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SOCIOLOGY | RESEARCH ARTICLE

HIV risk-related sexual behavior by cohabiting partner status among factory workers: Results from the 2015 Bangkok behavioral surveillance survey (BSS)

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Abstract: This study aimed to determine the prevalence of HIV risk-related sexual behaviors in the past 12 months and their related factors by cohabiting partner status among factory workers in Bangkok, one of the higher AIDS disease-burden provinces. The study found that one in five factory workers engaged in at least one of three HIV risk-related sexual behaviors, including ever-sex and unprotected-sex with a non-regular partner and multiple sexual partners. Those without a cohabiting partner (52%) were 4-fold greater than those with a cohabiting partner (13%). Factors associated with sexual risk behavior include being male, being younger, and having had HIV risk-related sexual behavior at first sex, regardless of cohabiting partner status (despite positive association with frequent alcohol consumption for those without a cohabiting partner). These findings imply the need for promotion of condom use in all episodes of sex with a potentially risk partner, reduction of non-regular partner sex and provision of education for safe sex for Bangkok factory workers.

Subjects: Social Sciences; Behavioral Sciences; Public Health Policy and Practice

Keywords: factory worker; condom use; multiple sex partners; non-regular sex partner

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PUBLIC INTEREST STATEMENT

Despite great success in reduction of new HIV infections in Thailand, the risk of HIV infection via heterosexual intercourse still remains high due to sex with multiple, non-marital partners, and unprotected sex with higher-risk groups who serve as a transmission bridge to the general population. It can be postulated that sexually-active individuals have different sexual behaviors according to cohabiting partner status. Therefore, this study aimed to measure the prevalence of HIV risk-related sexual behaviors, and to explore what factors are related to the risk behaviors by cohabiting partner status among factory workers in Bangkok, one of the higher AIDS disease-burden provinces in Thailand. This study concludes that one in five factory workers engaged in at least one of three HIV risk behaviors. Those without a cohabiting partner were 4-fold greater than those with a cohabiting partner.

1. Introduction

In the 1990s, Thailand recorded one of the highest adult HIV prevalence rates in Southeast Asia (UNAIDS, 2011). But Thailand has achieved great success in reduction of new HIV infections (by two-thirds during 2000–2014) (Thai National AIDS Committee, 2015) through nationwide promotion of 100% condom use in commercial sex, starting in 1992 (Rojanapithayakorn, 2006). Despite significant progress, the country is at risk of a resurgence of HIV cases given increasing trends in risk behavior among key vulnerable populations such as sex workers and their clients, men who have sex with men (MSM), and people who inject drugs (PWID) (Coates, Richter, & Caceres, 2008; Thai National AIDS Committee, 2015; UNAIDS, 2011). Accordingly, increased attention of evaluation and prevention programs is being given to the high-risk groups.

Nevertheless, heterosexual intercourse still accounts for the vast majority of HIV infections in adults in Thailand (Junge, Revilla Diez, & Schätzl, 2015). The risk of HIV infection via heterosexual intercourse arises from non-marital sex, multiple sex partners, and unprotected sex with higher-risk groups who serve as a transmission bridge to the general population. The risk of HIV infection has been increasingly observed among the general population (Lansky, Drake, DiNenno, & Lee, 2007), particularly in urban settings like Bangkok (UNAIDS, 2014). A quarter of new infections were among women in 2014 (Thai National AIDS Committee, 2015; Thepthien, Srivanichakorn, & Chucharoen, 2014), the majority of whom were infected through intercourse with their regular partner. Moreover, HIV risk for the general population in the reproductive age group has not changed significantly in recent years (Thai National AIDS Committee, 2015). According to the Thailand AIDS Response progress report 2015 (Thai National AIDS Committee, 2015), factory workers who had more than one concurrent sex partner remained 15–20% for men and 5% for women and, what is more, one-half of males and one-third of females reported that they used condoms in these relationships in 2014. These findings suggest that HIV risk-related sexual behavior remains relatively high in the sexually-active general population. Nevertheless, studies on the prevalence of HIV among a representative sample of the general population are still rare, due to the cost and complexity of such studies. In a concentrated epidemic, general population data play a small but important role in monitoring the potential spread of infection more broadly, particularly given increases in HIV transmission through heterosexual contact (Wiwattanacheewin, Sindhu, Teitelman, Maneesriwongul, & Viwatwongkasem, 2015).

