ORIGINAL RESEARCH

HIV PREVALENCE, KNOWLEDGE, AND ATTITUDES AND REPORTED STI-RELATED SYMPTOMS AMONG THE MOBILE KHMER POPULATION IN RURAL VIETNAM

THUONG VU NGUYEN [1,3], PHUC DUY NGUYEN[1], TOAN MINH LE[2], SAN HOANG LE[1] and NGHIA VAN KHUU[1]

[1]Pasteur Institute, Ho Chi Minh City, Vietnam, [2]Center for HIV/AIDS Prevention and Control, Soctrang Province, Vietnam; and [3]UCLA School of Public Health, Los Angeles, CA, United States of America.

Corresponding Author: Dr.Thuong Vu Nguyen: (thuong@ucla.edu or nguyenthuong@pasteur-hcm.org.vn)

ABSTRACT

Objective: To determine the prevalence of HIV, the correlates of HIV knowledge, positive attitudes towards HIV-infected persons (Pos-Attitude-HIV) and specific sexually transmitted infections (STI) related symptoms (Spe-STI-Sym) among mobile Khmer Vietnamese. Methods: Information about socio-demographic and behavioural characteristics, STI history, and HIV knowledge and attitudes were collected from 397 mobile Khmer Vietnamese in Soctrang province in 2005. Blood samples were taken for HIV and syphilis testing. Results: The prevalence of HIV and syphilis was 0.5% respectively. 34.3% reported having had an STI-related symptom in the past three months; 41% knew the three basic modes of HIV transmission (females 40.2%; males 41.9%), 15.6% had good HIV knowledge (females 14.1%; males 17.2%); and 61.9% had Pos-Attitude-HIV (females 62.9%; males 60.9%). Higher education level, being religious, having an occupation requiring a higher level of education, and reported Spe-STI-Sym were associated with good HIV knowledge. Knowing that monogamy can reduce sexual HIV transmission was less likely to be associated with Pos-Attitude-HIV, while knowing that a healthy-looking person can be HIV-positive was associated with higher likelihood of Pos-Attitude-HIV. Being married and daily alcohol consumption increased the risk of having Spe-STI-Sym. Those who worked in small businesses and barbershops or were workers, drivers, day-labourers' or masons were at higher risk of developing Spe-STI-Sym than farmers, office staff, students, mechanics and the unemployed. Knowing that using condoms can prevent HIV reduced the risk of developing Spe-STI-Sym, with males less likely to report acquiring certain specific STI-related symptoms. Conclusions: Despite the low prevalence of HIV, inadequate knowledge of HIV and high reported STI-related symptoms suggest a potentially high risk for HIV/STI infection in mobile Khmer Vietnamese. Women had slightly lower HIV-related knowledge than men and were more likely to report acquiring certain specific STI-related symptoms. Programs for HIV/STI education, counselling, testing, and control should be promptly implemented, with the emphasis on education for women.

KEYWORDS: mobile Khmer Vietnamese; HIV; Sexually transmitted infection; Knowledge; Attitudes; Behaviours.

SUBMITTED: 25 November 2009; ACCEPTED: 22 March 2010

INTRODUCTION

Vietnam faces an HIV epidemic that is occurring primarily in high-risk groups, including injecting drug users (IDUs) and female sex workers (FSWs). As of 2006, the prevalence of HIV in these high-risk groups varied between provinces, averaging 23.1% in IDUs (as high as 45.2% in Ho Chi Minh City and 54.5% in Quang Ninh) and 4.2% in FSWs (as high as 14.2% in Hanoi and 33.9% in Can Tho) (National Committee for Prevention and Control of AIDS, Drug and Sex Work of Vietnam, 2007). The prevalence of HIV among adults (15-49 years of age) in Vietnam (0.5%) is higher than in China (0.1%) but lower compared to Cambodia (1.2%) and Thailand (1.5%) and much lower compared with several countries in Africa such as Botswana, Lesotho, Swaziland, Zimbabwe, where the prevalence is more than 20% (UNAIDS, 2004; UNAIDS, 2008). The southern region of Vietnam has the highest HIV infection rate in the country with 72,659 cases detected by September 2007, comprising nearly 50% of all HIV cases detected in Vietnam (Pasteur Institute Ho Chi Minh City, 2008).

The Khmer population is the fifth largest of the 54 ethnicities in Vietnam, and was approximately 1.4% of the total Vietnamese population in 2003 (Hoang, 2008). Most of the Khmer population lives in the southern region of Vietnam, particularly in Soctrang province, where they comprise one-third of the population (Soctrang Department of Statistics, 2001). It is estimated that approximately 5-10% of Khmer Vietnamese in Soctrang province migrated for employment (information from the Soctrang local government). Mobility has been shown to increase sexual risk taking behaviours, including more new sexual partnerships, transactional sex, and casual sex (Khan et al., 2008; Kishamawe et al., 2006; Sopheab et al., 2006). Mobility also appears to be a key factor for spreading HIV in some rural areas because of the risky behaviours of the mobile population and because population movement enables dissemination of the virus (Lagarde et al., 2003).

