0.5
Graduated from a school in town						
Yes	31.1	19.6	25.1	22.5	15.1	19.0
No	64.4	75.3	70.1	77.5	81.7	79.5
Missing data	4.5	5.2	4.9	0.0	3.2	1.5
Worked in town						
Yes	32.8	4.6	18.1	42.2	17.2	30.3
No	66.7	90.2	79.0	57.8	81.7	69.2
Missing data	0.6	5.2	3.0	0.0	1.1	0.5

period or missing data on age, sex, or sexual behaviors. The final response rate was 84.1% for Village A and 78.0% for Village B, 81.9% in total.

Of the participants in both villages, more than 65% were younger than 34 years, two-thirds were married, 38.2% had no formal education, and the majority were farmers (see Table 1). The villages were markedly different in religious practices, $\chi^2(2, N = 522) = 174.2$, $P < .01$, but only moderately so in other variables; participants from Village B were less educated, more likely to be farmers, and had more experience working in town, $\chi^2(4, N = 545) = 15.2$, $P < .01$; $\chi^2(3, N = 557) = 23.8$, $P < .01$; $\chi^2(1, N = 554) = 10.0$, $P < .01$, reflecting the fact that inhabitants of Village B, having no private business in their village, had to seek job opportunities in town. There were large gender differences for marital status in Village A, $\chi^2(1, N = 371) = 17.2$, $P < .01$, and for occupational experience in town in both villages, Village A, $\chi^2(1, N = 360) = 46.8$, $P < .01$; Village B, $\chi^2(1, N = 194) = 14.0$, $P < .01$.

Table 2 describes the participants' HIV/STI-related knowledge, self-risk perception, attitudes toward non-traditional sexual practices, sexual experience, and

drug use. The knowledge score was calculated by summing the scores for all 17 questions by giving one point for each correct answer. Regarding sexual attitude, those who did not admit to any of the five non-traditional sexual practices were categorized in the conservative group and those who admitted to at least one nontraditional sexual practice were categorized in the nonconservative group. The self-risk perception was generally low and attitudes toward nontraditional sexual practices were predominantly conservative among both males and females. Most of the sexually active respondents were married, except for 12 males who comprised 10.3% of all single male respondents. Drug use was reported significantly more by males than by females, $\chi^2(1, N = 539) = 45.7$, $P < .01$. Amphetamine was used by 74.0% of the drug users, followed by opium (43.8%), marijuana (28.8%), and heroin (17.8%). Only one male reported injection drug use. There were no observed differences between the two villages in the prevalence and pattern of drug use.

Table 3 presents the prevalence of sexual behaviors and condom use among sexually active respondents, 97% of whom were married. The mean age at first

Table 2 HIV/STI knowledge, self-risk perception, sexual attitudes, sexual experience, and drug use of survey participants in two Karen villages (%)

	Village A			Village B		
	Male (n = 177)	Female (n = 194)	Total (n = 371)	Male (n = 102)	Female (n = 93)	Total (n = 195)
HIV/STI knowledge						
Lower score ^a (0–8)	24.9	52.6	39.4	26.5	45.2	35.4
Higher score ^a (9–17)	75.1	47.4	60.6	73.5	54.8	64.6
Missing data	0.0	0.0	0.0	0.0	0.0	0.0
Self-risk perception for HIV infection						
Possible to be infected	2.3	0.5	1.3	4.9	3.2	4.1
Not possible to be infected	87.0	95.4	91.4	91.2	95.7	93.3
Missing data	10.7	4.1	7.3	3.9	1.1	2.6
Sexual attitude						
Premarital sex with boy/girlfriend						
Nonconservative ^b	5.6	2.1	3.8	6.9	3.2	5.1
Conservative ^c	92.7	97.4	95.1	93.1	96.8	94.9
Missing data	1.7	0.5	1.1	0.0	0.0	0.0
Extramarital sex with other than a spouse ^d						
Nonconservative ^b	2.3	0.5	1.3	2.0	1.1	1.5
Conservative ^c	94.9	98.5	96.8	97.1	97.8	97.4
Missing data	2.8	1.0	1.9	1.0	1.1	1.0
Sex with FSW ^e						
Nonconservative ^b	3.4	0.5	1.9	3.9	1.1	2.6
Conservative ^c	92.7	99.0	96.0	93.1	95.7	94.4
Missing data	4.0	0.5	2.2	2.9	3.2	3.1
Sexual experience (lifetime)						
Yes	60.5	75.8	68.5	66.7	77.4	71.8
No	39.5	24.2	31.5	33.3	22.6	28.2
Missing data	0.0	0.0	0.0	0.0	0.0	0.0
Drug use ^f (last year)						
Yes	23.2	3.6	12.9	21.6	3.2	12.8
No	73.4	89.7	81.9	72.5	94.6	83.1
Missing data	3.4	6.7	5.1	5.9	2.2	4.1

^a Knowledge score is the total score for 17 true-or-false questions regarding knowledge about the transmission, prevention, and treatment of HIV/STI

^b Those who agreed to at least one traditional sexual behavior, that is, premarital sex, extramarital sex, or sex with a female sex worker

^c Those who never agreed to premarital sex, extramarital sex, and sex with a female sex worker

^d Sex with a female sex worker was excluded

^e FSW, female sex worker

^f Drugs include amphetamines, heroin, opium, and marijuana

Table 3 Sexual behavior and condom use of sexually active Karen survey participants by sex in two villages (%)

