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Incidence of HIV and Sexually Transmitted Infections and Risk Factors for Acquisition among Young Methamphetamine Users in Northern Thailand

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Abstract

Background—Southeast Asia is experiencing an epidemic of methamphetamine use, a drug associated with risky sexual behaviors, putting a large segment of the population at increased risk for STI and HIV and in need of prevention efforts. Incidence estimates of sexually transmitted infections (STIs) are rare in Southeast Asia, especially among newer risk groups.

Study Design—We enrolled methamphetamine users aged 18 to 25 years in a 12-month randomized behavioral intervention trial in Chiang Mai, Thailand in 2005. Behavioral questionnaires were administered at visits every three months and biological specimens were collected at baseline and 12 months to test for common STIs (chlamydia, gonorrhea, HSV-2, and HIV). Poisson regression with robust variance was used to determine risk factors for incident STIs.

Results—Overall, 12.7% of 519 participants acquired at least one STI. Chlamydia was the most common (10.6%), followed by HSV-2 (4.0%), gonorrhea (2.9%), and HIV (0.6%). Risk factors for both men and women included self-reported incarceration and having a casual sex partner during follow-up, and having a prevalent STI at baseline. Additionally, among women, having 2 or more heterosexual partners, and among men, having a greater frequency of drunkenness were risk factors for STI acquisition.

Conclusions—While HIV incidence is low in this population, incidence of other STIs is high compared to previous studies of young Thai adults. Risk factors for acquisition emphasize the need for new prevention strategies targeted towards current populations at risk.

Keywords

Thailand; HIV; STI; methamphetamine; young adults

Introduction

The HIV epidemic in Thailand in the late 1980's was associated primarily with injection drug use¹ and commercial sex among heterosexual adults.¹⁻⁴ New groups at high risk for HIV and STI infection have since emerged in Thailand. Thailand has experienced an

epidemic rise in methamphetamine (MA) use since the mid 1990's, particularly among adolescents and young adults.⁸ While MA in Thailand is generally smoked rather than injected,⁸ use of MA has the potential to impact the HIV and STI epidemics through its influence on sexual behavior. MA use can produce intense highs, and feelings of euphoria, stimulation and self-confidence.⁹ In addition, when used during sexual intercourse, MA has been associated with enhanced sexual arousal, intensified orgasm and prolonged sexual intercourse among men¹⁰ and more frequent and intense sexual intercourse among women.¹¹ Male MA users have also been found to have more regular and casual partners and seek commercial sex,¹² and MA use during heterosexual encounters has been associated with more risky sexual behaviors.¹³ Consequently, young Thai MA users may be at increased risk for HIV and other STI. Monitoring and evaluation of HIV and STI incidence and understanding risk factors for STI acquisition will be important in this group so that prevention efforts can be targeted appropriately.

In this study we determine the incidence of HIV and other STIs over 12 months as well as risk factors for acquisition among young MA users in northern Thailand.

Materials and Methods

Study Population

This study was conducted within a 12-month randomized peer network outreach trial in Chiang Mai, Thailand that aimed to reduce the harms associated with MA use. The trial compared the efficacy of a peer-educator, network-oriented intervention with a best practice, individually-focused life skills curriculum. Between April 2005 and June 2006, 1263 young adults aged 18-25 years were screened, of whom 1189 were eligible (94%) and 983 (78%) were randomized. Index participants were mainly recruited from venues where MA users congregate using street outreach workers. Index participants were eligible if they were 18-25 years of age, had used MA and had sex at least 3 times in the past 3 months, and were able to enroll at least one member of their drug or sexual network members. Drug and sexual network members were eligible if they were 18-25 years of age, and had used MA or had sex with the index participant at least 3 times in the past 3 months, respectively. After randomization, participants returned at 3, 6, 9 and 12 months for study visits. By the 12-month study visit, 882 (90% of those randomized) participants remained in the trial. The trial was approved by the Institutional Review Board at Johns Hopkins Bloomberg School of Public Health, the Human Experimentation Committee at the Research Institute for Health Sciences, Chiang Mai University, and the IRB of the Ministry of Public Health in Thailand.

This analytic sample includes 519 participants (59% of participants) who reported sexual activity during follow-up (58 excluded) and had test results at baseline and 12 months for at least one STI of interest (305 excluded).

