

# HIV-Related Risk Behaviors in Cambodia and Effects of Mobility

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**Objectives:** To study HIV risk behaviors in different population groups, linkages to bridge populations, and to examine factors affecting such behaviors and links.

**Methods:** Ten population groups in 4 provinces were surveyed. Stratified random cluster sampling was used, and interviews were conducted to provide information on sociodemographic characteristics, mobility, and risk behaviors. The groups surveyed were female sex workers (FSWs), household men and women, youths in vocational training, and men with high-mobility occupations (fishermen, mototaxi drivers, police, military, casino workers, and deminers). The total number surveyed was 3848.

**Results:** The proportion reporting sex in the past year with FSWs differed sharply between male groups ranging from 20% to 51% in the high-mobility groups and 5% to 10% in the other groups. Non-commercial sex varied less by group. Consistent condom protection (always used condoms in the past 3 months) with FSWs was high (>85% for most groups). However, condom use was significantly less with noncommercial partners, a high proportion of whom complained about a lack of condom availability. For the different male groups, travel away from home >1 month in the past year was a strong independent determinant of both sex with FSWs and noncommercial sex. Casual sex was more common in young unmarried men. Women in the general population did not report casual sex, but 41% of them were "worried about being infected by their husbands."

**Conclusions:** The results suggest mobility is a strong determinant of casual sex. Although FSWs may still act as an important bridge for HIV transmission in Cambodia, noncommercial sex is becoming increasingly important due to the relatively low condom use in such relationships.

**Key Words:** Cambodia, HIV, risk behavior, population survey, mobility, condom

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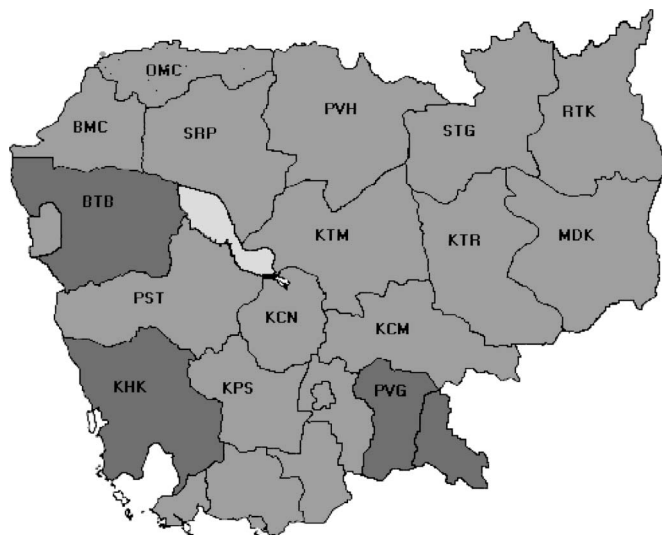
Cambodia is one of the few countries in southeast Asia with a generalized HIV epidemic.<sup>1</sup> Results from the national HIV surveillance system indicates a stabilization at prevalence levels between 2% and 4% in the general adult population aged 15 to 49 years and declining prevalence in female sex workers (FSWs).<sup>2,3</sup> Reductions observed in the proportion of men buying sex, together with substantial rises in the use of condoms among both sex workers and their clients, are seen as the most likely explanation. However, HIV prevalence is still high among sex workers: 29% in direct female sex workers or brothel-based sex workers (DFSWs) and 15% among indirect female sex workers (IDFSWs).<sup>2,3</sup>