Rapid spread of HIV still has the potential to ravage the work force, with huge negative impact on society if no effective HIV prevention and intervention activities are taken in the general population. The impact of HIV on employees in the workplace has certain features in common with this dark scenario (Brown & Peerapatanapokin, 2004). When HIV morbidity begins, sick leave and other forms of absenteeism increase, the overall productivity of the workforce declines due to employee illness, the overall labor costs increase, overtime pay and contractors' wages increase to compensate for absenteeism, and the increased use of medical insurance benefits causes premiums to rise (Knodel & VanLandingham, 2003). A large number of workplace HIV programs which implement a variety of interventions are rarely evaluated to determine their effectiveness (Franklyn, 2002). As HIV prevention is still under-resourced in the country, more prevention efforts must keep pace to reach the national target to reduce new HIV infections by two-thirds, according to the Thailand National Strategic Plan of HIV (2014–16) (Thai National AIDS Committee, 2015).

Although the role of marital status shows mixed results between studies, it can be postulated that sexually-active individuals have different sexual behaviors according to cohabiting partner status. Those without a cohabiting partner may be more likely to have multiple sex partners and engage in higher-risk sex with a non-marital/cohabiting sex partner, compared to those with a cohabiting partner. These risk behaviors may be associated with different condom use behaviors by cohabiting partner status. In addition, there are urban-rural migrants in Bangkok, who may have more opportunity for sexual risk (Hu, Liu, Li, Stanton, & Chen, 2006; Ishtiaque & Ullah, 2013), particularly those who live alone. Yet, it remains unclear whether the HIV risk-related sexual behaviors are different according to cohabiting partner status. In addition, different levels of risk behavior could be due to

differences in personal, economic, and behavioral factors by cohabiting partner status. Therefore, this study aimed to measure the prevalence of sexual risk behaviors, and to explore what factors are related to the risk behaviors by cohabiting partner status using data from a recent round of the HIV Behavioral Surveillance Survey (BSS) among factory workers in Bangkok, one of the higher AIDS disease-burden provinces in Thailand (Thai National AIDS Committee, 2015; UNAIDS, 2015b).

2. Materials and methods

2.1. Study design, setting and population

The data in this study are drawn from the 2015 Bangkok BSS. The Bangkok BSS is a series of repeated cross-sectional surveys which has been conducted to monitor changes in HIV/STD risk behaviors since 2002. The BSS applies guidelines to provide a standardized methodology using generic questionnaires that are adapted to the local context (Amon et al., 2000). The BSS has been conducted by the ASEAN Institute for Health Development (AIHD), Mahidol University in collaboration with the AIDS, TB and STI Division of the Bangkok Metropolitan Administration (Thepthien et al., 2014). Based on the findings of the previous BSS round, the sample size for the factory worker group was calculated, and the design effect and power were considered in estimating the sample size for each corresponding target group according to guidelines for the BSS (Amon et al., 2000). In 2012, there were 1,173 worksites in Bangkok which had over 200 factory workers each (Ministry of information & communication technology, National Statistic office, 2012). Bangkok has six cluster zones, namely Central Bangkok, Southern Bangkok, Northern Bangkok, Eastern Bangkok, Northern Thonburi, and Southern Thonburi. Six factories were randomly selected from each of the six cluster zones (Ministry of information & communication technology, National Statistic office, 2012). A total of 1,500 factory workers from 36 factories were randomly selected in proportion to factory size in each zone using the Thailand Standard Classification Census data for 2012. In order to accurately determine the sex behaviors according to cohabiting partner status, we excluded subjects who had never been sexually active ($n = 268$).

2.2. Data collection procedure

The BSS used highly supervised data collection and data handling procedures that followed manuals of the Guidelines for Conducting HIV/AIDS Risk Behavioral Surveillance Surveys (Amon et al., 2000). During June to August 2015, the researcher introduced the study team to the factory representative and clearly explained the objectives of the survey, what the information would be used for, that the survey is anonymous, that participants' confidentiality would be protected, and that the questionnaire would take 20–30 min to fill out. The researcher then asked for permission from the head of the factory to conduct data collection. Some factories declined to participate in the survey, and the researcher reviewed data on participating and non-participating factories to assess whether they had significantly different characteristics. Once the factory agreed to participate, the team leader worked with the head of the factory to prepare a list of all factory members by name, age, and sex. The factory worker refusal rate to participate was about 1–2%, with the most common reason being lack of time. After the questionnaires were completed, the researcher checked the forms to make sure that the questionnaires had been filled out completely, that there were no mistakes in skip patterns, that the answers were consistent, and that the answers were recorded legibly in the boxes provided. If the questionnaire was not correct or complete, the researcher returned to the respondent to complete it.