Data Collection

A questionnaire was administered at the baseline, 3-, 6-, 9-, and 12-month study visits that collected information on demographics, substance use, sexual behaviors, depressive symptoms and arrests or incarceration.

Laboratory Methods

Biological specimens, including blood and urine, were collected to test for common STIs. Due to financial constraints, all participants could not be tested at all study visits. Priority was given to indexes and their sexual networks and testing was limited to baseline and 12 months. Indexes and both drug and sexual network members were tested for chlamydia and gonorrhea by PCR in first-void urine specimens, and indexes and their sexual networks were

tested for antibodies to herpes simplex virus, type 2 (HSV-2). At both visits, participants were offered voluntary counseling and testing for HIV, as mandated by the Thai IRBs. Two weeks after testing, participants received post-test counseling and test results. Those with positive gonorrhea and chlamydia results were referred for medical treatment and scheduled for post-treatment testing one month later. All testing was performed using standard FDA-approved assays.¹⁵

Risk Factors and STI Outcomes

Characteristics from baseline and behaviors from follow-up were explored as risk factors for incident HIV/STI. Baseline characteristics included age, gender, education, employment status (student, employed and unemployed), prevalent laboratory-confirmed STI (any of chlamydia, gonorrhea, HSV-2 or HIV), and HIV testing. Participants were required to be negative for STI or to have received documented treatment at baseline in order to be included in the risk factor analysis, therefore only behaviors occurring during follow-up were considered, and the 3 month study visit was chosen because this time period most likely occurred prior to the incident infection. Twenty-one participants did not return for the 3 month study visit; for 17 participants behaviors from the 6 month visit were used, and 4 participants were excluded from the risk factor analysis as they missed both the 3 and 6 month study visits. Behaviors of interest (reported since the last visit unless otherwise indicated) were self-reported incarceration; selling or delivering drugs; substance use variables, including frequency of MA and alcohol use (0-3 days a week and 4-7 days a week), frequency of drunkenness in the past 30 days (0-4 days and 5 days), and CAGE score as a measure of drinking problems,¹⁶ with a positive screen indicated by affirmative answers to 2 or more questions; level of depressive symptoms based on the CES-D scale,¹⁷ with a score of 22 indicative of major depressive symptoms;¹⁸ sexual behavior variables, including the number of heterosexual partners (0, 1, 2), having a casual partner, visiting a commercial sex worker (CSW), having sex while high on drugs or drunk with any type of sexual partner, and always using condoms during vaginal sex in the past 30 days.

Incidence was defined for each of the four STIs separately, as well as overall. For incident HSV-2 and HIV, participants were included if they had a 12-month test result and tested negative for that infection at baseline. For chlamydia and gonorrhea, participants were included if they had a 12-month test result and had either a negative test result at baseline or a negative one-month post-treatment test result for that infection. For overall incidence, all participants with baseline and 12-month test results for any of the four STI were included.

Statistical Analysis

Risk factors for incident STI were determined by estimating relative risks (RR) and 95% confidence intervals (CI). Log-binomial regression was attempted, however the models failed to converge. Consequently, Poisson regression with robust variance was used to estimate RR. Many of the sexual and substance use behaviors were highly correlated, therefore building multivariate models to determine the independent effects of each behavior was not possible. A multivariate model was built for self-reported incarceration and included sexual behavior variables that were significant in univariate models. As risk factors were expected to differ by gender, stratified analyses by gender were performed. All statistical analyses were conducted using SAS for Windows Version 9.1.¹⁹

HIV and STI incidence was not found to differ between intervention arms. Consequently, the intervention was not accounted for in the present analysis as it was not of primary interest. In this trial, sexual risk behaviors, including condom use, and substance use improved significantly throughout follow-up, although improvement was also not differential across intervention arms.²⁰

As only 59% of participants returning at 12 months were also tested for STIs at baseline, participants who were and were not tested were compared on behaviors of interest at the 3 month study visit to determine the direction of any potential bias. Those tested were significantly more likely to be female, have had a girlfriend or boyfriend in the last 3 months, live with friends or their partner, have a lower frequency of drunkenness in the last 30 days and report unprotected sex in the last 30 days, but were otherwise similar. Similar differences were found when looking only at HIV testing at both the baseline and 12 month study visits.