HIV-related knowledge, attitudes and behaviours play a role in establishing strategies for preventing HIV transmission and infection. A study in Northern Vietnam showed HIV/AIDS knowledge was high in the urban area but rather low in the mountainous region (Bui et al., 2001). Although most studies of HIV/STIs in Vietnam have focused on IDUs, FSWs, STI patients, long-distance drivers, and antenatal women, little is known about

Published by the Anton Breinl Centre of Public Health and Tropical Medicine, James Cook University

the prevalence of HIV, knowledge about and attitudes towards HIV/AIDS and relevant risk behaviours among the Khmer-Vietnamese population, especially among the mobile populations (mobile Khmers). This cross-sectional study was conducted to examine the HIV prevalence, HIV-related knowledge, attitudes, selected risk behaviours and STI-related symptoms among mobile Khmer-Vietnamese in the Soctrang province of Vietnam.

METHODS

The study was conducted, between June and August 2005, in the three most densely populated Khmer-Vietnamese districts, including Myxuyen, Longphu, and Vinhchau in Soctrang province, where 30% to 50% of the population was Khmer Vietnamese. The "STATCAL" calculator in EPI-INFO 6.04d (statistical and epidemiological software created by CDC, USA and WHO, 2001) was used to compute the sample size. Given required estimated parameters such as: the estimated prevalence of Khmers who know the three basic modes of HIV transmission, including sexual intercourse, drug injection, and mother-to-child transmission (30%), as well as reporting STI-related symptoms (30%) with 5% desired precision, the sample size was computed to be 323, and it was 381 [based on estimated prevalence of HIV (1%) with 1% desired precision]. Allowing 5% for refusals and damage or loss of specimens, the final sample size calculation resulted in 400.

The sample size was proportionally allocated to each district according to its population size. Three communities were randomly selected in each district and the sample size was proportionally allocated to each community according to its population size. From each community a systematic random selection of Khmer Vietnamese who had left their homes for more than two consecutive weeks in the previous year was taken, based on a list obtained from the community government. Those who were absent when the interviewers arrived were revisited one week later. If they were still absent, the interviewers moved on to the next person on the list.

The interviewers were 10 public health workers (including assistant physicians, nurses and medical technicians) who were trained to conduct the interviews by the project investigators in a two day program. After obtaining informed consent the interviews were conducted anonymously with each person being given a unique private code and no names being collected. The interviews occurred at participants' homes, in their private rooms or in a garden area in private. The information collected included socio-demographic characteristics, sexual behaviours, and history of STIs, with questions being asked in both multiple-choice and open-ended formats. Following the interview each participant received a gift and technicians collected blood samples for diagnosis of HIV and syphilis.

Free treatment of syphilis was provided at district health centres according to the World Health Organization STD case management guidelines. Participants also received free STI/HIV education and counselling on the spot, by telephone or at provincial or district centres for HIV/AIDS prevention and control.

Laboratory Methods

Blood samples were sent to the Provincial Center for Preventive Medicine in Soctrang for detection of HIV with SFD (Bio-Rad, Tokyo, Japan; sensitivity 100%, specificity 99.74%) and syphilis with rapid plasma reagin (RPR; Bio-Rad, Tokyo, Japan). The sensitivity and specificity for RPR changes with the stage of syphilis infection (sensitivity varies 78% to 86%, 100% and 95% to 98% in primary, secondary and latent syphilis, respectively; Specificity ranges from 85% to 99%) (US Preventive Services Task Force, 2004). Positive sera were first stored at -20°C, then sent to the Pasteur Institute in Ho Chi Minh City every two weeks for HIV confirmation with two ELISA tests: Murex HIV 1.2.0, Abbott, 2002, Dartford, UK (sensitivity 100%; specificity 99.77%) and Genscreen HIV K V.2, Bio-Rad, 2002, Marnes La Coquette, France (sensitivity 100%; specificity 99.98%) and syphilis confirmation with the *Treponema pallidum* hemagglutination assay (TPHA; Bio-Rad, Tokyo, Japan). The sensitivity and specificity for TPHA are greater then 95% and 99%, respectively (Wiwanitkit, 2009).

The study protocol, questionnaire, and informed consent documentation, including ethical issues were reviewed and approved by the scientific and ethical councils of the Pasteur Institute, Ho Chi Minh City and the Center for HIV/AIDS Prevention and Control of Soctrang province.

Data Analysis

Data were entered into Epi-Info version 6.04 d (CDC, Atlanta, GA) and analysed using STATA version 9.2 (Texas, USA, 2006). Good HIV knowledge was defined as achieving at least 80% correct answers to basic questions about knowledge of HIV transmission and prevention. The dichotomous variable Pos-Attitude-HIV was defined as considering that HIV-infected persons should not be isolated and should have a normal life, including school, work, and other social activities (or not).

When assessing correlates for having STI-related symptoms in the past three months, only specific STI symptoms (Spe-STI-Sym) were included. For males these were: 1) urethral discharge, 2) genital vesicles, 3) genital warts, 4) burning sensation when urinating, and 5) genital ulcers. For females these were: 1) abdominal pain, 2) genital vesicles, 3) genital warts, 4) burning sensation when urinating, and 5) genital ulcers. The dichotomous variable "occupation" was defined as a higher education occupation (students, office staff, mechanics, workers) or the reference group (farmers, small business owners, labour-hired/masons, unemployed, barbershop employees, and drivers) when assessing correlates of good HIV knowledge and Pos-Attitude-HIV. However, occupation was defined as potentially higher risk occupation (small business owners, workers, drivers, labour-hired/masons, barbershop employees) or the reference group (farmers, office staff, students, mechanics and unemployed persons) when assessing correlates of a Spe-STI-Sym. Education was classified as grade 6 or higher (secondary or high school or higher) or lower (grade 5 or lower or illiterate). Consistent condom use was defined as always using condoms during sex within the past six months.