2.3. Data collection

The BSS uses a standardized questionnaire which is tailored to the local context based on consultation with technical experts. All the questions were closed-ended with options provided. The questionnaires were translated and back-translated between Thai and English to ensure consistency, and were field tested before use. The core questionnaire was designed to measure the key indicators of HIV risk as well as provide the data necessary for developing interventions in response to the findings. The questionnaire is composed of a series of questions on socio-demographic characteristics, sexual activity, regular sex partners, casual sex partners, transactional sex partners, condom use,

STI, knowledge/opinions/attitudes towards HIV, exposure and access to interventions and alcohol/drug use.

Respondents who responded affirmatively to “have you ever had sex?” were asked about gender and types of sex partner, and condom use at the first sex. They were then asked “have you had sex last 12 months?” and those responding “yes” were asked about the number of sex partners during the last 12 months. Additional questions regarding sex behavior during the last 12 months asked about the number of sex partners, and use of condoms (always, sometimes, never). The type of sex partner was categorized by lover (including husband or boy/girlfriend), non-regular partner (neither sex worker nor a lover), sex worker, and paid/paying partner. Regarding alcohol use, the response options were never, experimentally, occasionally, sometimes, and regularly. Those responding “sometimes” or “regularly” were grouped as frequent users of alcohol.

Although behaviors in the past year are not necessarily predictive of lifetime risk of acquiring HIV infection, the past-year data are relevant for planning purposes and useful for tracking trends in behavior (Slaymaker, 2004). Sexual risk behaviors in the prior 12 months were employed as the outcome variables. The first two outcome variables were chosen in accordance with Global AIDS Response Progress (GARP) indicators used to track reduction in sexual transmission of HIV (Thai National AIDS Committee, 2015): (i) Had sex with a non-regular partner in the past year. Non-regular partner was classified as non-marital or non-cohabiting partner. Thus, this category comprises sex workers, MSM and non-regular partner, such as single-episode relationships and other short-term relationships; (ii) Irregular condom use at sex with a non-regular partner in the past year. Among those reporting sex with a non-regular partner in the past year, those reporting either no or sometimes condom use were defined as non-regular users of condoms with any non-regular sex partner; (iii) Having multiple sex partners in the past year. Those reporting two or more sexual partners during the past year were classified as those having multiple partners. Finally, a composite measure of these factors was created by summing their values, since these interact to produce a different risk profile for each person (Slaymaker, 2004). The composite score ranges from 0 to 3, and having a score of 1 or more indicates engaging in at least one risk-taking behavior. Those with a score of 0 were defined as those having no risk-taking behavior (Table 1).

2.4. Data analysis

The proportions for the factors related to general characteristics and sexual behaviors were calculated and compared using the χ^2 test for categorical variables according to cohabiting partner status. In order to examine the effects of independent factors on HIV risk-related sexual behaviors and the composite measure in the last 12 months, logistic regression was employed to determine factors associated with a composite score of ≥ 1 . Meanwhile, non-regular condom use with a non-regular partner in the past year was not assessed in the logistic regression analysis due to the small number of respondents with values for the outcome variable. This analysis was limited to persons

Table 1. Construct of the composite score of the three HIV risk-related sexual behaviors

HIV risk-related sexual behaviors	Criteria		Status of engaging in HIV risk-related behaviors
Had sex with a non-regular partner [†]	No (coded as 0)	Yes (coded as 1)	If 1 or more, then engaging in HIV risk-related behavior; If 0, then no HIV risk-related behavior
Irregular condom use at sex with a non-regular partner [†]	Always use (coded as 0)	Sometimes or never use (coded as 1)	
Had multiple sex partners	1 partner (coded as 0)	≥ 2 partners (coded as 1)	
Total score	0 to 3		

Note: This analysis was limited to persons who were sexually active in the 12 months prior to the survey.

[†]The two indicators were chosen in accordance with Global AIDS Response Progress (GARP) indicators used to track reduction in sexual transmission of HIV (Thai National AIDS Committee, 2015).

who were sexually active in the past 12 months. All analyses were conducted using the SAS statistical software package version 9.4 (SAS Institute Inc., Cary, NC, USA).

2.5. Ethical considerations

The BSS was reviewed and approved by the Ethical Review Committee for Research in Human Subjects, Mahidol University, Thailand (2015/436.2311). Each potential participant was given an information sheet that described the objectives, methodology and advantages of the study to read before deciding whether to participate. Written informed consent was obtained from all participants.