So far, the National Center for HIV/AIDS, Dermatology and STDs (NCHADS) in Phnom Penh has conducted 5 rounds of behavioral sentinel surveillance (BSS) that have covered the 5 main provinces of the country.<sup>4</sup> Information on risk behaviors in most of the rest is, however, lacking. Mobility is assumed to increase risk, and areas with highly mobile populations have been identified for targeted HIV interventions.<sup>5–7</sup> The Community Action for Preventing HIV/AIDS Project established in Cambodia, Laos, and Vietnam late in 2001 identified 4 provinces in Cambodia (Svay Rieng, Prey Veng, Koh Kong, and Battambang) in which significant numbers were thought to migrate to either Phnom Penh, along the Cambodia–Thai border inside Thailand, or Vietnam. A behavioral survey was therefore conducted in these provinces in March 2002 to provide baseline information to both support a comprehensive set of HIV prevention activities in strategically important areas and groups and to strengthen the capacity of national and local HIV authorities and selected non-governmental organizations to develop community-based prevention and care programs. This study aims to investigate HIV risk behaviors among subpopulation groups; to study linkages to bridge populations, defined as men and women who have both commercial and noncommercial partners, which may include those who exchange sex for money but are not engaged in commercial sex as a full-time job; and to examine factors affecting such behaviors and links.

## METHODS

### Site Selection and Target Groups

The 4 provinces were selected as intervention sites due to their assumed high-risk situation and border proximity. In Cambodia there are 24 provinces/cities subdivided into 76 operational districts that cover health administration districts (Fig. 1). The interventions and survey were conducted in the



**FIGURE 1.** Map of Cambodia indicating the 4 provinces covered in this study.

following 6 operational districts: Svay Rieng, Prey Veng, Neak Loueng (Prey Veng), Smach Meanchey (Koh Kong), Sre Ambel (Koh Kong), and Sampeov Loun (Battambang). The following groups were included in the survey: household men and women, vocational students, casino workers, deminers, and fishermen. To be consistent with BSS surveys, sex workers, military, police, and mototaxi drivers from the provincial towns Svay Rieng, Prey Veng, and Smach Meanchey were also included in the survey. The survey protocol was accepted by the National Center for HIV/AIDS, Dermatology and STDs and Cambodia's Ministry of Health.

### Sampling

The sampling procedures applied were consistent with the national BSS. Cluster sampling with a take-all approach per cluster was used for DFSWs, IDFSWs, military personnel, policemen, deminers, fishermen, casino workers, and vocational students and time-location sampling was used for mototaxi drivers. Using randomly selected clusters of different sizes and taking all in selected clusters produces a self-weighted sample and was the approach used in the national BSS. Clusters for DFSWs were brothels; clusters for IDFSWs were beer companies or karaoke establishments that employed these women. Clusters for military, police, and deminers were units or battalions; for fishermen, fishing boats; for casino workers, units; and for students, classes. Street corners with heavy traffic such as those surrounding markets were used as clusters for mototaxi drivers. All clusters and number of individuals in each cluster were listed (sampling frames) by the Provincial AIDS Office of Svay Rieng, Prey Veng, Battambang, and Koh Kong. When sample size per province was lower than the sample required, a take-all approach was used.

Apart from the sampling described above, multistage cluster sampling was applied for Prey Veng, Svay Rieng, and Battambang provinces, where we targeted the general population at household level. Sampling frames of household populations under the operational district coverage were therefore

needed before fieldwork implementation. To determine the cluster numbers (villages) needed per site, we divided the total sample number by the number of expected men per household unit ( $211/38 = 6$  clusters of 25 households). For household women, the cluster numbers required per site were calculated by total sample size and divided by the number of women expected per household unit ( $140/25 = 6$  clusters of 25 households). We used probability proportional to size to select the 6 clusters needed per site. Twenty-five households were selected from a list, obtained from village chiefs and police posts, of all households in all selected villages. Systematic sampling was undertaken using a random start and sampling interval.

In each selected household, all eligible men and women were interviewed (a "take-all" approach). There was no replacement of households if no one was in. The inflation factor accounted for the number of expected men and women per household (38 men/25 households and 25 women/25 households) so that in households with  $>1$  man, all men were interviewed and those households with no available men were not replaced. The same procedure was applied for women. If eligible persons were absent, the interviewers made a maximum of 2 return visits to each house. A household record sheet was developed to identify the numbers of eligible men/women who were either interviewed, refused to answer questions, or not at home.