Odds ratios (with 95% confidence intervals) were used to measure the association of each of the three outcomes (having a Spe-STI-Sym, good HIV knowledge, and Pos-Attitude-HIV) with socio-demographic, sexual, behavioural, and STI history variables. All variables which could plausibly increase or decrease the risk of the outcome of interest or which had a p-value of 0.25 or lower by Wald test in univariate logistic regression analysis (for

the association between an exposure and the outcome of interest) were included in the multivariable logistic regression model (Hosmer and Lemeshow, 2000). All analyses were adjusted for the cluster effects; the basic sampling units were the nine communities. The association between the exposure and the outcome of interest was assessed using the corresponding adjusted odds ratio (aOR) and 95% confidence intervals (95% CI), while controlling for the other potential confounders in the model.

RESULTS

Three hundred and ninety seven Khmer Vietnamese agreed to participate in the study. There were three refusals. The majority were between 20 and 39 years of age. The education level was generally low, with only 25.8% of males and 19.1% of females achieving an education level of grade 6 or higher. The majority worked as farmers (70.7%: 67% females; 74.8% males) with 5.1% (6.6% females; 3.5% males) being unemployed. Almost all participants (90.4%) were Buddhists. While 5.8% drank alcohol every day, the majority (70%) reported drinking less than once per week (Table1).

Table 1: Selected socio-demographic factors and sexual behaviours among mobile Khmers in Soctrang, Vietnam, 2005

Variable	Female		Male		Total	
	N	(%)	N	(%)	N	(%)
Demographics						
Age (in years)						
15-19	21	10.5	25	12.6	46	11.6
20-29	67	33.7	61	30.8	128	32.2
30-39	67	33.7	61	30.8	128	32.2
40-49	44	22.1	51	25.8	95	23.9
Mean		31.4		31.7		31.6
Median		31.0		31.5		31.0
Range	15-49		15-49		15-49	
Gender	199	50.1	198	49.9		
Education: grade 6 or higher	38	19.1	51	25.8	89	22.4
Marital status: married or cohabiting	147	73.9	145	73.2	292	73.6
Religion: Buddhism	175	87.9	184	92.9	359	90.4
Other religion	2	1.0	1	0.5	3	0.8
No religion	22	11.1	13	6.6	35	8.8
Occupation Farmer	133	67.2	148	74.8	281	71.0
Small business	28	14.1	9	4.5	37	9.3
Hired-manual-labour/mason	17	8.6	13	6.6	30	7.6
Unemployed	13	6.6	7	3.5	20	5.1
Worker	6	3.0	12	6.1	18	4.5
Other (Barbershop,-student,-office staff, mechanics-motor/taxi/long distance driver)	1	0.5	9	4.5	10	2.5
Alcohol consumption: Daily	4	2.0	19	9.6	23	5.8
1-6 times/week	9	4.5	87	43.9	96	24.2
Never or less than 1 time/week	186	93.5	92	46.5	278	70.0
Sexual behaviours						
Ever had sexual intercourse	158	79.4	163	82.3	321	80.9
First sex at or before 17 years old	11	7.7	12	8.2	23	8.0
Ever had sex with boy/girl friend	4	2.0	13	6.6	17	4.3
Ever had sex with casual partner	1	0.5	7	3.5	8	2.0
Ever had commercial sex	2	1.0	32	16.2	34	8.6
Condom use in the last sexual encounter with:						
Spouse	13	8.8	11	7.6	24	8.2
Boy/girl friend	0	0.0	3	18.8	3	15.0
Casual partner	0	0.0	2	28.6	2	25.0
Sex worker/client	0	0.0	16	50.0	16	47.1
Consistent condom use with: Spouse	2	1.4	1	0.7	3	1.0
Boy/girl friend	0	0.0	1	7.1	1	5.9
Recreational drug use						
Had ever used recreational drugs	0	0.0	0	0.0	0	0.0

Nearly 81% had had sex, with 8% of these having their sexual debut at or before the age of 17 years. Rates of having sex with boy/girl friends, casual partners, and engaging in commercial sex were 4.3%, 2%, and 8.6%, respectively. Of those involved in commercial

sex (n=34), 32 (94%) were males as clients and 2 (6%) were females as sex workers. Condom use during the last intercourse with spouses, boy/girl friends, casual partners, and in commercial sex were 8.2%, 17.6%, 25%, and 47.1%, respectively. However, consistent condom use was only 1% and 5.9% with spouses and boy/girl friends, respectively. Information about consistent condom use for commercial or casual sex in the previous 6 months was not collected for. No one in this study reported recreational drug use.

In general, 15.6% (males 17.2%; females 14.1%) had good HIV knowledge, scoring 80% or higher on the 19 questions relating to HIV knowledge (Table 2). Nearly 87% had heard of HIV/AIDS, and 41.1% knew the three major modes of HIV transmission, although more males (81.8%) than females (68.3%) knew that sexual intercourse can transmit HIV infection. Approximately 70% of them knew that HIV would not be transmitted by mosquito bites, or having meals, shaking hands with, or sharing seats and/or toilets with HIV-infected persons. However, only 43% (males 47%, females 38.2%) could identify all three major strategies for preventing sexually transmitted HIV (abstinence, monogamy, and condom use)(Table2).

Table 2: Basic knowledge about and attitudes towards HIV/AIDS among mobile Khmers in Soctrang, Vietnam, 2005.

