

# **Sexual Risk and HIV/STD in Vulnerable Cambodian Females**

## **The Cambodian Young Women's Cohort:**

### **Factory Workers**



**National Center for HIV/AIDS, Dermatology  
and STDs  
&  
University of California, Los Angeles**

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## **Factory Workers 2005**

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## I. Introduction

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Cambodia is wrestling with a growing HIV/AIDS epidemic that is seeping from core groups into the general population.<sup>1,2</sup> HIV prevalence is monitored systematically by the HIV Sentinel Surveillance Program (HSS) of the Cambodian National Center for HIV/AIDS, Dermatology and STD (NCHADS). The rate among pregnant women in 1999 was 2.6%, which is among the highest in Asia, and 33.2% among Direct Female Sex Workers (DFSWs).<sup>3</sup> The high prevalence among women in antenatal care suggests that the epidemic has expanded from core groups such as DFSWs into the general population, thereby classifying Cambodia's epidemic as "generalized".<sup>4</sup> Nonetheless, there remains a high gradient for diffusion from high-risk core groups. In the late 1990s an aggressive, multi-sectoral HIV/AIDS prevention program was scaled up; however, interventions were focused mostly on core groups such as brothel based DFSWs and men in the military. Information, education and communication campaigns aimed at highlighting the risks of HIV/AIDS from commercial sex and widely publicized high HIV prevalence among FSWs increased awareness among Cambodian males of the risks of purchasing sex at venues such as brothels. This has produced a decrease in the purchase of commercial sex by men; in each of the past three years significantly fewer men in all sentinel groups followed in Cambodia's Behavioral Surveillance Survey (BSS) reported recent sex with a FSW.<sup>5</sup> Instead men may increasingly be turning to women who are not identified as sex workers for sex partners, and may be seeking to establish ongoing "casual" partnerships, a pattern noted in Thailand as their HIV/AIDS epidemic progressed.<sup>6</sup>

At the same time there has been a rapid rise in the number of factories employing young women from rural, traditional communities who are seeking new opportunities for income generation. Factory work in Phnom Penh pays each woman about \$40/month for an 8 hour day, and a large portion of that must go to her housing, food, and clothing costs.<sup>7</sup> Therefore, these young women are constantly pressed for money and often cannot send their families as much as anticipated. In response to these financial pressures, these young women seek other ways to earn money. Aware of these young women's financial vulnerability, recruiters for the sex industry offer them opportunities to gain fast cash through selling sex. There are reports of "pimps" recruiting in the dormitories and group houses of the factory workers, and working with some of the young women who already sell sex to recruit their peers. Additionally, men not involved in the formal sex industry have become aware of factory dormitories as a new site to recruit sexual partners that they perceive to be less risky for HIV than sex workers. These men offer financial assistance and support to these young women in exchange for sex and some develop ongoing partnerships based in the exchange of sex for money or goods - the "casual" partnerships described above. As recent migrants from rural areas, these young women working in factories come from traditional family life in a rural community that does not prepare them for living and working alone as a young woman in a big city. Therefore, these women may be unsure of what is safe and appropriate sexual behavior in this new social context.<sup>8</sup>

NCHADS is concerned at the potential for HIV to spread into the population of young factory workers as they are at risk of being drawn into commercial sex and casual sex. In much of Africa, young women have been noted to be the group with the highest HIV incidence<sup>9</sup> and most easily infected. Additionally, a recent review of the effectiveness of HIV prevention in developing countries noted that one of the three groups for which there is a dearth of evaluated prevention interventions is youth, especially female youth. In SE Asia, young women employed in formal sex work have also clearly been the sub-population with the highest HIV incidence.<sup>10</sup> A changing social organization of sexuality in SE Asian countries, rapidly progressing HIV epidemics, and HIV prevention education that steers men away from commercial sex may result in young women outside of the formal sex industry becoming an emerging group at highest risk of HIV infection with whom there is little experience with effective HIV prevention. Specific information on the risk behavior and sexual partnership patterns of vulnerable young women in Cambodia is necessary to develop appropriate HIV prevention programs.



## II. Previous Studies

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There have been mixed findings from research on factory workers in Cambodia conducted to date – with some suggesting sexual risk and other suggesting little sexual activity. Both quantitative and qualitative studies have been conducted but not enough evidence is available from these efforts to provide direction for prevention efforts. The controversy regarding the potential sexual risk of this group of women needs clarification before resources are expended in risk reduction.