### Training and Data Collection

Data collection was conducted by trained interviewers from the Provincial AIDS Office and provincial health departments staff and supervised by a national supervisory team from the Surveillance and Research Unit/NCHADS. Eight participants (3 women and 5 men) from each provincial health department participated in a 3-day training course at NCHADS. Informed consent was obtained and participants were reassured about confidentiality and privacy. Refusal rates were 7% in female casino workers, 4% in mototaxi drivers, and  $<3\%$  in other groups.

### Data Analysis

Data was coded and entered into Excel. Stata 8.0 for windows (Stata Corporation, Lakeway Drive, TX) was used for data analysis.

A multivariate logistic regression model was used to examine factors associated with casual sex, ie, those reporting either sex with FSWs or noncommercial sex with girlfriends, among the different male groups (motodriver, military personnel, policemen, and men in the general population). Mobility was measured based on the question, "In the past 12 months, have you been away from your home for more than one month in total?" The logistic regression analysis was performed separately for the population groups and by taking into account the design effect of cluster sampling. Other male groups were excluded from this analysis because of either the small sample size or a low proportion reporting casual sex.

## RESULTS

The monitoring and evaluation system established within the program Community Action for Preventing HIV/AIDS

established a set of core outcome indicators to be measured. Tables 1 (male groups) and 2 (female groups) give the related findings from the baseline survey.

### Sexual Linkages and Condom Protection

The proportion of men buying sex differed sharply between the groups with mobile occupations (military, police and mototaxi drivers, casino workers) compared with the other groups surveyed. Sex with FSWs during the past 12 months was reported by 20% to 51% of the former groups and ≤10% among men in the general population, vocational students, and fishermen. Consistent condom use (defined as condom use every time in the past 3 months) with FSWs was about 90% in all groups except for fishermen. The 2 indicator questions to measure condom use with girlfriends showed significantly less consistent use. The proportion of men who had always used condoms in the past 3 months was below 40% in most groups.

Among DFSWs, 47% had lived >1 year in the city where they now worked and had, on average, 1.6 clients the last working day (data not shown). Condom use at last sex with a client was 92% (Table 2). Sex with boyfriends was reported by 48% and condom use was about 60%. Among the IDFSWs, ie, beer girls and karaoke workers, 37% reported commercial sex in the past 12 months and 54% had a boyfriend with whom 76% reported sex (data not shown). The pattern of condom use in this group was very similar to the DFSWs, ie, high when selling sex and less frequent with their boyfriends. Other

female groups did not report noncommercial sex but “had boyfriends” (4%–16%). A high proportion (41%) of married women in the general population were worried about being HIV infected by their husbands.

### Indicators of Condom Distribution, HIV Testing Services, STI Symptoms, and HIV-Related Knowledge

The proportion of people who agreed that “condoms are available in this area” was low in many groups, and as low as 16% in men in the general population (Tables 1 and 2). Only DFSWs reported high condom availability. Forty-nine percent of the DFSWs and 53% of the police had ever been tested for HIV, but only a small proportion received counseling prior to testing. HIV testing rates were low in the general population, and few of those tested received counseling.

High proportions of the different female groups reported abnormal vaginal discharge in the past year, whereas few men reported urethral discharge. Sources of initial treatment tended to be more in favor of medical settings (private clinics or public hospitals) among DFSWs, military, police, and mototaxi drivers (Tables 1 and 2). However, DFSWs reported higher usage of public services in comparison with others (75%).

The survey included a number of questions on HIV-related knowledge. In general, the level of knowledge was high. However, there were marked differences between groups, and this is captured in the findings on selected indicator