3. Results

3.1. Socio-demographic and sexual characteristics

Table 2 presents the general characteristics of the participants. Almost half were male and 35 years of age or older. Around 40% had secondary school or lower education and lower monthly income (<10,000 baht), and frequent alcohol use (sometimes or always). In terms of sexual characteristics, around 90% had had sex with a different-sex partner or lover, and a two-thirds (66%) did not use a condom at first sex. A majority of factory workers (85%) had ever sex with one partner during the last 12 months. Those having sex with non-regular partners was 11.8% and over half (55%) reported no regular condom use.

3.2. Characteristics by cohabiting partner status

Those with or without cohabiting partners were 77 and 23%, respectively. Those without cohabiting partners were more likely to be male and younger. Regarding sexual behavior at first sex, overall, those having high-risk sex was 6% with sex with a same-sex partner, and 10% with a non-regular partner; only one-third (34%) reported use of condoms at first sex (Table 2). Those without a cohabiting partner reported more high-risk sex compared to those with a cohabiting partner ($p < 0.05$).

In terms of sexual behavior in the past year, those who had sex account for 84%, and the proportion was significantly higher for those with a cohabiting partner (94%) than those without a cohabiting partner (53%). The number of sex partners in the past year was 1.4 on average, and those without a cohabiting partner had almost twice the number of partners than those with a cohabiting partner. Those with a cohabiting partner had a higher proportion reporting sex with a regular partner and a lower proportion of sex with a sex worker, MSM, or paying/paid partner ($p < 0.0001$). The proportion reporting inconsistent (not always) condom use with a sex worker was distinctly higher in those without a cohabiting partner (38%) than their counterparts (8%) ($p < 0.05$).

3.3. Scores of the composite measure

Table 3 shows the proportions of the three sexual risk behaviors in the last 12 months. Those having sex with multiple sex partners and with a non-regular partner were 16 and 14%, respectively. Those without a cohabiting partner had 4–5 times higher level of these two risk behaviors (around 44% for each), compared to their counterparts (9 and 11%, respectively). Of those reporting sex with a non-regular partner, 52% reported inconsistent condom use, and there was no significant difference by cohabiting partner status. In the analysis of the composite risk measure, those engaging in one or more unprotected sexual risk behaviors was 19% and those with three risk behaviors was 6%. These values were around four times higher in those without a cohabiting partner than those with a cohabiting partner.

3.4. Risk factors

Factors related to HIV risk-related sexual behavior in the last 12 months using the logistic regression analysis are presented in Table 4. Factors associated with having sex with a non-regular partner in the past year for those members of the sample without a cohabiting partner include being male, having first sex with a non-regular partner, and no condom use. The risk factors for those living with their partner include being male and having higher education. Regarding intercourse with multiple

Table 2. Participants' characteristics by cohabiting partner status among factory workers in Bangkok

	Total	Without cohabiting partner [†]	With cohabiting partner [‡]	
	n (%)	n (%)	n (%)	
<i>Socio-demographic factors</i>				
Sex (male)	656 (53.3)	174 (61.5)	482 (50.8)	**
<i>Age groups (year)</i>				
<25	160 (13.0)	46 (16.3)	114 (12.0)	**
25–34	482 (39.1)	127 (44.9)	355 (37.4)	
≥35	590 (47.9)	110 (38.9)	480 (50.6)	
<i>Marital status</i>				
No partner	82 (6.7)	82 (29.0)	–	
Separate	136 (11.0)	136 (48.1)	–	
Living together	171 (13.9)	–	171 (18.0)	
Married	778 (63.2)		778 (82.0)	
Divorced	38 (3.1)	38 (13.4)	–	
Widowed	27 (2.2)	27 (9.5)	–	
<i>Highest level of education attained</i>				
Secondary school or less	469 (38.1)	97 (34.3)	372 (39.2)	NS
High school	357 (29.0)	93 (32.9)	264 (27.8)	
College or higher	406 (33.0)	93 (32.9)	313 (33.0)	
<i>Income (Thai baht)</i>				
<10,000 [§]	461 (37.4)	112 (39.6)	349 (36.8)	NS
10,000–20,000	569 (46.2)	136 (48.1)	433 (45.6)	
>20,000	202 (16.4)	35 (12.4)	167 (17.6)	
<i>Alcohol consumption</i>				
Never	436 (35.4)	84 (29.7)	352 (37.1)	NS
Experimental	16 (1.3)	4 (1.4)	12 (1.3)	
Infrequently	259 (21.0)	67 (23.7)	192 (20.3)	
Sometimes	422 (34.3)	102 (36.0)	320 (33.8)	
Regularly	98 (8.0)	26 (9.2)	72 (7.6)	
<i>Sexual behavior at first sex</i>				
<i>Gender of sex partner</i>				
Different gender	1,161 (94.2)	259 (91.5)	902 (95.1)	*
Same gender/Lady boy/ Others	71 (5.8)	24 (8.5)	47 (5.0)	
<i>Type of sex partner</i>				
Lover	1,110 (90.1)	239 (84.5)	871 (91.8)	***
Sex worker	41 (3.3)	17 (6.0)	24 (2.5)	
Other	81 (6.6)	27 (9.5)	54 (5.7)	
<i>Condom use</i>				
Use	420 (34.1)	108 (38.2)	312 (32.9)	NS
No use/Not necessary	812 (65.9)	175 (61.8)	637 (67.1)	