Findings from surveys showed few factory workers had sex before marriage, casual sexual partners (such as boyfriends or sweethearts) or multiple sex partners. For example, in the Cambodia Behavioral Surveillance Survey of 1997, conducted in 5 provinces, only 5.5% of never married working woman (who included factory workers and low wage government workers) reported sexual activity.<sup>11</sup> In addition, 8.9% of all these working woman reported having a sweetheart in the past year and 12.1% of the never married working woman reported having a sweetheart in the past year.<sup>12</sup> In the 1998 BSS 11.0% of unmarried working woman were considered sexually active because they reported an age of first sexual experience.<sup>13</sup> In addition, 7.4% of all working woman reported having a sweetheart in the past year.<sup>14</sup> These data suggested few women had risky partners or risky sex.

More recent surveys found even fewer factory women reported risky sexual activity. For example, in an International Labor Office (ILO) 2001 study, less than 1% of never married working woman reported sexual activity in Sihanouk Ville.<sup>15</sup> In a 2005 World Cambodia Vision of female factory workers and high school students along highway 4 and highway 5 only 2.3% of never married women reported being sexually active and 90% of sexually active female factory workers reported their first sexual partner was their husband and 6.6% reported their first sexual experience to be with a sweetheart.<sup>16</sup> Finally, in the ILO/ United States Department of Labor HIV/AIDS Workplace Education Program Baseline Survey Cambodia conducted in September 2004 in Phnom Penh and Siem Reap 1.7% female workers (hotel and factory) reported sex with a non-regular partner in the past 3 months.<sup>17</sup> In all of these surveys there was little evidence that factory workers were at high risk for HIV/AIDS through risky sex.

There have also been qualitative studies on the behaviors and activities of factory women in Cambodia. One of these by The Japan International Cooperation Agency in 1999 women in focus group discussions reported their fellow factory women had serious boyfriends and that these boyfriends were acquired about 5-6 months after moving to the city.<sup>18</sup> This report suggested a sexual revolution was occurring amongst the young women because participants indicated knowing locations, such as cheap cabins, where couples could go and have sex. In another focus group study by CARE International in Cambodia published in 1999 to assess the sexual needs of garment workers found no consensus among male and female participants about the percentage of their coworkers that had relationships or were sexually active.<sup>19</sup> For example, one man indicated that about 75% of the factory women had sweethearts while another

group reported very few factory women had sex, and that those unmarried people who had sex were engaged to be married but there were participants reported that factory workers experience violence and forced sex.<sup>20</sup>

As findings from these qualitative studies contradicted the results from the surveys, there was a need for a definitive study to measure the amount of risk for HIV/AIDS to female factory workers.



### III. Objectives of Cambodian Young Women Cohort

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1. To conduct a comprehensive study of sexual behavior and risk for HIV/AIDS using biomarkers among young women potentially at risk
2. To measure baseline HIV and Herpes Simplex Virus type 2 (HSV-2) prevalence among young female factory workers
3. To assess HIV and HSV-2 incidence, cohort retention, and behavior change after 1 year among young female factory workers



## IV. Methodology

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### 1. Study Population

The study population consisted of women working in factories in Phnom Penh. The women were at least 18 years of age and spoke Khmer as their first language.

### 2. Study Design

The Cambodian Young Women Cohort recruited women from October 9 to November 2 of 2002, contacted the women three months after baseline recruitment, and followed up with the women one year after initial enrollment. During baseline visit, women gave informed consent, completed a locator form, underwent a blood draw, and completed an interview with a trained interviewer. For their contributions to the study, the women received a gift. Three months later, the study staff attempted to locate the same women to verify and update the locator form, and gave them a gift for their time. One year later (October 16 to November 21 of 2003), follow-up data was gathered from those women from the initial cohort that were able to be located. The procedures at the follow-up visit were similar to baseline visit. During this time, women gave informed consent, underwent a blood draw, completed an interview with a trained interviewer, and received a gift. All the materials (recruitment scripts, informed consent forms, locator forms, questionnaires, and protocols) used in the study were reviewed and approved by the Cambodian National Ethics Committee (NEC) and University California Los Angeles Institutional Review Board (UCLA IRB).