**TABLE 1.** Core Indicators and Their Values (in %) Among Groups of Men

Indicators	Motodriv- ers n = 455	Military n = 437	Police n = 422	Deminers n = 139	Casino Workers n = 73	Men in	Vocational Students n = 287	Fishermen n = 262
						General Population n = 618		
Sexual behaviors and protection								
Sex partners past year: % with ≥2	—	—	—	—	—	5	7	10
Sex partners past month: % with ≥2	9	9	9	9	13	1	1	2
Sex w/FSWs past year	20	22	23	30	51	5	8	10
Always condom use past 3 months when sex w/FSW	92	93	91	88	96	91	100	57
Have girlfriend past year	14	11	7	7	30	10	—	11
Sex w/girlfriend past 3 mo	—	—	—	—	—	7	1	9
Always use condom w/girlfriend 3 mo	60	69	37	—	20	20	33	17
Condom use last sex w/girlfriend	73	70	54	40	53	68	71	68
Condom availability								
Condoms are available in this area	52	65	65	27	62	16	48	26
HIV testing and counseling								
Tested for HIV ever	17	39	53	35	33	4	7	9
Counseled when HIV tested last time	9	8	18	11	23	1	2	4
STI symptoms and treatment								
Self-reported STD (urethral discharge)	4	6	5	3	1	1	1	1
Treated at the public or private clinic/hospital	56	56	68	67	100*	14	45	75
Knowledge								
Answered no to: Appearance tells if a person is HIV infected	89	87	91	92	67	89	96	63
HIV can be transmitted from mother to the unborn child	35	28	35	9	4	28	63	7
HIV can be transmitted through sharing syringes/needles	63	75	79	52	45	59	84	32

\*Only 1 case that reported treatment at a private clinic.

Dashes indicate missing values when information was not collected for the particular group.

**TABLE 2.** Core Indicators and Their Values (in %) Among Groups of Women

Indicators	Direct Female Sex Workers Total n = 274	Indirect Female Sex Workers Total n = 154	Casino Workers Total n = 72	Women in the General Population Total n = 433	Vocational Students Total n = 207
Sexual behaviors and protection					
Condom used w/customer past time	92	90	—	—	—
Condoms used always in past week w/customers	86	—	—	—	—
Have regular customers	60	—	—	—	—
Condoms used always in past month w/regular customers	87	—	—	—	—
Had boyfriend in past year	48	54	16	4	8
Condoms used always in past week w/boyfriend	63	56	—	—	—
Condoms used past time w/boyfriend	60	63	No sex	No sex	No sex
Sex for money in past year	—	37	0	—	—
Worried being infected by husband (among those married)	—	—	—	41	—
Condom availability					
Condoms available in this area	96	73	61	35	69
HIV testing and counseling					
Tested for HIV ever	49	59	23	5	5
Counseled when HIV tested	16	12	3	1	1
STI symptoms and treatment					
Self-reported STD (abnormal discharge)	66	44	24	29	4
Treated at the public or private clinic/hospital	75	46	35	46	63
Knowledge					
Answered no to: Appearance tells if a person is HIV infected	62	65	61	72	81
HIV can be transmitted from mother to unborn child	45	36	7	53	74
HIV can be transmitted through sharing syringes/needles	67	58	47	69	87

Dashes indicate missing values due to information not collected for that particular group.

questions shown in Tables 1 and 2. In particular, this was related to knowledge of mother-to-child transmission of HIV and whether HIV could be transmitted through sharing of syringes or needles.

### Distribution of and Factors Affecting Casual Sex

Analysis of the distribution of and factors affecting casual sex were restricted to motodriver, military, police, and men in the general population (Table 3). Overall, casual sex was more likely in young and unmarried men. Regardless of population groups, mobility defined as being away from home >1 month in total in the past year increased the likelihood of being involved in casual sex by a factor of 2. Under this definition, 12% to 25% of men in the groups examined were mobile. The impact of mobility was also supported by the geographic contrasts found; eg, lower levels of casual sex were reported in Svay Rieng province, where mobility was less compared with the other provinces. Being married appeared to be strongly protective against casual sex.

The association between educational attainment and casual sex was inconsistent across groups. Among men in the general population, there was a tendency toward a greater likelihood of casual sex among the higher educated groups, although the opposite trend was found in policemen (Table 3).