Variable	Female		Male		Total	
	N	(%)	N	(%)	N	(%)
Ever heard about HIV/AIDS (1)	170	85.4	174	87.9	344	86.7
Knew major HIV transmission modes						
Sexual intercourse (1)	136	68.3	162	81.8	298	75.1
Drug injection (1)	116	58.3	133	67.2	249	62.7
Mother to child (1)	90	45.2	92	46.7	182	45.8
All three	80	40.2	83	41.9	163	41.1
Knew routes that do not transmit HIV						
Mosquito bites (1)	133	66.8	145	73.2	278	70.0
Having a meal with an HIV-positive person (1)	132	66.3	144	72.7	276	69.5
Shaking hands with an HIV-positive person (1)	130	65.3	141	71.2	271	68.3
Sharing a seat with an HIV-positive person (1)	135	67.8	141	71.2	276	69.5
Sharing a toilet with an HIV-positive person (1)	136	68.3	147	74.2	283	71.3
Knew how to prevent sexual transmission of HIV						
Abstinence (1)	116	58.3	137	69.2	253	63.7
Monogamy (1)	119	59.8	140	70.7	259	65.2
Condom use (1)	94	47.2	113	57.1	207	52.1
All three	76	38.2	93	47	169	42.6
Knew how to prevent HIV via blood contact						
Not sharing syringes or transdermic tools (1)	124	62.3	136	68.7	289	72.8
HIV screening of blood before transfusion (1)	52	26.1	53	26.8	116	29.2
Knew means to prevent HIV transmission from mother to child						
Avoiding pregnancy (1)	107	53.8	125	63.1	252	63.5
No breast-feeding (1)	76	38.2	72	36.4	164	41.3
Surgical delivery, Cesarian (1)	30	15.1	25	12.6	60	15.1
ARV prophylaxis (1)	19	9.6	32	16.2	57	14.4
Knew that a healthy-looking person can be infected with HIV (1)	64	32.2	81	40.9	145	36.5
Score (total=19)						
Mean (median)	9.9 (11)		11.1 (12)		10.5 (11)	
Range	0 - 19		0 - 19		0 – 19	
Good knowledge about HIV (80% or higher total score)	28	14.1	34	17.2	62	15.6
Positive attitude towards persons with HIV (n=344)	107	62.9	106	60.9	213	61.9

(1): 1 point for each correct answer.

Knowledge about preventing the spread of HIV via blood contact and from mother to child was mixed. For example, knowledge of preventing mother-to-child HIV transmission by avoiding pregnancy was quite high at 63.5%, but fewer participants (15.1%) were aware that surgical delivery could help to protect the child (Table 2). Only 36.5% (40.9% males; 32.2% females) knew a healthy looking person can be infected with HIV (Table 2). Among those who had heard about HIV/AIDS, 61.9% (females 62.9%; males 60.9) had a Pos-Attitude-HIV. Among those who had negative attitudes towards HIV-positive people, 64.1% felt HIV-positive people should be isolated in quarantine, or at home (51.2%), while 28.2% felt they should not attend school, or work (32.1%), and 74.8% felt they should be confined to hospital.

STI-related symptoms within the past three months were reported by 34% of participants (males 23.9%; females 44.9%), with nearly one-quarter of them reporting having had certain specific STI-related symptoms (15.3% males; 29.1%) (Table 3). A burning sensation when urinating was experienced by 13.7% of these participants (males 14.7%; females 12.7%). Nearly 21% of females complained of lower abdominal pain and approximately 1.8% of males had urethral discharge. For both males and

Published by the Anton Breinl Centre of Public Health and Tropical Medicine, James Cook University

females genital vesicles (0.6%, 1.3%), genital warts (0.6%, 1.3%), and genital ulcers (0%, 1.9%) were rather low (Table 3). The sero-positivity for HIV and syphilis of the participants in this study was 0.5% for each (95% CI 0-1.2%), however, HIV and syphilis were detected only in female participants, both at a prevalence of 1.0% (95%CI0-2.4%).

Table 3: Reported STI-related symptoms and sero-positivity for HIV and syphilis among mobile Khmers in Soctrang, Vietnam, 2005.

Variable	Male		Female		All	
	N	(%)	N	(%)	N	(%)
Reported STI-related symptoms (past 3 months)						
Having any STI-related symptoms	39	23.9	71	44.9	110	34.3
Having any specific STI-related symptoms	25	15.3	46	29.1	71	22.1
Genital discharge *	3	1.8	32	20.3	35	10.9
Burning sensation when urinating	24	14.7	20	12.7	44	13.7
Lower abdominal pain**		NA	33	20.9		NA
Genital itching	22	13.5	39	24.7	61	19.0
Inguinal swelling	7	4.3	0	0.0	7	2.2
Genital vesicle	1	0.6	2	1.3	3	0.9
Genital wart	1	0.6	2	1.3	3	0.9
Genital ulcer	0	0.0	3	1.9	3	0.9
HIV and sero-positivity for syphilis						
HIV prevalence (95% CI)***	0	0.0	2	1.0 (0.0, 2.4)	2	0.5 (0.0, 1.2)
Syphilis prevalence (95% CI)	0	0.0	2	1.0 (0.0, 2.4)	2	0.5 (0.0, 1.2)

*_Genital discharge_: Males, urethral discharge; females, vaginal discharge; **lower abdominal pain did not differentiate from menstrual pain; ***_CI_: confidence interval.