(Continued)

Table 2. (Continued)

	Total	Without cohabiting partner [†]	With cohabiting partner [‡]	
	n (%)	n (%)	n (%)	
<i>Sexual behaviors in past 12 months</i>				
Last year had sex (yes)	1,041 (84.5)	149 (52.7)	892 (94.0)	***
Number of sex partners				
1	866 (84.1)	84 (56.4)	782 (88.8)	***
≥2	164 (15.9)	65 (43.6)	99 (11.2)	
Last year had sex with:				
Spouse or girl/boy friend	1,009 (96.9)	119 (79.9)	890 (99.8)	***
Non-regular partner	123 (11.8)	57 (38.3)	66 (7.4)	***
Sex worker	37 (6.5)	24 (21.6)	13 (2.8)	***
Men	18 (3.1)	10 (9.0)	8 (1.7)	***
To get money	10 (1.0)	3 (2.0)	7 (0.8)	NS
Condom use (Not always)				
Spouse or girl/boy friend	852 (84.4)	90 (75.6)	762 (85.6)	**
Non-regular partner	68 (55.3)	30 (52.6)	38 (57.6)	NS
Sex worker	10 (27.0)	9 (37.5)	1 (7.7)	NS
Men	12 (66.7)	6 (60.0)	6 (75.0)	NS

Note: NS = Not significant.

[†]Single/separate/divorced/widowed.

[‡]Married or cohabitant.

[§]Average currency exchange rate between Baht and US\$ is 1US\$ = 35 Baht.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 3. Construct of the composite score of the three HIV risk-related sexual behaviors and the prevalence by cohabitating partner status

	Sex with a non-regular partner [†]	Irregular condom use [‡]	Multiple sex partners	Total score (0–3)			
	No (0); Yes (1)	Always (0); Sometimes/never (1)	1 (0); ≥2 (1)	0	1	2	3
Total (%)	13.7	52.5	15.9	81.3	6.3	6.8	5.6
Without cohabitating partner (%)	43.0	46.9	43.6	47.7	14.8	20.8	16.8
With cohabitating partner (%)	8.9	57.0	11.2	86.9	4.9	4.5	3.7

Note: This analysis was limited to persons who were sexually active in the 12 months prior to the survey.

[†]The two indicators were chosen in accordance with Global AIDS Response Progress (GARP) indicators used to track reduction in sexual transmission of HIV (Thai National AIDS Committee, 2015).

Table 4. Factors associated with three HIV risk-related sexual behaviors and its composite measure among a sample of factory workers in Bangkok