### DISCUSSION

Saphonn et al<sup>8</sup> have suggested that there has been a dramatic decline in HIV prevalence and HIV incidence in Cambodia because of intervention efforts. Initially, the main HIV transmission route was from FSWs to male clients. However, prevention efforts to reduce transmission related to sex work were very successful as evidenced by a dramatic increase in condom use and reduced proportions of men buying sex. Based on data from the national surveillance system and modeling approaches,<sup>3</sup> new transmissions are now more likely to occur both from husbands to wives or from men to other casual partners.<sup>9</sup> Our survey methodology was consistent with the national surveillance system, but the study was conducted in different geographic areas. Our findings support the assumption of very high consistent condom use in commercial sex as reported by men buying sex as well as by FSWs. However, condom use was still low among men involved in noncommercial sex and among sex workers when involved in noncommercial sex. Furthermore, condom availability seemed to be limited in many places.

Mobility and migration have been assumed to fuel the transmission of HIV, but there are relatively few studies documenting this.<sup>7,10-13</sup> In Zambia, HIV prevalence was increased in young men having recently migrated in, as compared with those migrating out, but there was no effect of

**TABLE 3.** Multivariate Analysis of Casual Sex Among Various Groups of Men\*

Population Group Variables	Motodrivers		Military		Police		Men in the General Population‡	
	%/n*	OR (95% CI)†	%/n*	OR (95% CI)†	%/n*	OR (95% CI)†	%/n*	OR (95% CI)
Age group								
15–24	40/114	1.2 (0.68–2.21)	—	—	—	—	10/124	1
25–29	26/91	1.1 (0.67–1.87)	—	—	—	—	20/124	0.3 (0.07–0.94)
30–49	22/250	1	—	—	—	—	7/368	0.9 (0.37–2.24)
20–29	—	—	50/70	1	37/35	1	—	—
30–39	—	—	27/227	0.4 (0.23–0.76)	24/254	0.6 (0.28–1.24)	—	—
40–49	—	—	14/140	0.2 (0.10–0.47)	27/133	0.6 (0.24–1.59)	—	—
Marital status								
Not married	50/100	1	43/145	1	47/73	1	20/227	1
Married	21/354	0.3 (0.16–0.45)	19/289	0.4 (0.21–0.65)	22/349	0.4 (0.23–0.86)	5/391	0.1 (0.05–0.24)
Years in school								
0–6	28/142	1	23/183	1	30/70	1	8/333	1
7–8	25/174	0.8 (0.47–1.35)	28/130	1.2 (0.68–2.14)	24/175	0.5 (0.19–1.24)	12/155	1.7 (0.81–3.55)
≥9	30/138	0.9 (0.54–1.34)	32/124	1.2 (0.70–2.08)	27/177	0.6 (0.23–1.39)	17/127	1.3 (0.40–4.11)
Mobility								
Not mobile	24/370	1	23/354	1	22/313	1	9/546	1
Mobile	41/84	2.2 (1.22–3.81)	42/77	2.0 (1.16–3.47)	38/106	1.6 (0.94–2.86)	20/72	2.8 (1.02–7.82)
Province								
Battambang§	—	—	—	—	—	—	6/191	1.6 (0.63–4.35)
Prey Veng	39/150	3.4 (2.02–5.65)	22/136	0.4 (0.17–0.85)	26/155	2.2 (1.17–4.30)	21/210	7.1 (3.38–14.97)
Koh Kong	28/151	1.7 (0.91–3.04)	36/148	0.8 (0.43–1.57)	45/119	5.7 (3.20–10.03)	—	—
Svay Rieng	15/154	1	22/153	1	12/148	1	4/217	1
Total	27/455	—	27/437	—	26/422	—	11/618	—

\*% reported sex with either FSWs or noncommercial sex during the past 12 mo.  
 †Adjusted for all variables in the model.  
 ‡Age groups used for this population group was: 15–19, 20–24, and with ≥25 years as reference.  
 §Data recently collected in Battambang for BSS 2001 so not done again.  
 ||No household data collected in Koh Kong.