In multivariate analysis, having an education level of grade 6 or higher (adjusted odds ratio (aOR) =5.0, 95% CI 2.18, 11.50), being religious (aOR=22.13, 95% CI 1.58, 310.0), having a higher education occupation (aOR=14.0, 95% CI 1.72, 113.81) and having a Spe-STI-Sym in the last three months (aOR=0.44, 95% CI 0.22, 0.90) were associated with a higher likelihood of having good HIV knowledge. Knowing that a healthy-looking person can be infected with HIV (aOR=3.79, 95% CI 1.23, 11.68) was associated with a higher likelihood of Pos-Attitude-HIV. However, knowing that monogamy can prevent sexual transmission of HIV (aOR=0.35, 95% CI 0.13, 0.98) was associated with a lower likelihood of Pos-Attitude-HIV.

Males, who knew that using condoms can prevent HIV transmission (aOR=0.46, 95% CI 0.21, 1.00) were less likely to have Spe-STI-Sym. Those who were married (aOR=12.04, 95%CI 2.66, 54.54) and consumed alcohol daily (aOR=5.07, 95% CI 1.34, 19.11) were at higher risk of Spe-STI-Sym (Table 4). Those who had worked in small businesses and barbershops or were workers, drivers, day-labourers or masons were more likely to have Spe-STI-Sym (aOR= 2.24, 95%CI 1.17, 4.30) than the reference group of farmers, office staff, students, mechanics and the unemployed. However, the magnitudes of the association (ORs for "Being male", "Daily alcohol consumption" and "knowing that condoms can prevent HIV transmission") shifted towards the null-value of the odds-ratio (1.0) when the outcome included any STI-related symptom (data not shown).

DISCUSSION

The prevalence of HIV among mobile Khmers in Soctrang is not high, and is lower than that observed in the general population in Cambodia (0.62% to 0.98% in 2005) (Mishra et al., 2008). The two HIV positive cases found in this study were females who reported never engaging in commercial sex, although they might not have reported their real sexual behaviour. Thus, the prevalence of HIV among mobile Khmer females was estimated as 1%, higher than that of the general population in southern Vietnam (0.27% in pregnant women in 2005) (Pasteur Institute Ho Chi Minh City, 2008) indicating this is an important health issue for rural Khmer women, especially those who form part of the mobile population. Women did not report using condoms in their most recent sexual encounters although a few had been involved with casual or commercial partners. More men reported sexual encounters with sex workers or casual partners with fewer than half of them using condoms in their most recent encounter. Thus unsafe sexual practices were reported by both sexes.

Fewer than half the participants knew the three basic modes of HIV transmission and prevention. Fewer than 16% had good HIV knowledge, with women having poorer knowledge than men, and those who were better educated having better HIV knowledge. This finding is consistent with earlier studies (Al-Serouri et al., 2002; Khan, 2002; Yerdaw et al., 2002). In this study, more than 91% of participants were Buddhist and almost 1% identified themselves as belonging to another religion. Religion may play an important role in health education as being religious was associated with a higher likelihood of having good HIV knowledge, which is consistent with an earlier study in Ghana (Takyi, 2003). It is possible that religious leaders had provided education on these issues, as found in a Cambodian study (Anonymous, 1997).

Those who had had a Spe-STI-Sym in the last three months were less likely to have good HIV knowledge, possibly because poor HIV knowledge could lead to the acquisition of an STI as both HIV and STI share a similar major transmission route via sexual contact. Interventions providing information about STIs, among other constructs, have shown promise in both increasing HIV knowledge and reducing the risk of acquiring HIV (Downs et al., 2004).

Males seemed to have better HIV knowledge than females probably because males had higher educational attainment than females although the gender difference for HIV knowledge was not significant in the multivariate analysis (controlling for several other covariates).

More than 60% of participants in this study had a Pos-Attitude-HIV, with those who knew that a healthy-looking person can be infected with HIV being more likely to have a Pos-Attitude-HIV. These results suggest that people with a better understanding of the modes of transmission of HIV and methods of HIV prevention are more likely to have Pos-Attitude-HIV, as has been shown previously by Chen and colleagues (2007) for attitudes towards HIV/AIDS patients.

The data collected in this study provide some baseline information about the STIs in the mobile Khmer population which may reflect their "unsafe" sexual behaviours. The overall prevalence of syphilis was low, although it was higher in women (1%). Laboratory testing for other common STIs such as Gonorrhea, Chlamydia, and herpes simplex virus type 2 (HSV-2) was not undertaken. However, more than 22% of study participants (29.1% women; 15.3% men) reported having had a specific STI-related symptom in the past three months, with the most common symptoms being a burning sensation during urination in males, and lower abdominal pain in females. These reported symptoms suggest a high prevalence of STIs in the mobile Khmer population, especially in women.

Table 4: Correlates of good HIV knowledge, positive attitudes towards HIV-positive persons and reported specific STI-related symptoms.