	Without cohabiting partner [†]						With cohabiting partner [†]					
	Had sex with a non-regular partner		Multiple sex partners (≥2)		Composite measure (total score ≥1)		Had sex with a non-regular partner		Multiple sex partners (≥2)		Composite measure (total score ≥1)	
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI
<i>Socio-demographic factors</i>												
Sex (male)	10.4***	(2.94, 37.1)	4.67**	(1.74, 12.6)	6.41***	(2.70, 15.2)	3.79***	(2.05, 7.01)	5.37***	(2.92, 9.86)	4.25***	(2.53, 7.12)
<i>Age groups (year)</i>												
≥35	1.00		1.00		1.00		1.00		1.00		1.00	
25-34	1.52	(0.58, 3.97)	0.87	(0.36, 2.10)	1.86	(0.89, 3.90)	1.10	(0.65, 1.89)	0.99	(0.59, 1.66)	1.25	(0.78, 1.99)
<25	1.11	(0.34, 3.63)	1.79	(0.62, 5.18)	3.39*	(1.33, 8.67)	1.54	(0.72, 3.29)	2.46**	(1.26, 4.81)	2.14*	(1.14, 4.05)
<i>Education level</i>												
Secondary school or less	1.00		1.00		1.00		1.00		1.00		1.00	
High school	0.84	(0.31, 2.31)	1.73	(0.69, 4.39)	1.39	(0.62, 3.12)	1.24	(0.65, 2.36)	1.07	(0.61, 1.90)	0.92	(0.54, 1.57)
College or higher	0.67	(0.21, 2.16)	1.08	(0.36, 3.18)	1.05	(0.40, 2.71)	2.32*	(1.21, 4.45)	1.62	(0.89, 2.97)	1.67	(0.96, 2.93)
<i>Income</i>												
<10,000*	1.00		1.00		1.00		1.00		1.00		1.00	
10,000-20,000	1.20	(0.46, 3.13)	1.34	(0.55, 3.25)	1.02	(0.47, 2.21)	0.71	(0.39, 1.28)	0.73	(0.43, 1.25)	0.62	(0.38, 1.02)
>20,000	2.74	(0.53, 14.0)	3.68	(0.82, 16.5)	1.50	(0.47, 4.80)	0.78	(0.35, 1.72)	0.72	(0.34, 1.55)	0.69	(0.34, 1.38)
<i>Alcohol consumption</i>												
Never/occasionally	1.00		1.00		1.00		1.00		1.00		1.00	
Some-times/always	1.25	(0.55, 2.85)	1.34	(0.63, 2.85)	2.72**	(1.43, 5.20)	1.60	(0.96, 2.67)	1.32	(0.83, 2.12)	1.45	(0.94, 2.24)
<i>Sexual experience at first sex</i>												
<i>Gender of sex partner</i>												
Different gender	1.00		1.00		1.00		1.00		1.00		1.00	
Same gender	2.37	(0.61, 9.16)	3.09	(0.93, 10.2)	3.42*	(1.17, 10.0)	1.42	(0.46, 4.37)	2.83*	(1.09, 7.32)	1.86	(0.75, 4.59)

(Continued)

Table 4. (Continued)

	Without cohabiting partner [†]				With cohabiting partner [‡]					
	Had sex with a non-regular partner	Multiple sex partners (≥2)	Composite measure (total score ≥1)	Had sex with a non-regular partner	Multiple sex partners (≥2)	Composite measure (total score ≥1)	Had sex with a non-regular partner	Multiple sex partners (≥2)	Composite measure (total score ≥1)	
	aOR	aOR	aOR	aOR	aOR	aOR	aOR	aOR	aOR	
Type of sex partner										
Lover	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Sex worker/other	5.33**	(1.92, 14.8)	2.15	(0.88, 5.25)	6.60***	(2.90, 15.0)	1.87	(0.95, 3.67)	2.63**	(1.44, 4.80)
Condom use										
Use	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
No use/Not necessary	2.64*	(1.08, 6.43)	2.23*	(1.00, 4.95)	2.04*	(1.03, 4.04)	1.40	(0.83, 2.38)	1.91*	(1.14, 3.20)

[†]Single/separate/divorced/widowed.

[‡]Married or cohabitant.

[§]Average currency between 1US\$ and Thai baht is 1US\$ = 35 Thai baht.

**p* < 0.05.

***p* < 0.01.

****p* < 0.001.

sex partners in the past year, those without a cohabiting partner were more likely to be male and used condoms at first sex. For those living with their partner, risk for sex with multiple partners in the past year include being male, younger, and having had higher-risk sexual experience at first sex. Using the composite measure, having at least one HIV risk-related sex act last year was associated with being male (aOR = 6.41, 95% CI = 2.70–15.2), being younger (aOR = 3.39, 95% CI = 1.33–8.67), having higher-risk sex at first sex (aOR = 3.42, 95% CI = 1.17–10.0, when with a same-sex partner, aOR = 6.60, 95% CI = 2.90–15.0, when with a non-regular partner, and aOR = 2.04, 95% CI = 1.03–4.04, when no condoms were used), and frequent alcohol use (aOR = 2.72, 95% CI = 1.43–5.20) among those without a cohabiting partner. For those with a cohabiting partner, being male (aOR = 4.25, 95% CI = 2.53–7.12), being younger (aOR = 2.14, 95% CI = 1.14–4.05), and having had a HIV risk-related first-sex experience, such as sex with a non-regular partner (aOR = 2.24, 95% CI = 1.26–3.99) or non-condom use (aOR = 1.68, 95% CI = 1.06–2.67) were associated with a higher composite risk score.