Results

Study Population

The participants in this study were young, with a median age of 19 (IQR: 18-20), and mostly Buddhist and Thai (Table 1). Almost half of the participants lived in urban areas (41.0%) and the majority lived with their parents or relatives (65.9%) and had a current girlfriend or boyfriend (83.2%), although few were currently or previously married (0.6%). Few participants had completed high school (20.4%), and one-third were currently enrolled in school (38.3%).

MA use in this population was high, with the majority using at least once a week (61.1%) at baseline. Few participants had ever had sexual partners of the same sex (15.6%) or had engaged in commercial sex (<3% for both men and women), and condom use was generally low, with only 28.4% reporting using a condom at their last sexual encounter.

There were several differences by gender, with males more likely to be employed, to have higher levels of substance use, and to have used a condom during their last sexual encounter, and less likely to have a current girlfriend or boyfriend, and to have ever had a sexual partner of the same sex.

Incidence of HIV and Sexually Transmitted Infections

Overall, the incidence of any STI over the 12 month follow-up was 12.7% (66/519) (Table 2). Chlamydia had the highest incidence (10.6%; 45/424), followed by HSV- 2 (4.0%; 15/380), gonorrhea (2.9%; 12/418), and HIV (0.6%; 2/354). No significant differences in STI incidence were observed by gender. For gonorrhea and chlamydia, the majority of incident infections occurred among participants who were negative at baseline, with only 1 reinfection (8.3%) for gonorrhea, and 9 reinfections (20.0%) for chlamydia.

Risk Factors for Acquisition of HIV and Sexually Transmitted Infections

Risk factors for incident STI by gender are presented in Table 3. For both men and women, having a prevalent STI at baseline and having a casual sexual partner and having been incarcerated in the prior 3 months were associated with incident STI. In addition, for women, having 2 or more male sexual partners in the prior 3 months and consistently using condoms in the prior 30 days were also associated with incident STI. For men, frequency of drunkenness in the prior 3 months was significantly associated with incident STI, and higher CAGE score and having sex while drunk in the past 3 months were marginally associated with incident STI. All other demographic characteristics and behaviors were not associated with incident STI for men or women.

Sexual and substance use behaviors found to be associated with incident STI were highly correlated, therefore determining their independent effects was not possible. For women, higher numbers of sexual partners was correlated with both having a prevalent STI at baseline and having a casual sexual partner in the past 3 months. In addition, reporting

consistent condom use in the past 30 days was correlated with having a casual sexual partner, with women reporting consistent condom use significantly more likely to report a casual sexual partner (23% vs 8%, $p < 0.05$). For men, higher frequency of drunkenness was correlated with higher CAGE score and having sex while drunk in the past 3 months.

For both men and women, incarceration remained significantly associated with incident STI independently of sexual behavior (number of sexual partners and having casual sexual partners)(adjusted RR[95% CI]: 2.57 [1.01,6.50] for men; 7.21 [3.71,14.00] for women).

Discussion

In this study of young methamphetamine users in Chiang Mai, Thailand, incidence of STI over 12 months was high, with 12.7% of participants acquiring an infection, while incidence of HIV was low, with less than 1% of participants seroconverting. The main risk factors for STI acquisition for both men and women were having a prevalent STI at baseline, having a casual sexual partner and being incarcerated. In addition, having greater numbers of sexual partners was a risk factor for women, and higher frequency of drunkenness was a risk factor for men.

Estimates of the incidence of HIV and STI in Thailand are rare, with only a few studies available for comparison. Studies of Royal Thai Army and Air Force conscripts found that the incidence rates of any STI and HIV declined from 17.0 per 100 person-years (PY) and 2.48 per 100 PY in 1991 to 1.79 per 100 PY and 0.55 per 100 PY in 1993, respectively.⁶ Other studies of treatment-seeking non-injecting opiate users and married women attending family planning clinics or postpartum wards found incidences of HIV of 2.8 per 100 PY in 1993-1995,²¹ and 0.14 per 100 PY in 1998-1999,²² respectively. The incidence of any STI of 12.7% found in this study was similar to that found among the military conscripts in 1991 prior to the documented decline. The incidence of HIV of 0.6% in this study was more comparable to that seen among the conscripts in 1993 and was lower than the incidence among non-injecting opiate users.