Factors	Unadjusted OR			Adjusted OR		
	OR (95% CI)		P-value	OR (95% CI)		P-value
Correlates of good HIV knowledge						
Age	1.01	(0.98, 1.04)	0.681	1.03	(0.98, 1.08)	0.243
Being male	1.27	(0.57, 2.82)	0.517	0.97	(0.33, 2.85)	0.949
Having education level of grade 6 or higher	3.12	(1.26, 7.71)	0.020	5.00	(2.18, 11.48)	0.002
Being married/cohabiting	1.43	(0.84, 2.43)	0.163	24.55	(0.57, 1055.16)	0.085
Being religious	6.89	(0.35, 134.12)	0.172	22.13	(1.58, 309.99)	0.027
Occupation of higher education*	3.39	(1.01, 11.36)	0.049	13.98	(1.72, 113.81)	0.020
Daily alcohol consumption	0.80	(0.10, 6.37)	0.811	0.55	(0.05, 5.74)	0.569
Ever engaging in commercial sex	1.76	(0.27, 11.52)	0.507	3.82	(0.47, 31.26)	0.180
Having at least one STI related symptom in the past 3 months	0.53	(0.23, 1.21)	0.114	0.44	(0.22, 0.90)	0.029
Correlates of positive attitudes towards						
Age	0.99	(0.94, 1.04)	0.620	1.00	(0.96, 1.04)	0.972
Being male	0.92	(0.53, 1.59)	0.729	0.72	(0.39, 1.34)	0.259
Being married/cohabiting	0.48	(0.13, 1.85)	0.248	0.42	(0.14, 1.28)	0.111
Having education level of grade 6 or higher	0.93	(0.37, 2.36)	0.871	0.42	(0.13, 1.38)	0.129
Occupation of higher education*	2.47	(0.42, 14.39)	0.271	0.52	(0.09, 2.92)	0.405
Knowing that shaking hands does not transmit HIV	1.94	(0.52, 7.23)	0.282	2.15	(0.64, 7.19)	0.183
Knowing that a healthy-looking person can be HIV-positive	2.47	(1.03, 5.93)	0.044	3.79	(1.23, 11.68)	0.026
Knowing that ARV prophylaxis can prevent HIV being	2.22	(0.58, 8.49)	0.207	2.00	(0.70, 5.74)	0.167
Choosing monogamy to prevent HIV transmission	0.38	(0.11, 1.26)	0.098	0.35	(0.13, 0.98)	0.046
Having at least one specific STI-related symptom in the past	0.39	(0.10, 1.55)	0.156	0.42	(0.12, 1.45)	0.145
Correlates of reported specific STI-related symptoms**						
Age	0.99	(0.93, 1.07)	0.873	0.96	(0.90, 1.02)	0.182
Being male	0.44	(0.24, 0.81)	0.015	0.45	(0.23, 0.88)	0.026
Having education level of grade 6 or higher	0.90	(0.32, 2.54)	0.824	0.50	(0.16, 1.55)	0.198
Being married/cohabiting	2.63	(0.55, 12.52)	0.191	12.04	(2.66, 54.54)	0.005
Occupation with potentially higher risk***	2.02	(0.84, 4.88)	0.103	2.24	(1.17, 4.30)	0.021
Daily alcohol consumption	1.60	(0.48, 5.31)	0.393	5.07	(1.34, 19.11)	0.023
Age at sexual debut ≤17 years	0.72	(0.16, 3.27)	0.633	0.42	(0.15, 1.16)	0.085
Having sex with a boy/girl friend	0.45	(0.04, 5.21)	0.477	3.03	(0.12, 75.16)	0.448
Ever having engaged in commercial sex	0.44	(0.06, 3.41)	0.381	1.18	(0.18, 7.92)	0.847
Knowing that using condoms can prevent sexual	0.56	(0.30, 1.03)	0.060	0.46	(0.21, 1.00)	0.05
Positive attitudes towards HIV-positive persons	0.39	(0.10, 1.55)	0.156	0.36	(0.08, 1.49)	0.135

*Occupation of higher education (students, office staff, mechanics, workers) compared with reference group (farmers, small business owners, labour-hired/masons, unemployed , barbershop employees and drivers)

**Including only more specific STI symptoms:

Males: 1) urethral discharge. 2) genital vesicles, 3) genital warts, 4) burning sensation when urinating, and 5) genital ulcers.

Females: 1) abdominal pain, 2) genital vesicles, 3) genital warts, 4) burning sensation when urinating, and 5) genital ulcers]

***Occupation with potentially higher risk for HIV/STIs (small business owners, workers, drivers, labour-hired/mason, barbershop employees) compared with reference group (farmers, office staff, students, mechanics, and unemployed)

P-value: from Wald test in logistic regression

Adjusted OR: Odds ratios for an independent variable in the model adjusted for all other variables in the same model.

Several correlates of the Spe-STI-Sym were found in the current study. These correlates may reflect associations with current STIs, the duration of diseases related to STIs, or the ability to report personal disease symptoms. Men were less likely to have Spe-STI-Sym than women. The higher infection rate in women may be due to greater exposure in females from pooled semen in the vagina and greater trauma to tissues during intercourse (Wong et al., 2004). The lower prevalence of Spe-STI-Sym in males may be explained by the fact that men's knowledge of methods of prevention of sexual transmission of HIV was higher than that of females and that "knowing that condom use can prevent HIV transmission" was associated with a lower likelihood of having a Spe-STI-Sym. Furthermore, there was a strong association between knowing that using condoms can prevent HIV transmission and reporting condom use during the last commercial sex encounter (data not shown) suggesting that knowledge about the role of condoms in the prevention of HIV could be associated with higher condom use with sexual partners.

There were a number of correlates that increased the risk of having Spe-STI-Sym, including being married or cohabiting. These people may be more aware of their genital health status including genital symptoms and thus more likely to report them. Other studies have found that being married increased the risk of STIs in female sex workers (Harijaona et al., 2009), and young adults, possibly as a result of frequent unprotected intercourse with an infected spouse (Shaw et al., 2001). Alcohol consumption is common in rural areas of Vietnam for cultural reasons and because of the lack of other entertainment services. Daily alcohol consumption was associated with Spe-STI-Sym, probably due related risk behaviours, such as unprotected sex and more sexual partners (Madhivanan et al., 2005; Mohammad et al., 2007; Mercer et al., 2007). In this study, daily alcohol consumption was associated with a higher likelihood of engaging in commercial sex (data not shown). In addition, those who worked in small businesses and barbershops or were workers, drivers, day-labourers or masons were at higher risk for Spe-STI-Sym than farmers, office staff, students, mechanics or the unemployed, possibly because they travelled more and engaged in higher risk behaviours (Mercer et al., 2007; Sadovszky et al., 2008; Singh et al., 1994).