		Village A			Village B		
		Male (n = 107)	Female (n = 147)	Total (n = 254)	Male (n = 68)	Female (n = 72)	Total (n = 140)
Had premarital sex	Yes	20.6	9.5	14.2	20.6	11.1	15.7
	Missing data	0.0	0.0	0.0	0.0	1.4	0.7
Had extramarital sex (n = 382) ^a	Yes	26.5	17.0	20.8	15.4	9.7	12.4
	Missing data	0.0	0.7	0.4	0.0	1.4	0.7
Had sex with a FSW ^b	Yes	13.1	–	–	11.8	–	–
	Missing data	3.7	–	–	7.4	–	–
Had more than one sex partner	Yes	32.7	17.7	24.0	19.1	11.1	15.0
	Missing data	0.0	0.0	0.0	0.0	1.4	0.7
Diagnosed with STI in life time	Yes	4.7	2.0	3.1	5.9	0.0	2.9
	Missing data	2.8	0.7	1.6	8.8	5.6	7.1
Used a condom during the first sexual encounter	Yes	6.5	4.1	5.1	5.9	4.2	5.0
	Missing data	4.7	0.7	2.4	4.4	2.8	3.6
Used a condom during the last sexual encounter	Yes	8.4	4.8	6.3	8.8	2.8	5.7
	Missing data	3.7	5.4	4.7	13.2	8.3	10.7
Ever used a condom with spouse (n = 382) ^a	Yes	19.4	10.9	14.3	26.2	9.7	17.5
	Missing data	1.0	4.8	3.3	12.3	8.3	10.2
boy/girlfriends (n = 79) ^c	Yes	51.7	25.0	39.6	85.7	58.3	73.1
	Missing data	13.8	4.2	9.4	0.0	0.0	0.0
FSW ^c (n = 22) ^d	Yes	28.6	–	–	25.0	–	–
	Missing data	35.7	–	–	37.5	–	–

^a Married only (M = 163, F = 219)

^b FSW, female sex worker

^c Those having had sex with a boy/girlfriend (M = 43, F = 36)

^d Those having had sex with a FSW (M = 22)

sexual intercourse was 23.1 ($SD = 4.7$) and 19.4 ($SD = 3.4$) for males and females, respectively. Premarital and extramarital sex and multiple sexual partnerships were experienced by 20% to 30% of males and 10% to 16% of females. Sex with a FSW was experienced by 12.6% of males.

During their lifetimes, approximately 80% of the participants indicated that they had never used a condom with their spouse, and one-third of males indicated they had never used a condom with a FSW. The condom nonusage rate of females with a boyfriend was much higher than that of males with a girlfriend, $\chi^2(1, N = 74) = 7.6, P < .01$.

A history of STI was reported by 5.1% ($n = 9$) of sexually active male participants, and was significantly concentrated in males with a history of having sex with a FSW compared with those who had no such history, $\chi^2(1, N = 159) = 16.7, P < .01$.

Correlates of Sexual Behavior

Premarital and extramarital sex and sex with a FSW were evaluated with bivariate analyses in relation to possible risk factors (see Table 4). Analyses of premarital and extramarital sex were limited to the

married respondents and excluded sex with a FSW. Premarital sex was significantly associated with occupational experience in town; extramarital sex was associated with Village A, a nonfarmer status, and drug use. Sex with a FSW was associated with being unmarried, a nonfarmer status, education higher than primary school, graduating from a school in town, and occupational experience in town. Religion, HIV/STI-related knowledge, and attitudes toward nontraditional sexual practices did not demonstrate significant correlations.

Multivariate logistic analyses using a backward stepwise procedure were then performed both for all participants and by village among married respondents with no history of sex with a FSW for premarital and extramarital sex and only among males for sex with a FSW (see Table 5). In the multivariate analysis for all, occupational experience in town remained significantly associated with premarital sex and sex with a FSW. Respondents who had ever worked in town were 2.4 times more likely to have reported premarital sex and those males were 3.7 times more likely to have had sex with a FSW, whereas Christians were 2.4 times more likely to have reported premarital sex. Participants in Village A and drug users were 3.1 times and 2.8 times

Table 4 Bivariate analyses of correlates of premarital and extramarital sex and sex with a FSW among sexually active Karen survey participants in two villages^a