Sexual and substance use behaviors were found to be the main risk factors for STI acquisition among both men and women in this group of young methamphetamine users and were different from those previously found in Thailand in this age group. In the 1990's, studies of 19-23 year old male military conscripts found that the main behavior associated with STI acquisition was visiting a CSW during the study period, which conferred a 3-5 fold increase in risk, and was reported by 30-50% of participants.^{4, 6} In contrast, in this study visiting a CSW was only reported by 0.6% of men and was not associated with incident STI. Sex with casual partners was far more common, and was a risk factor for STI acquisition. Heavier use of alcohol and the use of alcohol during sexual encounters were also common and were found to influence STI acquisition, consistent with the literature on the important role of alcohol in the male social environment in Thailand.^{4, 23}

The female methamphetamine users in this study were also at high risk for STI acquisition, as they were engaging in unprotected sexual activity with both regular and casual partners, and no differences were found between men and women in STI incidence. Condom use was low in general, but was more consistent with casual sexual partners, as has been found in other settings.^{24, 25} These findings highlight the integral role that young women are playing in the STI epidemic in this group, as STIs were not confined to a minority of women engaging in high-risk behaviors, and are consistent with observations of changing norms surrounding sexual behavior and the increased social freedom young women are experiencing in Thailand.²⁶

Incarceration was also found to be a risk factor for STI acquisition among both men and women in this population. While it was not commonly reported, those who were incarcerated were 2-7 times more likely to acquire STIs. The timing of the episode of incarceration in relation to STI acquisition cannot be determined in this study, however incarceration has been associated with STIs in other studies, including HIV,²⁷⁻²⁹ HSV-2,³⁰ and syphilis,³¹ and it is an environment conducive to the spread of HIV and STI among drug users, as needles are frequently shared when injecting drugs and condom availability is limited.³²⁻³⁴ MA use is criminalized in Thailand and accounts for almost three-quarters of drug-related offenses.³⁵ As MA use becomes more pervasive in Thai society, an increasing number of young men and women will come into contact with the judicial system, thereby increasing their risk for STI acquisition.

This study has several limitations. First, infection status was only determined at the 12-month visit. Given that the majority of infections were bacterial, estimates of STI incidence may have been underestimated, as participants acquiring infection during follow-up may have sought treatment elsewhere or their infections may have cleared spontaneously.^{36, 37} In addition, only 59% of participants were tested at both baseline and 12 months, and those tested for all STI and for HIV alone were more likely to have a regular partner, to use condoms less consistently and to be drunk less frequently. Condoms were more commonly used among casual and commercial sexual partners in this population; therefore these characteristics may reflect a lower risk of STIs among those tested, and may indicate that STI incidence was underestimated. Second, the timing of the behaviors of interest in relation to infection acquisition is unclear. Behaviors from the 3 month study visit were chosen as they were most likely to have occurred prior to infection, however this may not be the relevant period of exposure given that incidence was determined over 12 months. Third, several measures of sexual behavior pertinent to STI acquisition, such as concurrency,³⁸ were not available in this study. Fourth, due to the nature of the intervention, this study recruited volunteers residing in Chiang Mai, Thailand. Consequently, participants in this study may not be representative of MA users in Chiang Mai or other regions of Thailand, or other age groups of MA users, and the incidence of STI and HIV and risk factors for acquisition may not be generalizable to other populations.

Despite these limitations, the results of this study highlight the need for prevention efforts among young methamphetamine users in Thailand. While the incidence of HIV in this group is currently low, the incidence of STIs remains high and high-risk behaviors are prevalent, thereby creating an environment conducive to the spread of HIV should it enter the population. The risk factors identified in this study emphasize the heterogeneity of groups at risk for HIV and the need to target prevention efforts appropriately.

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Short Summary

A 12-month study of young methamphetamine users in northern Thailand found 13% acquired STIs, and risk factors included incarceration, having a prevalent infection at baseline and more sexual partners.