### 3. Sampling

The study involved a multi-stage representative sample of women in Phnom Penh working in factories selected from their living quarters. In the first stage, two districts Tuol Kork and Meanchey, containing an abundance of factories, were chosen as study sites. The two districts selected were chosen amongst seven in the city of Phnom Penh using Probability Proportional to Size (PPS) sampling. In the second stage, two communes per district were selected using PPS for a total of four communes: Tuek

Leork III, Boeung Kork II, Stueng Meanchey, Chak Angre Loeu. The next stage involved selecting one village per each of the four communes. These included: village 01 in Boeung Kork II Quarter, village 06 in Tek Leork III Quarter, village Damnak Thom in Stung Mean Chey Commune, and village Prek Takong in Chak Angre Loeu Quarter. Finally, approximately 115 women were randomly selected from the four villages in their dorms in the procedure listed below.



To create a sampling frame, maps and a list of all the factory dormitories in each neighborhood of the selected village were created by the Phnom Penh AIDS Office a week prior to data collection. The list named each dorm and identified the total number of women in each. In addition, the list outlined all the households that hired rooms for factory workers, the number of rooms in each household, and the average number of women in each room. In order to decrease bias and guarantee a representative sample, a random number was generated from one to the total number of individuals in the population, and the cluster, each household unit, within which the random number fell, was selected as the first cluster. All individuals in the cluster were interviewed with a "take-all" approach. If a woman was not there, if for example she was still on duty in the factory, the study team attempted to contact her two additional times. Since some women left the factories at 4:30 pm, some at 6:00 pm others at 8:00 pm, it was necessary to vary the timing of the visits. The procedure was repeated until the sample size was attained, approximately 115 women from each village, resulting in a self-weighted sample. A total of 464 women consented to being interviewed and gave blood for HSV-2 and HIV testing.

#### 4. Method of Subject Identification and Recruitment

The first step in identifying and recruiting subjects was to obtain the cooperation of owners of dormitories to prepare the lists of potentially eligible women in each site for the sampling frame. Since the study was conducted as part of an activity of Cambodia's HIV surveillance program, there was already a good relationship with local dormitory owners. This established relationship aided the NCHADS staff in gaining access and locating women who belonged to the randomly selected clusters described earlier. Once women belonging to the desired cluster were located, they were approached by a staff member and queried as to their potential eligibility. Eligibility criteria were 18 years or

older, fluent in Khmer, and currently employed as a factory worker. Upon verification of eligibility, the NCHADS staff member read the potential participant the IRB approved recruitment script. If the potential subject agreed to participate, the trained study staff member obtained oral informed consent by reading the consent form and completed a locator form for future contact information of the participant. The locator information form requested the workplace address, home address, and telephone number for the individual and a close contact person.



## 5. Study Procedures

During the fieldwork, the Co-Principal Investigator (CoPI) and supervisors were present at all times to help the team to solve any problems of coordination, administration or questionnaires, and to ensure interviewers followed the study protocol. Privacy and confidentiality were monitored and stressed as was the participant's right to refuse

All eligible women agreeing to participate in the study gave oral informed consent prior to data collection. The investigators believed that the study participants would better understand the study protocols and the voluntary nature of participation if it was explained to them orally. The process of consent was conducted in a quiet location separate from the other factory women and staff. Each woman was given a copy of the consent form for her own personal records.

After obtaining informed consent, the interviewer filled out a locator form for each participant. The locator form requested the workplace address, home address, and telephone number for the individual and a close contact person. In addition, the locator form had a designated identification area where a unique identifier number was written and later removed and stored separately from the locator form. Later, the names and identifiers were used to create a master "key". The "key", containing only the participant's study number, name, and enrollment date, have always been kept in a locked file cabinet in Phnom Penh, where only the Study Coordinator and Principal Investigators have had access to it. Since the purpose of the unique identifier was to protect patient confidentiality and privacy, only the unique identifier was used to mark questionnaires, blood specimens, and lab data.





The questionnaire administered to all study participants was developed by the study investigators to capture the individual living situations, partnership characteristics, work history, sexual behaviors, and other variables hypothesized to affect risk behavior. In order to compare changes in behavior among factory workers over time, the questionnaire included exact questions from the Cambodian BSS that included factory workers in 1997 and 1998. Questions were also included from the questionnaire from BSS for women in high risk groups (such as sex workers and those in beer companies) to allow for comparisons between factory workers and higher risk women. Other data collected included socio-demographic characteristics (marital status, level of education, income), age at first sexual intercourse, frequency of condom use, type of sexual partners (client, regular client, boyfriend), STD health care seeking behavior, hygienic practice and mobility. The questionnaires were pre-tested, translated and back-translated into Khmer.