The limitations of this study include the fact that recruitment of participants relied on the list of inhabitants obtained from the local government which may not have included the whole mobile Khmer population in the communities, thus resulting in an under representation of the mobile Khmer Vietnamese. In addition, the cross-sectional design could not distinguish temporal relationships between the exposures and the outcomes of interest. Furthermore, under-reporting of sexual behaviours or recreational drug use might have occurred. Finally, STI-related symptoms assessed might not be specific for current STIs of participants.

Conclusions

Although the prevalence of HIV and syphilis in mobile Khmers in Soctrang province was not high, the prevalence of reported specific STI-related symptoms was, possibly due to infections such as Chlamydia and/or Gonorrhea. These infections may be spread by sexual contact between the mobile Khmers and female sex workers, among whom the prevalence of Gonorrhea or Chlamydia (or both) is high (54.9%) (Nguyen et al., 2008). In addition, insufficient knowledge about HIV/AIDS and low condom use with high-risk partners suggests the potential for an increasing number of HIV/STI infections among mobile Khmer Vietnamese, particularly for females who could be more vulnerable to HIV but receive less HIV/STI interventions.

The results of this study provide guidance for HIV/STI intervention strategies for this mobile Khmer Vietnamese population. A comprehensive HIV/STI education program including HIV/STI knowledge and prevention, such as condom use and positive attitudes towards HIV-positive persons, should be promptly implemented using appropriate local language. The role of religious leaders should be considered, as they have been shown to be effective in improving protective behaviours against HIV infection (Lagarde et al., 2000). Such a program should be combined with HIV/STI counselling, testing, and access to HIV treatment. Enhancing the existing STI control program, including condom promotion would be a feasible ways to reduce HIV/STI infections, using free-of-charge mobile STI clinics with treatment according to WHO-recommended guidelines for periodic syndromic STD management, including promotion of partner treatment

ACKNOWLEDGEMENTS

This study was funded by the Southeast Asian Ministers of Education Organization (SEAMEO) and the German Agency for Technical Cooperation (GTZ). We particularly wish to thank Dr. Ofelia Pardo Saniel (University of the Philippines Manila Shool of Public Health) for her important support and comments in the study design and Muhammad N. Farid of Central Bureau of Statistics, Jakarta, Indonesia for his invaluable help in data analysis. We also wish to thank Dr. Huu Ngoc Tran, Dr. Lien Xuan Truong (Pasteur Institute Hochiminh City); Dr. Hau Phuc Tran, Ms. Phuong Kim Thi Tran and Dr. Quang Duy Pham (AIDS Programme, Pasteur Institute Hochiminh City); Dr. Phong Hoai Truong (Soctrang Department of Health); Dr. Anh Phuong Nguyen (Soctrang Center for HIV/AIDS Control and Prevention) and the staff members of the District Health Centers of Myxuyen, Longphu, and Vinhchau of Soctrang province for their help and support. We also thank Dr. Nigel O'Farell (London School of Hygiene and Tropical Medicine, London, UK) for his useful comments, and Wendy Aft (UCLA, Department of Epidemiology) and Thanh Boi Thuc Nguyen for editorial assistance.

REFERENCES

Al-Serouri A.W., Takioldin M., Oshish H., Aldobaibi A., Abdelmajed A. (2002). Knowledge, attitudes and beliefs about HIV/AIDS in Sana'a, Yemen. *Eastern Mediterranean Health Journal* 8(6):706–15.

Anonymous (1997). Knowledge, attitudes, and behavior. Cambodia's monks, nuns fill gap for AIDS patients. Abstract. *AIDS Weekly Plus* 25-6.

Bui T.D., Pham C.K., Pham T.H. et al (2001). Cross-sectional study of sexual behaviour and knowledge about HIV among urban, rural and minorities in Viet Nam. *Bulletin of the World Health Organization* 79: 15-21.

Chen J., Choe M.K., Chen S., Zhang S. (2007). The effects of individual- and community-level knowledge, beliefs, and fear of stigmatization of people living with HIV/AIDS in China. *AIDS Care* 19(5): 666-73.

Downs J.S., Murray P.J., Bruine de Bruin W. et al. (2004). Interactive video: Behavioral intervention to reduce adolescent females' STD risk: a randomized controlled trial. *Social Science Medicine* 59(8):1561–72.

Harijaona V., Ramambason J.D., Morisset R., Rasamindrakotroka A., Ravaoarinoro M. (2009). Prevalence of and risk factors for sexually-transmitted infections in hidden female sex workers. *Medecine et Maladies Infectieuses* 39(12): 909-13.

Hoang N. Pictures of the community of 54 Vietnamese ethnicities. Webpage of the Committee for Ethnicities (of Vietnam). http://cema.gov.vn/modules.php?name=Content&op=viewcat&mcid=124&page=1 (in Vietnamese). Last accessed October 19, 2008.

Hosmer D.W, Lemeshow S. (2000). Model-Building and Strategies and Methods for Logistic Regression, Applied Logistic Regression, Second Edition, Wiley Series in Probability and Statistics. John Wiley and Sons Inc; p. 91-142.