Table 1

Baseline characteristics of young methamphetamine users in northern Thailand

	Total (N=519)	Women (N=172)	Men (N=347)
Median age (IQR)	19 (18-20)	19 (18-20)	19 (18-20)
Religion - Buddhist	505 (97.3)	168 (97.7)	337 (97.1)
Ethnicity - Thai	517 (99.6)	171 (99.4)	346 (99.7)
Urban residence	213 (41.0)	77 (44.8)	136 (39.2)
Current boyfriend/girlfriend	432 (83.2)	165 (95.9)	267 (77.0) ^a
Reside with parents or relatives	342 (65.9)	80 (46.5)	262 (75.5) ^a
Completed high school	106 (20.4)	45 (26.2)	61 (17.6) ^a
Employment status			
Student	199 (38.3)	91 (47.1)	118 (34.0) ^a
Employed	185 (35.7)	44 (25.6)	141 (40.6)
Unemployed	135 (26.0)	47 (27.3)	88 (25.4)
Frequency of methamphetamine use			
0-3 days a month	202 (38.9)	82 (47.7)	120 (34.6) ^a
1-3 days a week	230 (44.3)	66 (38.4)	164 (47.3)
4-7 days a week	87 (16.8)	24 (14.0)	63 (18.2)
Lifetime history of same-sex sexual partners	81 (15.6)	59 (34.3)	22 (6.4) ^a
Condom use at last sex (n=489)	139 (28.4)	29 (20.3)	110 (31.8) ^a
History of recent commercial sex ^b	---	4 (2.3)	7 (2.1)

^a p<0.05 for comparison between men and women^b for women: receiving money for sex in last 6 months; for men: sex with a female sex worker in last 12 months (no men reported sex with a male sex worker)

Table 2

Incidence of sexually transmitted infections over 12 months among young methamphetamine users in northern Thailand

Infection	Total Tested	Total Testing Positive (%)	Women Testing Positive (%)	Men Testing Positive (%)
Chlamydia	424	45 (10.6)	13 (8.7)	32 (11.6)
Gonorrhea	418	12 (2.9)	5 (3.7)	7 (2.5)
HSV- 2	380	15 (4.0)	8 (6.1)	7 (2.8)
HIV	354	2 (0.6)	1 (0.9)	1 (0.4)
Any infection	519	66 (12.7)	23 (13.4)	43 (12.4)

Table 3
Risk factors for HIV and sexually transmitted infections among young methamphetamine users in northern Thailand

	Women (n=172)				Men (n=343)			
	Prevalence of risk factor N (%)	Incidence of HIV/STIs N (%)	Crude relative risk (95% CI)	Prevalence of risk factor N (%)	Incidence of HIV/STIs N (%)	Crude relative risk (95% CI)	Prevalence of risk factor N (%)	Incidence of HIV/STIs N (%)
Age: < 20	124 (72.1)	18 (14.5)	1	222 (64.7)	32 (14.4)	1		
20	48 (27.9)	5 (10.4)	0.72 (0.28,1.82)	121 (35.3)	11 (9.1)	0.63 (0.33,1.21)		
Education:								
Some high school or less	127 (73.8)	19 (15.0)	1	282 (82.2)	38 (13.5)	1		
Completed high school	45 (26.2)	4 (8.9)	0.59 (0.21,1.65)	61 (17.8)	5 (8.2)	0.61 (0.25,1.48)		
Occupation:								
Student	81 (47.1)	11 (13.6)	0.85 (0.36,2.05)	114 (33.2)	13 (11.4)	0.85 (0.44,1.64)		
Employed	44 (25.6)	7 (15.9)	1	141 (41.1)	19 (13.5)	1		
Unemployed	47 (27.3)	5 (10.6)	0.69 (0.23,1.95)	88 (25.7)	11 (12.5)	0.93 (0.46,1.86)		
STI testing: All negative	124 (72.1)	12 (9.7)	1	278 (81.0)	30 (10.8)	1		
1 positive	48 (27.9)	11 (22.9)	2.37 (1.12,5.00)	65 (19.0)	13 (20.0)	1.85 (1.03,3.35)		
HIV testing: No	55 (32.0)	5 (9.1)	1	110 (32.1)	10 (9.1)	1		
Yes	117 (68.0)	18 (15.4)	1.69 (0.66,4.32)	233 (67.9)	33 (14.2)	1.56 (0.80,3.05)		
<i>Characteristics at 3 months*</i>								
Incarceration: No	170 (98.8)	21 (12.4)	1	331 (96.5)	39 (11.8)	1		
Yes	2 (1.2)	2 (100.0)	8.10 (5.42,12.08)	12 (3.5)	4 (33.3)	2.83 (1.21,6.64)		
Selling or delivering drugs: No	139 (80.8)	19 (13.7)	1	248 (72.3)	27 (10.9)	1		
Yes	33 (19.2)	4 (12.1)	0.89 (0.32,2.43)	95 (27.7)	16 (16.8)	1.55 (0.87,2.74)		
Frequency of MA use:								
None	65 (37.8)	7 (10.8)	1	79 (23.0)	9 (11.4)	1		
0-1 day per week	67 (39.0)	9 (13.4)	1.25 (0.49,3.15)	162 (47.2)	16 (9.9)	0.87 (0.40,1.87)		
2-7 days per week	40 (23.3)	7 (17.5)	1.63 (0.62,4.29)	102 (29.7)	18 (17.7)	1.55 (0.74,3.26)		
Frequency of alcohol use:								
0-3 days per month	66 (38.4)	8 (12.1)	1	48 (14.0)	4 (8.3)	1		
1-3 days per week	68 (39.5)	12 (17.7)	1.46 (0.64,3.33)	143 (41.7)	14 (9.8)	1.17 (0.41,3.40)		
4-7 days per week	38 (22.1)	3 (7.9)	0.65 (0.18,2.31)	152 (44.3)	25 (16.5)	1.97 (0.72,5.39)		
Frequency of drunkenness in past 30 d:								