Explanatory variables		Premarital (lifetime)			Extramarital (lifetime)			Sex with FSW ^c (lifetime)		
		n	(%)	χ^2	n	(%)	χ^2	n	(%)	χ^2
Village	A (developed)	233	9.9	1.1	233	18.9**	7.5	103	13.6	0.0
	B (less developed)	125	13.6		125	8.0		63	12.7	
Age group (years)	15–34	198	13.6	2.7	198	15.7	0.1	82	18.3†	3.6
	35–54	160	8.1		160	14.4		84	8.3	
Sex	Male	141	13.5	1.2	141	15.6	0.0	–	–	–
	Female	217	9.7		217	14.7		–	–	–
Marital status	Married or divorced	–	–	–	–	–	–	155	9.0**†	36.2
	Never married	–	–	–	–	–	–	11	72.7	
Religion	Christianity	156	14.7†	3.6	156	14.1	0.3	83	15.7	0.7
	Others ^d	193	8.3		193	16.1		80	11.3	
Education	Primary or lower	300	10.3	1.0	300	14.3	0.7	132	9.8†	6.9
	Secondary or higher	53	15.1		53	18.9		33	27.3	
Main occupation	Farmer	324	10.2 ⁱ	3.3	324	13.6 [†]	6.9	140	8.6**†	23.6
	Nonfarmer ^e	28	21.4		28	32.1		21	47.6	
Graduated from a school in town	Graduated	31	19.4 [†]	2.5	31	19.4 [†]	0.6	28	28.6 [†]	7.0
	Not graduated	308	10.1		308	14.3		131	9.9	
Worked in town	Worked	61	23.0**	9.8	61	14.8	0.0	68	23.5*	10.4
	Never worked	290	9.0		290	15.2		97	6.2	
HIV/STI-related knowledge score ^f	Lower (0–8)	158	10.1	0.3	158	15.2	0.0	48	18.8	1.8
	Higher (9–17)	200	12.0		200	15.0		118	11.0	
Sexual attitude	Conservative ^g	339	10.6 [†]	0.8	339	15.3 [†]	1.1	151	13.2 [†]	0.0
	Not conservative	17	17.6		17	5.9		14	14.3	
Drug use ^h (last year)	Used	46	10.9	0.0	46	26.1*	4.8	47	19.1	1.6
	Did not	294	11.6		294	13.6		113	11.5	

† $P < 1$, * $P < .05$, ** $P < .01$ ^a Calculated excluding missing data. Degree of freedom of every comparison = 1^b Married with no history of sex with a FSW^c Males only^d Buddhism and animism^e Daily wage laborer, student, and other^f Knowledge score is the total score for 17 true-or-false questions regarding knowledge about the transmission, prevention, and treatment of HIV/STI^g Those who never agreed to premarital sex, extramarital sex, and sex with a FSW^h Amphetamines, heroin, opium, or marijuanaⁱ Fisher's exact test

more likely to have had extramarital sex, respectively. Unmarried male respondents and those with a nonfarmer status were almost 11 times and 5 times more likely to have had sex with a FSW, respectively. Village-wise analyses further revealed that in Village A, a nonfarmer status was significantly associated with all types of nontraditional sexual behaviors, while other factors were differently associated with nontraditional behaviors: the younger age group (15–34 years old) was almost four times more likely to have reported premarital sex, drug users in the last year were 2.6 times more likely to have had extramarital sex, and unmarried men were 16 times more likely to have had sex with a FSW. In Village B, however, only two

associations were significant: those who had occupational experience in town were 3 times more likely to have reported premarital sex and unmarried males were 20 times more likely to have had sex with a FSW.

Discussion

This study evaluated the prevalence and social correlates of nontraditional sexual behaviors among Karen villagers. The results revealed that traditional sexual attitudes prevailed strongly in both villages, with over 95% of the respondents indicating that sexual relationships before marriage and extramarital sex were

Table 5 Multivariate analyses of correlates of premarital and extramarital sex and sex with a FSW among sexually active Karen survey participants by village and of the whole population^a

Explanatory variables	Premarital sex ^b (lifetime)		Extramarital sex ^b (lifetime)		Sex with FSW ^c (lifetime)	
	AOR ^d	95% CI	AOR ^d	95% CI	AOR ^d	95% CI
Village A (Developed)						
Age group of 15–34 (vs. 35–54)	3.91*	1.08–14.17	–	–	16.15**	1.96–133.15
Never married (vs. married or divorced)	–	–	–	–	9.98**	2.00–49.95
Nonfarmer ^e (vs. farmer)	4.13*	1.35–12.65	2.61*	1.03–6.65	–	–
Used drug ^f in the last year (vs. did not use)	–	–	2.61*	1.03–6.65	–	–
Village B (Less developed)						
Never married (vs. married or divorced)	–	–	–	–	20.20*	1.36–301.09
Ever worked in town (vs. never)	3.13*	1.09–9.03	–	–	–	–
Whole Study population						
Village A (vs. Village B)	–	–	3.17**	1.38–7.28	–	–
Never married (vs. married or divorced)	–	–	–	–	10.79**	2.19–53.17
Christianity (vs. Buddhism or animism)	2.42*	1.10–5.31	–	–	4.89*	1.41–17.00
Nonfarmer ^e (vs. farmer)	–	–	–	–	3.66*	1.16–11.53
Worked in town (vs. never)	2.44*	1.09–5.48	–	–	–	–
Used drug ^f in the last year (vs. did not use)	–	–	2.84*	1.28–6.32	–	–

* $P < .05$, ** $P < .01$ ^a Calculated excluding missing data^b Married with no history of sex with a FSW^c Male only^d Adjusted odds ratio^e Daily wage laborer, student, and other^f Amphetamines, heroin, opium, or marijuana

unacceptable. However, nontraditional sexual behaviors, such as premarital and extramarital sex and sex with a FSW, were seen in 10% to 20% of the participants in both villages, suggesting that sexual traditions are waning.

The multivariate analysis of all the participants revealed that these nontraditional sexual practices were significantly associated with occupational experience in town, a nonfarmer status (e.g., student, daily wage laborer), and living in Village A, which has a paved road connecting it with a town. It appears that a mobile lifestyle, which allows more contact with town life, promotes changes in sexual traditions. The strong association of nonfarmer status with sex with a FSW could also be explained by a potential regular cash income among the daily wage laborers, since seven out of ten nonfarmers with a history of sex with a FSW were daily wage laborers. The association of premarital sex with Christianity was not unexpected, since a recent anthropology study revealed that Christianity brought about a deterioration in the sexual sanctions based on rituals on conversion of the ritual leaders to Christianity (Hayami, 2003).