Due to the sensitive nature of the questions being asked, the investigators chose to use BSS interviewers, a team drawn from Ministry of Health offices outside of the local AIDS office that had five years of experience administering questionnaires on sexual behavior. The interviewers conducted oral one-on-one interviews in private using the questionnaire. The interviewer marked the questionnaire only with the study identifier and conducted the interview in a quiet place away from the other participants. The study supervisor insured that no other bystanders were listening to the questions or responses. In addition, the supervisors checked and edited each questionnaire upon completion to ensure the accuracy and consistency of the data collected.



Besides the questionnaires, the study collected blood specimens to determine associations between reported behavioral risk, partnership types, and sexually transmitted disease. The diseases tested for were HIV and HSV-2. Although HIV prevalence is not a good measure of recent risk behavior, it does show history of risk and potential for transmission to others. HSV is a well-known cofactor and enhancer of HIV transmission and HSV serology has also been used to assess a population's age of sexual debut and rate of acquisition of genital herpes. It has been suggested that HSV-2 antibody results may provide measures of sexual behavior such as the amount of multiple partnerships in a population.<sup>21</sup> The importance of HSV as a potential cofactor in HIV transmission is well established and more than 30 epidemiologic studies have shown a 2-4 fold risk of HIV acquisition with HSV prevalence.<sup>22</sup> As a result, HSV prevalence and incidence data are crucial to determining the usefulness of potential interventions in a vulnerable population. Recent data also suggest that antibodies to HSV types 1 and 2 may decline with time, and therefore, serial assessments provide greater validation of findings.<sup>23</sup> An experienced NCHADS phlebotomist drew the blood by venipuncture into a specimen tube marked with the unique study identifier. The specimens were transferred from vacutainer tubes to cryotubes every morning and then kept frozen before being shipped to Brown/Tufts Laboratory, Brown University and screened at the Cambodia National Institute of Public Health (NIPH) laboratories.

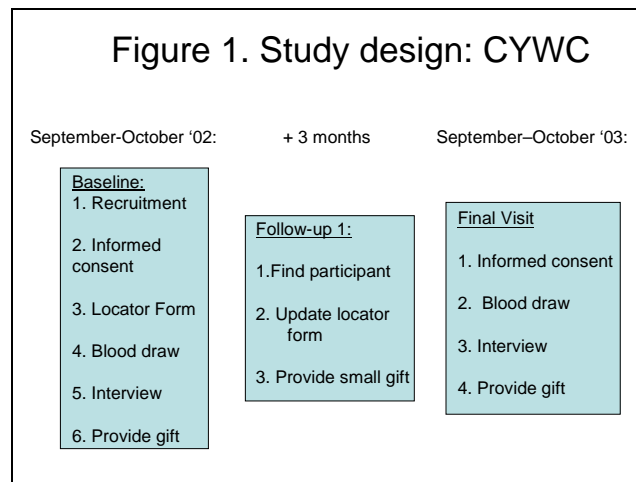


Prevalence at baseline and after one year for HIV and HSV was calculated as the percent of women testing positive for either disease at either point. Incidence for HIV and HSV was calculated as percent of new cases after one year, the number of women who were negative at baseline but tested positive at one year follow-up.

An NCHADS supervisor arranged to have all questionnaire forms collected and specimens transported, and stored by the NIPH Laboratories. The results of the blood test were sent to the principal investigator by study number as an electronic file. All the serologic results had the same unique study identifier number as the HIV testing results and questionnaire. As a result, the biomarkers and questionnaire results could be linked to each other. In order to ensure participant privacy, no personal information of the participant was used and all of the study forms, including locator forms, were stored apart from the master key. The locator forms were kept in a locked cabinet in the study office. All questionnaires and HIV results from the laboratory were entered in to the

Surveillance Unit computers at NCHADS, which were password protected and only accessed by the study coordinator and Principal Investigators. A backup of these files (without personal identifiers) was updated regularly and sent electronically to the UCLA Principal Investigator who kept a copy on her computer at the School of Public Health building on the UCLA campus. All study questionnaires, test results, and the master key will be destroyed five years after study completion. Laboratory specimens will remain frozen at the Lifespan/Brown/Tufts laboratory and computer files containing only study numbers will be maintained on the principle investigator and study coordinators computers.