	Women (n=172)			Men (n=343)		
	Prevalence of risk factor N (%)	Incidence of HIV/STIs N (%)	Crude relative risk (95% CI)	Prevalence of risk factor N (%)	Incidence of HIV/STIs N (%)	Crude relative risk (95% CI)
0-4 days	136 (79.1)	17 (12.5)	1	187 (54.5)	17 (9.1)	1
5+ days	36 (20.9)	6 (16.7)	1.33 (0.57,3.14)	156 (45.5)	26 (16.7)	1.83 (1.03,3.25)
CAGE score: 0-1	64 (43.0)	9 (14.1)	1	132 (39.8)	11 (8.3)	1
2	85 (57.0)	10 (11.8)	0.84 (0.36,1.94)	200 (60.2)	31 (15.5)	1.86 (0.97,3.57)
Depressive symptoms: 0-21	96 (55.8)	12 (12.5)	1	241 (70.3)	33 (13.7)	1
22	76 (44.2)	11 (14.5)	1.16 (0.54,2.48)	102 (29.7)	10 (9.8)	0.72 (0.37,1.40)
No. of sex partners of the opposite sex:						
0	50 (29.1)	2 (4.0)	1	55 (16.0)	6 (10.9)	1
1	103 (59.9)	15 (14.6)	3.64 (0.87,15.31)	175 (51.0)	16 (9.1)	0.84 (0.34,2.04)
2	19 (11.1)	6 (31.6)	7.89 (1.74,35.76)	113 (32.9)	21 (18.6)	1.70 (0.73,3.98)
Sex with casual partner: No	155 (90.1)	18 (11.6)	1	242 (70.6)	24 (9.9)	1
Yes	17 (9.9)	5 (29.4)	2.53 (1.08,5.96)	101 (29.4)	19 (18.8)	1.90 (1.09,3.31)
Sex with sex worker: No	172 (100.0)	23 (13.4)	1	341 (99.4)	43 (12.6)	1
Yes	0 (0.0)	---	---	2 (0.6)	0 (0.0)	---
Sex while high on drugs: No	118 (68.6)	16 (13.6)	1	243 (70.9)	27 (11.1)	1
Yes	54 (31.4)	7 (13.0)	0.96 (0.42,2.19)	100 (29.1)	16 (16.0)	1.44 (0.81,2.55)
Sex while drunk: No	83 (48.3)	9 (10.8)	1	150 (43.7)	13 (8.7)	1
Yes	89 (51.7)	14 (15.7)	1.45 (0.66,3.17)	193 (56.3)	30 (15.5)	1.79 (0.97,3.32)
Condom use in past 30 d: < 100 %	119 (82.1)	14 (11.8)	1	191 (74.6)	25 (13.1)	1
100 %	26 (17.9)	8 (30.8)	2.62 (1.22,5.58)	65 (25.4)	8 (12.3)	0.94 (0.45,1.98)

Bold indicates p<0.05

* Characteristics are reported from the past 3 months, unless otherwise indicated