mobility among young women.<sup>12</sup> We found mobility to significantly increase the likelihood of casual sex among men, a finding that was consistent across groups, ie, about a 2 times higher likelihood of casual sex. Mobility in our study was defined with 1 question (been away from home ≥1 month in the past year). This is a limitation that is likely to represent an underestimation of the effect. Both the household male survey conducted in 2002 by NCHADS and another study in Banteay Meanchey Province, Cambodia, have shown clearly an association between travel and the demand for commercial sex.<sup>14,15</sup> In our study, there were also other indications on how mobility affects risk behaviors. A majority of the sex workers seemed to be mobile, ie, >50% originated from other provinces and had worked in that particular city for <1 year. Findings from a previous study suggested that mobility of sex workers might play an important role in the spread of STIs and HIV in Cambodia<sup>16</sup>: sex workers may begin their career in cities and then relocate to rural areas after being infected by STIs or HIV.

Fishermen in this region have been found to be at high risk of HIV.<sup>5,7</sup> The recent study on fishermen in Sihanouk Ville, located in the coastal area not far from the fishermen population in this survey, showed an HIV prevalence of 16% and a high level of risk behavior among fishermen, with both about 54% reporting sex with FSWs in the past 3 months and a low level of consistent condom use. By contrast, the fishermen

in our survey reported more modest risk behavior, with only 10% buying sex in the past year. An explanation for this striking difference is complex, although one likely explanation is that fishermen in Sihanouk Ville spent more time away from their villages.

Findings from a randomized trial in 3 counties in sub-Saharan Africa supported the efficacy of voluntary HIV testing and counseling (VCT) to reduce risk behaviors in the short term.<sup>17</sup> Furthermore, cost-effectiveness estimates from African settings have shown VCT to compare favorably with other preventive intervention,<sup>18</sup> but use of VCT has been hampered by acceptability barriers rooted in worries about privacy.<sup>19</sup> We found that a relatively high proportion of men in mobile occupations and FSWs had ever been tested for HIV, but the proportion having received counseling was very low for most groups. Most HIV testing in Cambodia is still done at private laboratories or clinics. However, VCT has now been established and expanded as a standard service and our findings indicate an urgent need to promote VCT services that can serve as entry points to HIV prevention and care.

Studies from sub-Saharan Africa have shown a positive association between educational attainment and HIV prevalence, ie, a higher risk of infection in the more educated. However, some studies conducted in mature epidemics have reported a shift toward reduced risk differentials and that of

a negative association in younger age groups,<sup>12,20</sup> although in our study, casual sex was more likely in young, unmarried men. Similar differential changes have been observed in risk behaviors; ie, the most favorable changes in risk have been observed among groups with higher education.<sup>12</sup> However, in a population-based survey in Cambodia, HIV prevalence was not found to differ significantly by educational attainment.<sup>21</sup> In our study the likelihood of casual sex in men in the general population tended to be highest among the more educated, although this was not the case in policemen.

Although self-reported STI symptoms are not particularly useful indicators for estimating STI prevalence, they can be a useful indicator in men in assessing health-seeking behavior in those with a recent STI. The low numbers of self-reported urethral discharge among male groups in this survey were consistent with those reporting high levels of condom use with FSWs. Our findings reinforce those of both the national BSS that showed a continued year-by-year increase in consistent condom use between 1997–2003 and a decline of commercial sex partners in the past year in mototaxi drivers, military, and police, 3 of the most important bridging populations, and the reduced STD prevalence found in 2001.<sup>4,22</sup> However, a higher proportion of women surveyed reported abnormal vaginal discharge even in low-risk groups, eg, casino workers and antenatal clinic attenders. Clearly, vaginal discharge is not as good an indicator of recent STI among women as urethral discharge is among men. Qualitative studies should be done to examine other noninfective factors that may lead Cambodian women in the general population to complain of vaginal discharge in the absence of STIs.

In conclusion, this project includes actions on several fronts, including behavior change communication, condom promotion, targeted STI services for FSWs,<sup>23</sup> and VCT services. In addition it is extending support and care services to apply the concept of continuum of care, linking VCT, institutional care, home-based care, and local support groups. The project intends to document changes in transmission and risk behaviors in subpopulation groups and relate this to information on “what was implemented.”

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