One year after baseline, the NCHADS staff returned to the original study sites to administer a follow-up questionnaire and collect blood specimens. The Phnom Penh AIDS Office was responsible for contacting Chiefs of Quarters/communes and key local authorities of villages to inform them that the follow-up data collection would take place.



Prior to returning to the field, the study key was unlocked by the study coordinator to match the participant names and study identifiers to ensure that the identifier number used on the followup questionnaire and specimens would be the same as baseline. Only the “key” was transported to the field in a locked study box, no lab or questionnaire data. Therefore, neither the study coordinator nor interviewers knew who had tested positive or had seen the baseline questionnaire.

The follow-up questionnaire asked the women to report their behavior in the past year since the baseline interview. Once again, the interviews were conducted in a private location away from the other participants, study staff, and factory workers. The phlebotomist drew the blood by venipuncture into a specimen tube. Follow-up questionnaires and tubes were marked with the unique study identifier given to each woman at baseline. An NCHADS supervisor arranged to have all questionnaire forms collected and specimens transported, stored, and analyzed by the NIPH Laboratory.

Participant privacy and comfort were of high importance, especially during data collection. As a result, the study required all interviewers to undergo 3 training sessions.

The first training was prior to data collection, occurred between August 15-16, 2002, and was conducted by the study principle investigators. During this time, interviewers reviewed study protocol, recruitment materials, locator forms, and the questionnaire. In addition, the interviewers were trained on their roles, confidentiality, privacy, and the process of informed consent. The second training was a refresher session held two days before the data collection. The interviewers and phlebotomists were asked to participate at this time, so that they were clear about what needed to occur during the fieldwork. The last refresher training was held on October 15, 2003 in preparation of the follow-up data collection. As before, the training was facilitated by the study principle investigators. All interviewers and phlebotomists were the same as the year one baseline data collection, except for one interviewer and one phlebotomist who were replaced. Training materials and revised forms were reviewed. The data collection process was discussed and the usage of the same study identifiers as baseline for each participant was emphasized. The investigators were also concerned with whether the questionnaire fit the local context of the future participants. Therefore, they pre-tested the questionnaire in the field with a group of factory workers from Tek Thla village. The pretest was organized by a local NCHADS team. After all forms and questionnaire were pretested, the appropriate changes were made.

#### 6. Loss to Follow-up/Withdrawal

Three months after the initial enrollment into the cohort, the staff went to the location where the participants were recruited and counted the number of participants in the study still employed there. For those that were no longer working there, the staff person tried to contact the participant by telephone. If the telephone numbers was not valid, then the staff person tried to visit the person at their address. If the participant could not be located through any of these attempts, they were coded as lost to follow-up and no further attempts were made to contact them. Additionally, at the three month contact, if the participant expressed a desire to leave the study and not be contacted again, they were coded as withdrawing from the study and no further attempts were made to recontact them.



For the one year follow-up, if the participant was no longer residing in the dormitory, the study team tried to locate her in the nearby village by asking roommates, house owners,



friends, and relatives. If they were still unsuccessful, attempts were made to contact the participant via information provided by the locator form.

## 7. Special Considerations

In accordance with the national policy on HIV testing of NCHADS at the time the study was conducted, HIV testing conducted for the purpose of research or surveillance was required to be anonymous and unlinked. The informed consent system in Cambodia required that all participants were fully aware of this policy and provided oral consent. All women were clearly informed that their blood sample would be tested for HIV and further tested for HSV but that their test result would not be provided to them through the study. Those who wanted to know about their HIV status were referred for retesting at the VTC at the National STD Clinic. A card with the address of VTC at the National STD Clinic was given to the participants.

## V. Results

### 1. Social and Demographic Characteristics of Factory Workers

The factory workers were on average 23.4 years of age, had a mean of 5.5 years of school education which is an average of just under completion of primary school, and were earning on average the equivalent of \$US 67 per month. The factory workers were not recent migrants to the city, having lived in Phnom Penh for an average of 3.6 years. The mean number of months the women had been working at their current jobs was 31.8 months (over 2 years). Only about one third (31.2%) of the factory workers were newly employed by the factories (had been working for 12 months or less).