The risk profiles associated with nontraditional sexual behaviors appear to differ between villages. Nonfarmer status was associated with all types of nontraditional sexual behavior in Village A, but not in Village B. This may be related to the fact that there are private construction and timber businesses in Village A, where there is electricity and a paved road to town. These job opportunities may have shifted the labor pattern of Village A to more daily wage laborers than in Village B; living on cash, having more free time, and the easy access to town might have contributed to the change in the opportunity for and the cultural norm to nontraditional sexual behaviors among daily wage laborers in Village A. Conversely, experience working in town was significantly correlated with premarital sex in Village B only, and not in Village A. This might be related to the fact that people in Village B have to leave the village for jobs because there are no private businesses in the village.

The villages are not without a risk of HIV infection, although the proportion of participants who had a history of sex with a FSW was smaller than that reported for Thais (Lertpiriyasuwat, Plipat, & Jenkins, 2003). This is suggested from the fact that male participants

with a sexual history with a FSW had many more partnerships in a lifetime than those with no history of sex with a FSW [86.4% (19/22) vs. 18.8% (27/144)]. In addition, condoms are only infrequently used during sex with a FSW and rarely used during sex with spouses within the study population. If this situation continues or expands, HIV could easily be introduced through such vulnerable sexual linkages. In light of this possibility, the observed association between sex with a FSW and a self-reported history of STI is alarming. In a departure from tradition, the use of amphetamines rather than opium was dominant among drug users. If this drug practice becomes more widespread, it might increase the risk of HIV infection among Karen villagers by increasing the prevalence of nontraditional sexual practices. Furthermore, the villages have an actual risk for HIV infiltration since they are located very close to the epicenter of HIV infection in Thailand.

This study has several limitations. Despite gender matching between interviewers and participants, confidential settings for interviews, and self-administered answer sheets for sensitive questions, we might have failed to eliminate reporting bias because of the sensitive nature of the questions. Our results cannot be generalized to other Karen populations, as only two villages were studied. Moreover, we failed to include 18.1% of the inhabitants because of their absence during the study period or missing data on age, sex, or sexual behaviors. It is possible that our data underestimated the sexual behaviors of villagers because those who were absent might have been more mobile and frequent travelers to town, and as a result might have been more sexually active.

Within these potential limitations, our study demonstrated the presence of a risk for sexually transmitted HIV infection among mountain-dwelling Karen villagers, which had not previously been well documented. Although the conservative nature of the Karen sexual culture might contribute to the extremely low HIV prevalence rate (Beyrer et al., 1997), despite living close to the infection epicenter in Thailand, our findings suggest that this trend will not persist. As HIV spread readily and widely among FSWs and male clients in the Thai population within a short time in the early 1990s, especially in northern Thailand, emerging unprotected sexual contact with a FSW, and other nontraditional sexual behaviors, will allow the HIV to infiltrate these mountain-dwelling ethnic minority communities if no timely, effective preventive measures are taken.

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References

- Beyrer, C., Celentano, D. D., Suprasert, S., Sittitai, W., Nelson, K. E., & Kongsab, B., et al. (1997). Widely varying HIV prevalence and risk behaviors among the ethnic minority peoples of northern Thailand. *AIDS Care*, 9(4), 427–439.
- Celentano, D. D., Hodge, M. J., Razak, M. H., Beyrer, C., Kawichai, S., & Cegielski, J. P., et al. (1999). HIV-1 incidence among opiate users in northern Thailand. *American Journal of Epidemiology*, 149(6), 558–564.
- Celentano, D. D., Jittiwutikorn, J., Hodge, M. J., Beyrer, C., & Nelson, K. E. (1998). Epidemiology of HIV-1 infection in opiate users in northern Thailand. *Journal of Acquired Immune Deficiency Syndromes Human Retrovirology*, 17(1), 73–78.
- Celentano, D. D., Nelson, K. E., Suprasert, S., Eiumtrakul, S., Tulvatana, S., & Kuntolbutra, S., et al. (1996). Risk factors for HIV-1 seroconversion among young men in northern Thailand. *JAMA*, 275(2), 122–127.
- Department of Public Welfare. (1997). *Highland community in 20 provinces of Thailand, 1997*. Bangkok: Ministry of Labor and Welfare.
- Hayami, Y. (2003). Morality, sexuality and mobility: changing moral discourse and self. In O. D. Claudio (Eds.), *Living at the edge of Thai society: The karen in the highlands of northern Thailand* (pp. 112–129). London: Routledge/Curzon.
- Lertpiriyasuwat, C., Plipat, T., & Jenkins, R. A. (2003). A survey of sexual risk behavior for HIV infection in Nakhonsawan, Thailand, 2001. *AIDS*, 17(13), 1969–1976.
- Lewis, P., & Lewis, E. (1998). *Peoples of the golden triangle*. London: Thames and Hudson.
- Limpakarnjanarat, K., Mastro, T. D., Saisorn, S., Uthaiworavit, W., Kaewkungwal, J., & Korattana, S., et al. (1999). HIV-1 and other sexually transmitted infections in a cohort of female sex workers in Chiang Rai, Thailand. *Sexually Transmitted Infection*, 75(1), 30–35.
- Nopkesorn, T., Mastro, T. D., Sangkharomya, S., Sweat, M., Singharaj, P., & Limpakarnjanarat, K., et al. (1993). HIV-1 infection in young men in northern Thailand. *AIDS*, 7(9), 1233–1239.
- Omori, K. (1999). Knowledge about AIDS and risk behaviors among hill tribes in northern Thailand. *Nippon Koshu Eisei Zasshi*, 46(6), 466–475.
- Razak, M. H., Jittiwutikorn, J., Suriyanon, V., Vongchak, T., Srirak, N., & Beyrer, C., et al. (2003). HIV prevalence and risks among injection and noninjection drug users in northern Thailand: need for comprehensive HIV prevention programs. *Journal of Acquired Immune Deficiency Syndromes*, 33(2), 259–266.
- Toruga, K., Anderson, S., Thongsen, N., Sirisopana, N., Jugsudee, A., & Junlananto, P., et al. (2003). HIV epidemic among young Thai men, 1991–2000. *Emergency Infectious Diseases*, 9(7), 881–883.
- UNAIDS. (2004). *2004 Report on the HIV/AIDS Epidemic: 4th Global Report*. Bangkok: UNAIDS.
- Wiewel, E. W., Go, V. F., Kawichai, S., Beyrer, C., Vongchak, T., & Srirak, N., et al. (2005). Injection prevalence and risks among male ethnic minority drug users in northern Thailand. *AIDS Care*, 17(1), 102–110.