5. Discussion

The findings show that about 15% of factory workers in the 2015 BSS reported sexual experience with a non-regular sex partner and multiple sex partners. Those HIV risk-related sexual behaviors were much higher in those without a cohabiting partner. Furthermore, half of those having a non-regular sex partner reported inconsistent (i.e. not always) condom use. Those engaging in at least one HIV risk-related sexual behavior in the past year account for 19% of the sample, and the proportion for those without a cohabiting partner was double that for those with a cohabiting partner. Factors associated with sexual risk behavior include being male, being younger, and having had HIV risk-related sexual behavior at first sex, regardless of cohabiting partner status (although frequent alcohol consumption was associated with risk for those without a cohabiting partner). These findings imply the need for promotion of condom use for all episodes with a potentially-risky sex partner, reduction of non-regular partner sex and creating a supportive environment for safe sex for Bangkok factory workers.

Many factory workers in the Bangkok survey came from other provinces to seek higher-paying work (Amare, Hohfeld, Jitsuchon, & Waibel, 2012; Reda, Hohfeld, Jitsuchon, & Waibel, 2012). Living away from the home community may present more opportunities for sexual risk (Hu et al., 2006; Ishtiaque & Ullah, 2013). Historically, reduction in sex with sex workers and increased use of condoms in commercial sex were primarily responsible for the significant declines in HIV incidence in Thailand (Nelson et al., 1996). Our study found that 15% of the sample of factory workers reported sexual intercourse with a non-regular partner or multiple partners in the past year, and significantly more persons without a cohabiting partner reported these behaviors than those with a cohabiting partner (52 and 13%, respectively). Being male and younger were significant predictors of sexual risk among the sample, and this finding is consistent with other studies (Abdulkader, Goswami, Rai, Misra, & Kant, 2015; Deb et al., 2009; Gálvez-Buccollini, DeLea, Herrera, Gilman, & Paz-Soldan, 2009). A Thai study on attitudes and behavior regarding sexual intercourse among Thai adolescents found that pre-marital sex is becoming more common in Thai society (Tangmunkongvorakul et al., 2014). Thus, new programs are needed which reflect the changing cultural and social norms (Gálvez-Buccollini et al., 2009), and the interventions should begin early in adolescence, and target boys in particular.

At the end of 2014 in an effort to stem the HIV epidemic in Thailand, the “Aligning Care and Prevention of HIV/AIDS with Government Decentralization to Achieve Coverage and Impact” (ACHIEVED) project was launched. This was a national HIV prevention program for young people, funded by the Global Fund against AIDS, TB and Malaria (UNAIDS, 2015a). The program aimed to reduce the number of new HIV infections and STI among young people, as well as to reduce unwanted pregnancy and HIV-related risk behavior. ACHIEVED combined a sustained multi-media awareness and education campaign with a nationwide program of youth-friendly sexual health and outreach services. An evaluation of ACHIEVED found that, overall, youth had good knowledge of condoms, but did not show improved HIV knowledge levels (before and after the program)

(UNAIDS, 2015a). Compared to youth in the community and the school, youth in factories had lower condom use for all episodes of sex in the past year with a non-regular partner (25%) (UNAIDS, 2015a). That finding points to the need for targeted and intensified interventions, particularly in young factory workers.

In our study, higher educational attainment was found to be a predictor of having sex with a non-regular partner among those with a cohabiting partner, and that finding is different from other studies which found either an inverse association (Abdulkader et al., 2015) or no association (Deb et al., 2009; Gálvez-Buccollini et al., 2009; Sivaram et al., 2008) between educational attainment and sexual risk. However, a study conducted among adults in Botswana found that individuals who had primary or secondary education were less likely to have multiple, concurrent sexual partners compared to those with higher education.

Our study found that sexual behavior at first sex was predictive of risk later in life, regardless of cohabiting partner status. A Vietnamese study of women using the Multiple Indicator Cluster Survey 2011 had similar findings to our study in that there was a positive association between early debut of sexual intercourse and lifetime prevalence of multiple-partner sex (Son et al., 2016). These findings are consistent with a longitudinal study that found that delinquent youth who had engaged in ten or more risk behaviors related to HIV/STI, persisted in the risk behavior at a three-year follow-up (Romero et al., 2007). Another longitudinal study also found that those who had multiple sex partners showed a rapid increase in the number of partners across a six-year period of follow-up, compared to those reporting few or a single partner (Ashenurst, Wilhite, Harden, & Fromme, 2016). Furthermore, the study found that those having multiple sex partners were more likely to have had same-sex behavior and had more permissive values about sex (Ashenurst et al., 2016). These findings suggest that risk-taking at a younger age may continue into adulthood. More longitudinal studies are needed to clarify this tendency.