**Table 1: Social and Demographic Characteristics (n=464)**

	Mean	(Median)
Mean years of age	23.4	(22)
Mean years of education	5.5	(6)
Mean monthly income	\$67	(\$62)
Mean years living in current city	3.6	(2)
Mean months working at current job	31.8	(24)

### 2. Partnerships: Marital Status, Sweethearts, Expectations

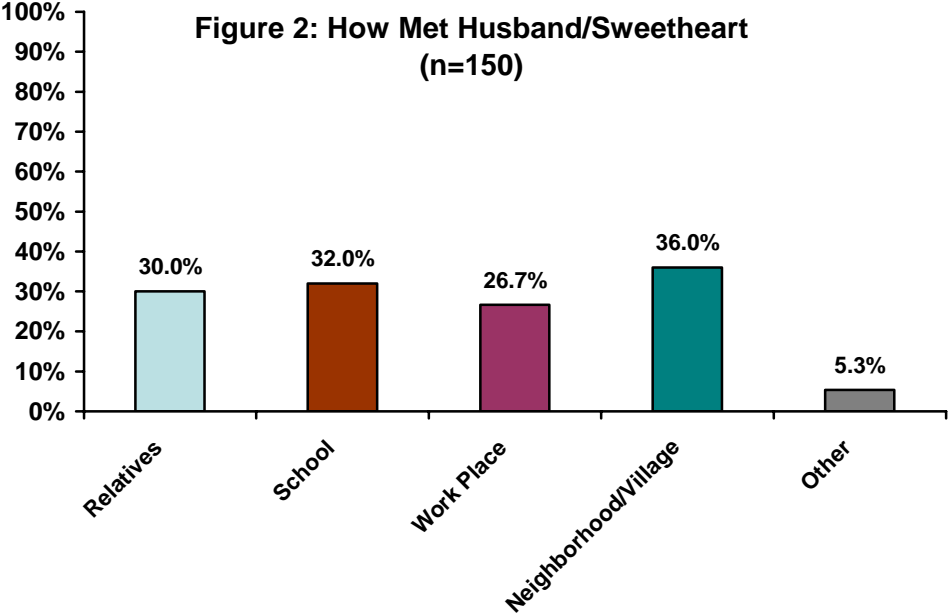
Most factory workers were unmarried; only 8.0% of the cohort reported being officially married and 1.3% reported being married unofficially. Few women reported being divorced (11.0%) or separated (4.5%). Amongst women who had ever been married, most reported that their husbands were chosen for them in an arranged marriage (85.3%). The mean age of marriage for the women who had ever been married was 19.8 years. Overall 24.8% of the women reported ever being married.

**Table 2: Marital Status, Characteristics of Marriages, and Relationship Dynamics of Married of Factory Workers**

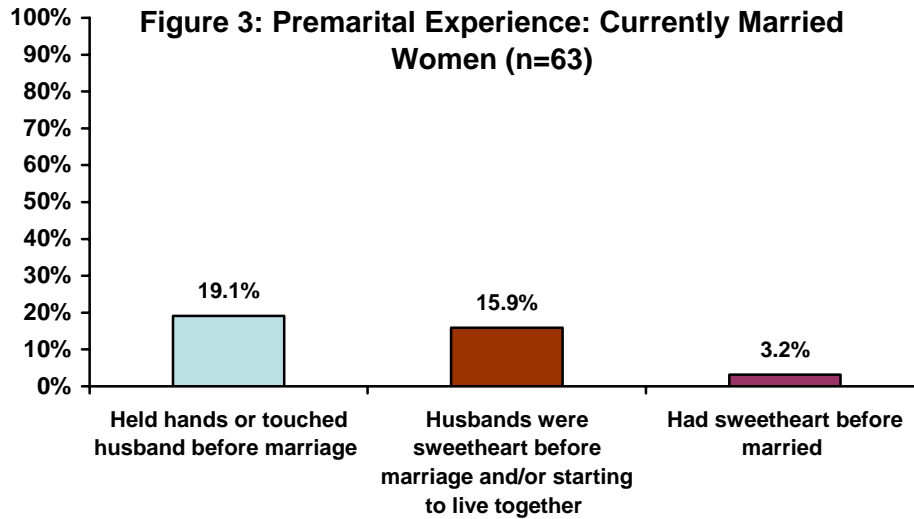
	%/mean	(n/median)
Marital Status (n=464)		
Currently – Officially	8.0%	(37)
Currently – Not officially	1.3%	(6)
Never	75.2%	(349)
Divorced	11.0%	(51)
Separated	4.5%	(21)
Ever Married (n=115)	24.8%	
Mean age, median	27.2	(26)
Mean age marriage, median	19.8	(19)
Parents chose husband (n=116)	85.3%	(99)