SUBSTANCE USE AND SEXUAL BEHAVIORS AMONG JAPANESE TOURISTS, STUDENTS, AND TEMPORARY WORKERS IN HONOLULU, HAWAII

Tooru Nemoto, Mariko Iwamoto, Anne Morris, Fumihiko Yokota, and Kiyoshi Wada

A total of 249 Japanese nationals—tourists ($n = 107$), students ($n = 98$), and temporary workers ($n = 44$)—were recruited at the targeted community venues in Honolulu, Hawaii, and completed a structured survey questionnaire. Reported lifetime sexually transmitted diseases, or STDs infection (10% male and 20% female participants), and HIV infection rates (7%, 2 out of 31 persons tested) were high. Male participants were more likely to practice safe sex with female sex workers than with steady and casual female partners both in Japan and Hawaii. More than 80% of the participants reported having had sex under the influence of alcohol. Multivariate analysis revealed that positive attitudes toward drug use and negative attitudes toward condom use were significantly correlated with the frequency of sex under the influence of drugs with steady partners in the past 12 months. Future HIV/STD prevention intervention programs must target Japanese youths who are planning to visit Hawaii or elsewhere abroad, as well as Japanese high-risk groups (e.g., temporary workers in Hawaii), and provide information about HIV/STD prevention in relation to substance use.

A total of 3,277 cumulative AIDS cases and 6,560 HIV infection cases were reported in Japan in December 31, 2004, according to the *AIDS Surveillance Report* by the Japanese Ministry of Health, Labor, and Social Welfare (2005). Compared with those in other Asian countries affected by the AIDS pandemic such as China, Cambodia, India, and Thailand, the numbers of HIV and AIDS cases in Japan are substantially lower. However, the number of HIV infection cases in Japan has been consistently increasing every year since 1990, particularly among men who have sex with men (MSM)

Tooru Nemoto and Mariko Iwamoto are with the Center for AIDS Prevention Studies, Department of Medicine, University of California, San Francisco. Anne Morris is with the Department of Medicine, University of California, San Francisco. Fumihiko Yokota is with the Department of Public Health, Tulane University, New Orleans, LA. Kiyoshi Wada is with the National Institute of Mental Health, Japan.

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Address correspondence to Tooru Nemoto, PhD, CAPS/UCSF, 50 Beale Street, Suite 1300, San Francisco, CA 94105; E-mail: Tooru.Nemoto@ucsf.edu

(Kihara et al., 2003). In recent years HIV cases among MSM or heterosexual youths/younger adults are also increasing (Nemoto, 2004). The annual AIDS cases in Japan have remained steady at about 300 cases a year since 1999. This trend of AIDS cases differs from that of other economically developed countries such as the United States in which AIDS cases have declined since the middle of the 1990s because of antiretrovirus therapy. Kihara (2002) pointed out that this is due to the lack of early detection of HIV infection and the delay of treatment in Japan and that HIV infection cases would reach an epidemic level with an estimate of over 50,000 Japanese living with HIV in 2010. Multiple factors such as the recent increase of sexually transmitted disease (STD) cases in the general population and HIV seroprevalence among blood donors, unfavorable attitudes toward implementing HIV/STD prevention education programs in Japanese school systems, low prevalence rates of HIV testing, and infrequent condom use, particularly among sexually active youths, would contribute to a significant increase of HIV cases in Japan (Kihara, 2002).

Although the majority of HIV/AIDS cases among Japanese nationals were infected within the territory of Japan, the HIV/AIDS surveillance conducted in Japan between 1995 and 1999 provided estimates of the AIDS cases infected in foreign countries (23% of heterosexual male AIDS cases, 14% female cases, and 5% homosexual male cases) (Ministry of Health, Labor, and Social Welfare, 2005). Owing to relatively easy access by air transportation and inexpensive airfares, a large number of Japanese travel abroad for various purposes such as business, vacation, and study. The number of Japanese who departed for foreign countries increased from 11 million in 1990 to 17 million in 2002 (Takamatsu, 2004), and during a high peak of traveling between August 2002 through September 2002, more than 3.3 million Japanese traveled to foreign countries (Japan Tourism Marketing, 2004), mostly in Hawaii, other Pacific islands, and Asian countries. Japanese youths travel to neighboring Asian countries such as Thailand, Cambodia, Nepal, and India to experiment with illicit drugs and engage in risky sexual behaviors such as sex under the influence of alcohol and/or drugs (Nemoto, Yokota, Hanafusa, & Wada, 2002).