Khan M.A. (2002). Knowledge on AIDS among female adolescents in Bangladesh: evidence from the Bangladesh demographic and health survey data. *Journal of Health, Population and Nutrition* 20(2):130–7.

Khan M.R., Patnaik P., Brown L., Nagot N., Salouka S., Weir S.S. (2008). Mobility and HIV-related sexual behavior in Burkina Faso. *AIDS Behavior* 12: 202-12.

Kishamawe C., Vissers D.C.J., Urassa M., et al. (2006). Mobility and HIV in Tanzanian couples: both mobile persons and their partners show increased risk. *AIDS* 20: 601-8.

Lagarde E., Loeff M.S., Enel C., et al. (2003). Mobility and the spread of human immunodeficiency virus into rural areas of West Africa. *International Journal of Epidemiology* 32: 744-52.

Lagarde E., Enel C., Seck K. et al.(2000). Religion and protective behaviours towards AIDS in rural Senegal. *AIDS* 14(13): 2027-33.

Madhivanan P., Hernandez A., Gogate A. (2005). Alcohol use by men is a risk factor for the acquisition of sexually transmitted infections and human immunodeficiency virus from female sex workers in Mumbai, India. *Sexually Transmitted Diseases* 32(11): 685-90.

Mercer A., Khanam R., Gurley E., Azim T. (2007). Sexual Risk Behavior of Married Men and Women in Bangladesh Associated With Husbands' Work Migration and Living Apart. *Sexually Transmitted Diseases* 34 (5): 265–73.

Mishra V., Barrere B., Hong R., Khan S. (2008). Evaluation of bias in HIV seroprevalence estimates from national household surveys. *Sexually Transmitted Infections* 84(Suppl 1): i63-70.

Mohammad K., Farahani F.K.A., Mohammadi M.R. et al. (2007). Sexual risk-taking behaviors among boys aged 15–18 years in Tehran. *Journal Adolescent Health* 41: 407–14.

National Committee for Prevention and Control of AIDS, Drug and Sex Work of Vietnam (2007). Workshop on HIV/AIDS Prevention and Control in Vietnam in 2006, Planning for 2007, Hanoi (in Vietnamese).

Nguyen T.V., Khuu N.V., Le T.T.T. et al (2008). Sexually transmitted infections and risk factors for gonorrhea and Chlamydia in female sex workers in Soctrang, Vietnam. *Sexually Transmitted Diseases* 35(11): 935-40.

Pasteur Institute Ho Chi Minh City (2008). Workshop on HIV/AIDS Prevention and Control in Southern Vietnam in 2007, Planning for 2008.

Sadovszky V. V. (2008). Preventing Women's Sexual Risk Behaviors During Travel. *Journal of Obstetric, Gynecology and Neonatal Nursing*; 37: 516- 24.

Shaw M., van der Sande M., West B. et al. (2001). Prevalence of herpes simplex type 2 and syphilis serology among young adults in a rural Gambian community. *Sexually Transmitted Infections* 77; 358-65.

Singh Y.N. and Malaviya A.N. (1994) Long Distance Truck Drivers in India: HIV Infection and Their Possible Role in Disseminating HIV into Rural Areas. *International Journal of STD & AIDS* 5(2): 137-138.

Soctrang Department of Statistics (2001). Annual Report of Statistics (in Vietnamese).

Sopheab H, Fylkesnes K, Vun MC., and O'Farrell N. (2006). HIV-Related Risk Behaviors in Cambodia and Effects of Mobility. *Journal of the Acquired Immune Deficit Syndrome* 41:81–86.

Takyi B.K. (2003). Religion and women's health in Ghana: insights into HIV/AIDs preventive and protective behavior. *Social Science Medicine* 56(6): 1221-34.

UNAIDS (2004). 2004 Report on the global AIDS epidemic: Executive Summary. Geneva: 5-6.

UNAIDS (2008). 2008 Report on the global AIDS epidemic. [http://www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/2008_Global_report.asp] Last accessed September 18, 2009.

U.S. Preventive Services Task Force (2004). Screening for Syphilis Infection: Recommendation Statement. *Annals of Family Medicine* 2:362-365.

West Pacific Regional Office of the World Health Organization, and the National Centre for HIV/AIDS, Dermatology and STDs; and the Ministry of Health, Cambodia (2001). Controlling STIs and HIV in Cambodia, The Success of Condom Promotion. (WPRO, WHO and National Centre for HIV/AIDS, Dermatology and STDs, Ministry of Health, Cambodia, 2001; World Health Organization, 2001).

Wiwanitkit V. (2009) A cost-utility analysis of Treponema pallidum haemagglutination (TPHA) testing for syphilis screening of blood donors: is the TPHA test useful for syphilis screening in a blood centre? *Blood Transfusion* 7: 65-6.

Wong T., Singh A., Mann J., Hansen L. and McMahon S. (2004) Gender Differences in Bacterial STIs in Canada. *BMC Women's Health* 4(Suppl 1):S26.

World Health Organization (2001). Guidelines for the Management of Sexually Transmitted Infections. Last accessed November 24, 2009 at: http://whqlibdoc.who.int/publications/2003/9241546263.pd f.

Yerdaw M., Nedi T., Enquoselassie F. (2002). Assessment of awareness of HIV/AIDS among selected target groups in and around Addis Ababa, Ethiopia. *African Journal of Reproductive Health* 6(2):30–8.

Published by the Anton Breinl Centre of Public Health and Tropical Medicine, James Cook University