Married Women (n=63)		
Have money available at home without having to ask husband	73.0%	(46)
Know if husband currently has any debts	17.5%	(11)
Know husband's dancing/drinking friends	71.4%	(45)
Know them	28.6%	(18)
Don't know them at all		

Before getting married, only 3.2% of factory workers reported having a sweetheart other than their husband, 15.9% stated that their husbands were their sweethearts before marriage, and 19.1% of the women said they held hands or touched their husband prior to marriage. The largest proportion of women, 36.0% met their husband/sweethearts around the neighborhood or villages. The second common way a factory worker met her husband/sweetheart was with her relatives. 26.7% of factory workers met their husbands/sweethearts at the work place (see Figure 2).



Before getting married, 31% of the women reported knowing their husbands well. Only 17% reported knowing their husband very well, and 14% said that they didn't know him at all.



In terms of household finances, women seem to have control in some areas and not in others. Of the women ever married, the majority had money available at home without having to ask their husband. On the contrary, a small percentage knew if their husband currently had any debts. In terms of the friends who their husband went dancing or drinking with, 41.3% knew their husbands friends well to very well. But, 28.6% did not know their husband's friends at all (see Table 2).

In the past year, 12.7% of the factory workers reported a sweetheart/boyfriend and 10.8% of the women reporting currently having a sweetheart/boyfriend.

Most of women who reported a current sweetheart/boyfriend had never been married (86%). The remaining 14% of women who currently had a sweetheart/boyfriend were divorced (10%) or currently married (4%). Most women with sweethearts (88%) only reported one sweetheart/boyfriend. The highest number of current sweethearts/boyfriends reported was 3 by 3 women (6% of the women who reported having a sweetheart/ boyfriend).

More than half of women in relationships with sweethearts/boyfriends reported not receiving money from their sweethearts/boyfriends (61.3%). Out of those women who do receive money, none of the women reported receiving money when they have sex (Table 3). Most of the women in relationships believe they are likely or very likely to marry their current sweetheart/boyfriend (86.4%). Because few of these women receive money connected to sex from their sweetheart and most expect marriage, it is unlikely that many of these sweethearts are commercial sex partners.

**Table 3: Sweetheart Status and Relationship Dynamics of Factory Workers with Sweethearts/Boyfriends**

	%	(n)
Had a sweetheart/boyfriend in the past year (n=463)	12.7%	(54)
Have a sweetheart/boyfriend currently (n=463)	10.8%	(50)
Received money from sweetheart/boyfriend: (n=62)		
Never	61.3%	(38)
Every time have sex	0 %	(0)
Ever week	3.2%	(2)
Every month	6.5%	(4)
Not regularly	29.0%	(18)
Likelihood of marrying current sweetheart/boyfriend: (n=59)		
Very likely	35.6%	(21)
Somewhat likely	28.8%	(17)
Likely	22.0%	(13)
Unlikely	13.6%	(8)
Very unlikely	0%	(0)

Women who were married or had a sweetheart were asked about things they communicate with partners about (Table 4). When asked questions about whether the women talked to their husbands/sweethearts about things that occurred at work/on the farm, at home, in the community, or about fears and concerns, more than half of the women expressed never talking to their husbands/sweethearts regarding these matters. In fact, 87.7% of the women said they did not talk to their partners about occurrences in the community. When it came to discussing personal worries, plans for the future of the family, or what to spend money on, slightly lower percentage of women, about 45%-50%, expressed never talking to their husbands about these matters. Therefore, many factory workers in this cohort of women seem to be able to communicate with their husbands about domestic matters but rarely discuss other topics. When it came to more personal interactions, most factory women indicated that their husbands/sweethearts spent time with them (75%), and were affectionate (75.2%). Very few factory workers stated that their rights were never respected by their husband/sweetheart (5.3%).