Hawaii is one of the most preferred destinations for Japanese along with the U.S. mainland, South Korea, and China (Imai, 2001). Hawaii Department of Business, Economic Development, and Tourism (2003) reported that more than 1 million Japanese visited Hawaii in 2002. Also, the number of Japanese tourists, students, and temporary workers visiting Hawaii has remained high since the mid-1990s, approximately 2 million a year (Hawaii Department of Business, and Tourism, 2003). In addition, more than half of Japanese visitors to Hawaii had visited previously (March, 2003). Hawaii is also popular for Japanese students. Several universities and colleges (e.g., University of Hawaii, Hawaii Pacific University, and Honolulu Community College) have a large number of Japanese international students. International Student Services at the University of Hawaii at Manoa (2003) reported that almost one third of international students on campus came from Japan. In addition, because a large number of Japanese Americans in Hawaii (17% of the total population) (U.S. Census Bureau, 2000), Hawaii keeps attracting Japanese business persons and temporary workers, as well.

There are no available data identifying foreign countries where Japanese nationals became infected with HIV. As many recent Japanese heterosexual men were infected with HIV-1 subtype E, which is common in Southeast Asian countries, these cases may include heterosexual Japanese men who were infected with HIV in Asian countries (Kihara, 2002) through unprotected sex with HIV-positive women in these

countries. When we consider that a huge volume of Japanese (annually more than 1 million) travel to Hawaii and the majority of these tourists are young adults, it is quite possible that they may engage in HIV-related risk behaviors while staying in Hawaii. However, little is known about their HIV-related drug use and sexual behaviors. It is beneficial to describe their risk taking behaviors in Hawaii in comparison with those in Japan in order to develop future HIV/STI prevention intervention programs targeting high-risk groups of Japanese. Because a large number of people travel to Hawaii and elsewhere, it is also important to describe HIV-related risk behaviors among tourists and business travelers, particularly for those transient Japanese who engage in unprotected sex with commercial and casual sex partners. They may be infected with HIV/STDs or may transmit diseases to local people while traveling, as well as transmit diseases to people when they return to Japan.

METHODS

PROCEDURES

Based on ethnographic mapping, the target areas for sampling were identified by two survey workers and three local collaborators who were enrolled in a graduate school of the University of Hawaii. The survey workers and local collaborators who are bilingual in Japanese and English were trained for the study protocol, sampling and recruitment procedures, human subjects protection, and data collection and maintenance, which were approved by the Committee on Human Research, University of California, San Francisco. A total of 249 Japanese nationals were recruited from the identified target areas in Honolulu, Hawaii in 2000. We utilized stratified sampling methods by gender (approximately 50% each gender) and types of participants (targeted 100 each for tourists, students, and temporary workers). Temporary workers were Japanese nationals who reported having had part- or full-time jobs in Honolulu, and not being enrolled in schools. The target areas included Waikiki Beach, English-language schools, universities, Japanese restaurants, and shopping malls where the survey workers and collaborators randomly approached potential study participants.

Potential participants were carefully screened for eligibility by the trained survey workers and local collaborators. The eligibility criteria included (a) being 18 years or older, (b) having stayed or planned to stay in Hawaii for more than 3 days, and (c) expressing intention to return to Japan eventually. After obtaining informed consent verbally, the participants were asked to self-administer a survey questionnaire anonymously in a private space where they could spend approximately 30 minutes to complete the questionnaire. After the survey workers answered any questions from the participants regarding the questionnaire items and examined the completeness of the questionnaire, the participants were reimbursed by cash and provided with free condoms, lubricant, and information about HIV/AIDS service organizations (e.g., HIV/STD testing sites) and substance abuse treatment programs in Honolulu as well as in Japan.

MEASUREMENTS AND DATA ANALYSIS

The structured questionnaire included anchored questions and Likert-type scales asking about participants' demographics, HIV-related sexual behaviors (e.g., condom use and sexual behaviors under the influence of substances), alcohol and drug use, AIDS knowledge, attitudes toward condom use in general and with casual partners, and adaptation to the American mainstream culture (adaptation to American

life). The measurements were modified from those used for our previous study (Nemoto, Onizuka & Wada, 1999) in HIV-related risk behaviors among Japanese drug users who were temporarily staying in the United States. The measurements are written in Japanese and designed to be culturally appropriate and sensitive to Japanese who live in the U.S. as well as Japanese visiting the United States.