STI and HIV continue to spread among comparatively lower-risk groups through heterosexual contact. Thus, condom use is more important than ever. However, our study found that condom use among this sample of factory workers is inconsistent, regardless of cohabiting partner status. Moreover, condom use varied by type of partner, and there was lower use with long-term partners, compared to a non-regular sex partner, and that finding is consistent with other studies (Ford & Chamrathirithong, 2007; Kassie, Mariam, & Tsui, 2008; Sivaram et al., 2008). It is noteworthy that, while over 90% of those with a cohabiting partner reported consistent use of condoms at sex with sex workers, only around 40% of those without a cohabiting partner reported consistent condom use with a sex worker. A study in India found lower perception about and intention to use condoms in married persons compared to the unmarried (Deb et al., 2009). Our findings suggest that those living without a cohabiting partner may have lower perceived threat of HIV infection from a non-regular partner. Thus, there is a need to continue to promote condom use in the general population, particularly among those without a cohabiting partner. This would be in line with the National Condom Strategy (2015–2019) to promote condom use and to provide an enabling environment for prevention and response to HIV in the workplace (Thai National AIDS Committee, 2015). These efforts might focus specifically on the HIV risk arising from having multiple sex partners and unprotected sex with a non-regular partner.

Furthermore, one of the factors related to sexual risk for those without a cohabiting partner was frequent alcohol use, and this finding is consistent with other studies (Gálvez-Buccollini et al., 2009; Schensul et al., 2006; Weiser et al., 2006). A study in Peru found that sex with a non-regular partner in the prior three months was associated with heavy episodic drinking of alcohol, regardless of marital status (Gálvez-Buccollini et al., 2009). In addition, a study on migrants in Thailand found that alcohol use was common among males regardless of type of sex partner, but it was more often reported as a precursor to sex with a sex worker than with a regular partner (Ford & Chamrathirithong, 2007). It is noted that, in spite of the lack of a difference in proportion of frequent alcohol use by cohabiting partner status, frequent alcohol use was a predictor of risk in the regression analysis only

among those without a cohabiting partner. Alcohol use in our study was measured by asking how often respondents consumed alcohol in the last 12 months. Thus, interpreting associations between alcohol consumption and sexual risk in this study should be done with caution, despite consistency with other studies (Gálvez-Buccollini et al., 2009; Sivaram et al., 2008). In any case, programs need to continue to promote awareness of the impact of alcohol consumption on an individual's ability and intention to use condoms with a non-regular partner (Ford & Chamrathrithrong, 2007).

This study has certain limitations that should be taken into account during interpretation of the findings. The measure of sexual experience at first sex may not be accurate due to recall bias and the cross-sectional and retrospective design of our study. This study was not designed to test causality between the independent and dependent variables. In addition, although anonymous self-reporting can be a reliable method for gaining factual information from sensitive questions on sexual behavior and alcohol consumption (Fishbein & Pequegnat, 2000), there may be some social desirability bias. In Thai society, sex usually takes place secretly and in private, and talking about it is generally not socially acceptable. Thus, the measure of number of sex partners is assumed to be subject to bias, as men may report exaggerated numbers, while women usually underreport sexual activity (Slaymaker, 2004). Also, this study did not determine whether multiple partners were concurrent or serial. Nevertheless, our results are noteworthy because, to our knowledge, there are no comparable studies on Thai factory workers' sexual risk-taking behaviors by cohabiting partner status using a representative sample of all types of factories in Bangkok. Programs should implement tailored strategies to address the needs of the factory worker population, particularly among those without a cohabiting partner, by using modern and popular communication channels to increase awareness of HIV infection and changing community norms about HIV risk behavior.

Government agencies need to serve as models of good practice, to be emulated by business and the private sector, in creating an environment for prevention and response to HIV in the workplace. There is also a need to expand innovative workplace HIV intervention programs to include micro-, small-, and medium-size enterprises.

6. Conclusions

This study found that one in five Bangkok factory workers engaged in HIV risk-related sexual behavior, and those without a cohabiting partner reported more risk. These findings may imply the need for more intensive interventions to reduce sexual risk among factory workers, with a focus on those without a cohabiting partner. There is also a need for safe sex education among young adults, and to motivate younger people to reduce the incidence and frequency of sex with non-regular partners. Intervention strategies should include work-related policies and address factors that increase the likelihood of HIV transmission.

Author Contributions

Thepthien B designed the survey, participated in the data collection, performed the customized imputation models analysis and writing the manuscript; Hong SA participated in analyzing the data, interpretation and writing and critiquing of the manuscript; All authors approved the final version of the manuscript.

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