The questions about sexual behaviors included sexual activities with three different types of partners (steady, casual, and female sex workers) over a participant's lifetime and in the past 12 months both in Japan and Hawaii. A steady partner is defined as a spouse or lover with whom a participant has a committed relationship that involves sex during the past 12 months. If a participant had more than one steady partner during this period, he or she was asked about sexual behaviors with the person with the longest relationship during the period. Casual partners include sex partners that are one-night stands, casual hookups, and dating relationships and do not include commercial sex partners. The frequencies of condom use for vaginal, oral, and anal sex, and the frequencies of sex under the influence of substances were asked by using a 5-point Likert scale (1 = never to 5 = always). The measures for substance use included eight types of illicit drugs used in lifetime and the past 6 months both in Japan and Hawaii. The psychosocial measures were also taken from Nemoto's previous study (Nemoto, Onizuka & Wada, 1999): AIDS knowledge (Cronbach's $\alpha = .62$), positive attitudes toward condom use in general ($\alpha = .71$), and positive attitudes toward condom use with casual partners ($\alpha = .81$). For example, an item in the scale of the positive attitudes toward condom use in general asked whether participants agreed or disagreed with a statement: "I can enjoy sex using a condom." Responses were coded using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Other measures using a 5-point Likert scale included adaptation to American life ($M = 2.49$, $SD = .95$, $\alpha = .95$) and positive attitudes toward using illicit drugs ($M = 2.34$, $SD = .94$, $\alpha = .90$).

The questionnaire was pilot-tested for appropriateness and clarity based on five Japanese international students recruited in San Francisco. The successful recruitment rate among the potential study participants who were approached by our project staff was about 60%. Recruitment at the beach, shopping malls, or language schools was more successful than at other target areas such as Japanese restaurants and street corners. A total of 250 questionnaires were collected. One questionnaire in which more than 60% of questions were not completed was discarded from the study.

Quantitative data from 249 study participants were analyzed using SPSS. Differences in HIV-related risk behaviors among Japanese tourists, students, and temporary workers were analyzed using analysis of variance (ANOVA) for continuous variables and chi-square test for categorical variables. Multiple regression analyses were conducted to examine the frequency of condom use with a steady partner and the frequency of having sex with a steady partner under the influence of drugs in relation to demographic and psychosocial variables.

PARTICIPANTS

Demographic characteristics by participant groups (tourists, students, and temporary workers) are shown in Table 1. The participants ($N = 249$) consisted of 107 tourists (43%), 98 students (39%), and 44 temporary workers (18%) and of 132 females (53%). Ninety-two percent of the participants identified as heterosexual, 3% gay men, 1% bisexual, and 4% didn't know or were unsure about their sexuality. Temporary workers ($M = 29.8$ years old, range = 21–40 years) and tourists ($M = 28.1$

TABLE 1. Demographic Characteristics of Participants (N = 249)

	Tourist (n = 107) %	Student (n = 98) %	Temporary Worker (n = 44) %	Total (n = 249) %	χ^2
Age					36.43**
18-24	61.7	58.2	13.6	51.8	
25-30	14.0	26.5	45.5	24.5	
31-59	24.3	15.3	40.9	23.7	
Gender					Ns
Male	55.1	40.8	40.9	47.0	
Female	44.9	59.2	59.1	53.0	
Marital status					24.00***
Single	79.4	92.8	67.4	82.6	
Married	20.6	5.2	23.3	15.0	
Divorced or separated	0	2.1	9.3	2.4	
Education					28.73**
High school or less	54.2	43.9	9.1	42.2	
Junior college/Technical school	23.4	27.6	34.1	26.9	
University or higher	22.4	28.6	56.8	30.9	
Length of stay in Hawaii					205.65**
Less than 1 month	98.1	5.1	13.6	46.6	
1 month - 1 year	1.9	57.1	38.6	30.1	
More than 1 year	0	37.8	47.7	23.3	
Housing in Hawaii					102.93b**
Hotel/Condominium	97.2	35.7	31.8	61.4	
Apartment/House	1.8	56.1	54.6	32.5	
Other	0.9	8.2	13.6	6.0	

Note. ns = not significant. ^aphi (.31), ^bphi (.64). ** $p < 0.01$.

years, range = 18-59 years) were significantly older than students ($M = 25.0$ years old, range = 18-44 years), $\chi^2(4, N = 249) = 36.4, p < .01$. More than 92% of students were single compared with the tourists (79%) and temporary workers (67%), $\chi^2(4, N = 247) = 24.0, p < .01$. The temporary workers had significantly higher levels of education, $\chi^2(4, N = 249) = 28.7, p < .01$, and had stayed in Hawaii longer, $\chi^2(4, N = 249) = 205.6, p < .01$, compared with the tourists and students. Among the tourists ($n = 104$), more than the half (56%) were visiting Hawaii for the first time, 27% previously visited once or twice, and 18% visited more than twice.

RESULTS

SEXUAL BEHAVIORS

Ninety-five percent of the participants had sexual intercourse. The mean age for first sexual intercourse was 17 years ($SD = 2.2$ years, range = 12-28 years). In the past 12 months, the majority of participants (81%) reported having had sex with steady partners (Table 2). Overall, more than one third of the participants ($n = 83$) reported having had sex with casual partners in the past 12 months. Overall, more females (57%) reported having had casual sex in Hawaii in the past 12 months, but a significant association was found between gender and participant groups. All tourists who reported this behavior were female ($n = 4$). About two thirds of temporary workers

TABLE 2. Sexual Behaviors by Gender in Hawaii and Japan during the Past 12 Months

	Tourist (<i>n</i> = 107)	Student (<i>n</i> = 98)	Temporary Worker (<i>n</i> = 44)	Total (<i>n</i> = 249)	χ^2
Had sex with steady partners	(<i>n</i> = 103) %	(<i>n</i> = 89) %	(<i>n</i> = 44) %	(<i>n</i> = 236) %	ns
	77.7	80.9	86.4	80.5	
Had sex with casual partners in Hawaii	(<i>n</i> = 4) %	(<i>n</i> = 24) %	(<i>n</i> = 16) %	(<i>n</i> = 44) %	6.21**
Male	0	58.3	31.3	43.2	
Female	100.0	41.7	68.8	56.8	
Had sex with casual partners in Japan	(<i>n</i> = 27) %	(<i>n</i> = 16) %	(<i>n</i> = 10) %	(<i>n</i> = 53) %	ns
Male	48.1	68.8	20.0	49.1	
Female	51.9	31.3	80.0	50.9	

Note. ns = not significant. *phi (.38). ** $p < 0.05$.

who reported this behavior were female (69%). Fifty-three participants reported having had casual sex in the past 12 months in Japan. However, there was no significant association between gender and participant groups.

There were no significant differences in the number of sexual partners between the groups as well as between genders. However, a number of participants had reported having multiple steady and casual sex partners. Over half of the participants who reported having had a steady partner in the last 12 months (53%) had multiple steady partners during the same period (median = 2.0 steady partners, range = 1-20). Nearly 70% of the participants who had casual sex partners in the past 12 months reported having had multiple casual sex partners (median = 2.0 casual partners, range = 1-15).

Overall, 37% of male participants reported having had sex with female sex workers in lifetime. Among the male participants, a higher proportion of the temporary workers (50%) and tourists (42%) reported having ever had sex with sex workers compared with the students (22%) ($p = .07$). Among those Japanese males who had had sex with sex workers in the past 12 months ($n = 14$), 69% and 21% of them reported having had sex with sex workers in Japan and Hawaii, respectively. There were no significant group differences on sex with sex workers during the past 12 months. Two male (2%) and 12 female (10%) participants reported having ever exchanged sex for money.

In terms of types of sex engaged in with a steady partner in the past 12 months ($n = 186$), 95% reported vaginal sex, 73% oral sex, and 11% anal sex. Among participants who engaged in sex with casual partners in Hawaii ($n = 44$) and in Japan ($n = 51$) in the past 12 months, 89% and 98% reported vaginal sex in Hawaii and Japan, 80% and 49% oral sex, and 14% and 6% anal sex, respectively.

Overall, the participants reported inconsistent condom use for vaginal sex with steady as well as casual partners. Only about one quarter (27%) reported always using a condom for vaginal sex with a steady partner during the past 12 months. Similarly, only one quarter of the participants reported always using a condom for vaginal sex with casual partners in Japan (22%) and in Hawaii (28%) (no significant difference between these two countries). Almost all participants reported inconsistent con-

TABLE 3. Types of Drug Used and Place of the First Drug Use

Types of drugs ever used ^a	Tourist	Student	Temporary Worker	Total	χ^2
	(<i>n</i> = 25) %	(<i>n</i> = 31) %	(<i>n</i> = 31) %	(<i>n</i> = 87) %	
Marijuana	92.0	93.5	100.0	95.4	ns
Ecstasy	36.0	19.4	25.8	26.4	ns
Cocaine	16.0	19.4	29.0	21.8	ns
LSD	20.0	22.6	19.4	20.7	ns
Solvents	16.0	12.9	12.9	13.8	ns
Methamphetamine	8.0	12.9	9.7	10.3	ns
Crack	4.0	9.7	6.5	6.9	ns
Heroin	4.0	3.2	3.2	3.4	ns
Other	0	14.3	3.4	6.1	ns
First Drug Use	(<i>n</i> = 25) %	(<i>n</i> = 30) %	(<i>n</i> = 31) %	(<i>n</i> = 86) %	21.70*
In Japan	88.0	50.0	35.5	55.8	
In Hawaii	4.0	40.0	29.0	25.6	
In other foreign countries	8.0	10.0	35.5	18.6	

Note. ns = not significant. ^aNot mutually exclusive answers. **p* < 0.01.

dom use for oral sex with steady (99%) and casual partners (97% in Hawaii and 96% in Japan) during the past 12 months.

Male participants reported more consistent condom use with female sex workers (vaginal sex [60%, *n* = 40] and oral sex [32%, *n* = 25]) in lifetime than with steady or casual partners. However, it is alarming that 40% of male participants had ever had vaginal sex with sex workers without using a condom.

HIV/STD STATUS

Eleven male (10%, *n* = 116) and 26 female participants (20%, *n* = 129) reported ever being infected with at least one STD. Types of STDs included the following: gonorrhea (3% of males and 1% of females), chlamydia (3% of males and 15% of females), and herpes (3% of males and 2% of females). Only 31 participants (12%) reported ever being tested for HIV, and two participants reported being HIV-positive (7%), 26 were HIV-negative, and three didn't know or did not answer the question.

DRUG USE

In spite of the general perception about the low prevalence of illicit drug use in Japan, more than one third of the participants reported that they had ever used illicit drugs. Marijuana was most commonly used (95% among 87 participants who ever used any illicit drugs), followed by ecstasy (26%), cocaine (22%), and lysergic acid diethylamide (LSD) (21%) (Table 3). Very few participants reported having used other drugs such as solvent, methamphetamine, crack, and heroin. Only four participants reported having ever injected drugs (5%, 4 out of 85 drug users). Although no significant group differences were found in types of drugs used in the past 6 months, there was a significant group difference in lifetime drug use. A higher proportion of the temporary workers (71%) reported having used at least one illicit drug in their lifetime than the tourists (23%) and students (32%), $\chi^2(2, N = 249) = 31.2, p < .01$.