**Table 4: Communication Between Factory Workers and their Partners (n=90)**

	%/mean	(n)
Talk to husband/sweetheart about:		
Things that happen at his work/on farm		
Never	68.5%	(61)
Ever	31.5%	(28)
Things that happen at home		
Never	53.3%	(48)
Ever	46.7%	(42)
What to spend money on		
Never	47.8%	(43)

Ever	52.2%	(47)
Things that happen in the community		
Never	87.8%	(79)
Ever	12.2%	(11)
Fears or concerns about the family		
Never	50.0%	(45)
Ever	50.0%	(45)
Plans for the future of the family		
Never	46.2%	(42)
Ever	53.8%	(49)
Personal worries		
Never	46.2%	(42)
Ever	53.8%	(49)
Their husband/sweetheart		
Likes to spend time with them (n=132)		
Never	25.0%	(33)
Ever	75.0%	(99)
Is affectionate with them (n=133)		
Never	24.8%	(33)
Ever	75.2%	(100)
Respects their rights (n=133)		
Never	5.3%	(7)
Ever	94.7%	(126)

The women with partners were also asked about what they know about their partner's history with other women and current relationship status (Table 5). A little over one third of factory workers did not know if their husband/sweetheart had ever had a sweetheart other than them and almost half (46.2%) believed that their husband/sweetheart had a sweetheart before them. In terms of sexual activity, half of the women with a sweetheart believed that it was likely to very likely that their sweetheart had sex with other women. The average age of the sweethearts/boyfriends of factory workers they reported to be 23.4 years, and almost all factory workers reported that their sweethearts were not married. Only 3.2% of the women were unsure about whether their sweetheart was married. Therefore, it appears that these young women have sweethearts that are not married and close to their own age.

**Table 5 : Characteristics of Husbands/Sweethearts**

	%/mean	(n/median)
Their husband/sweetheart (n=91)		
Has ever had a sweetheart other than them	46.2%	(42)
Has never had a sweetheart other than them	17.6%	(16)
Don't know if ever had a sweetheart other than them	36.3%	(33)
Likelihood of sweetheart/boyfriend has sex with other woman: (n=60)		
Likely	51.7%	(31)
Unlikely	48.3%	(29)

Sweetheart's marital status: (n=62)		
Married	3.2%	(2)
Not Married Don't Know	93.6%	(58)
	3.2%	(2)
Mean age of sweetheart/boyfriend (year, n=60)	23.4	(23)

### 3. Sexual Experience and Condom Use

In this cohort of factory women, 118 of them reported having had sexual intercourse when asked about their first age of sex. Only 3 women who have never been married indicated ever having had sex.

**Figure 4: Percent of Factory Workers Reporting Ever Had Sexual Intercourse (n=462)**

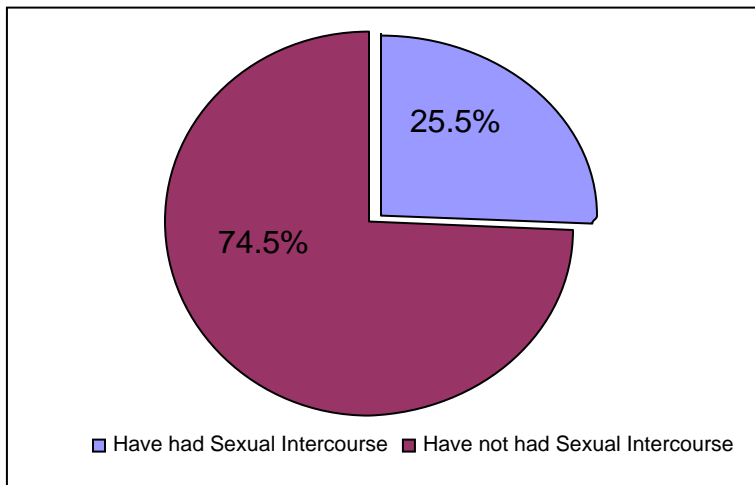


Table 6 summarizes the sexual activity reported by women in this cohort. The average age of first intercourse for factory women was 19.8 years of age. Most of the women (94.8%) reported having only one lifetime partner. The highest number of partners reported by any factory woman was two. Amongst those who mentioned having had 2 lifetime partners, the majority of them, 50%, were divorced (Table 6).

Almost all of factory workers who reported sexual activity, reported that they first had sexual intercourse with their husband (96.6%) (Table 6). One woman indicated that her first sexual partner was a client. Additionally, only one ever married woman reported she had had sex with her husband before marriage. In the year before the survey, 5 women reported having sex with a sweetheart.

Among all the factory workers, only two women reported ever having sex for money. Both of these women had never been married. In terms of anal sex, only two women reported ever having had anal sex.

**Table 6: Sexual History and Condom Use Among Sexually Active Factory Workers**

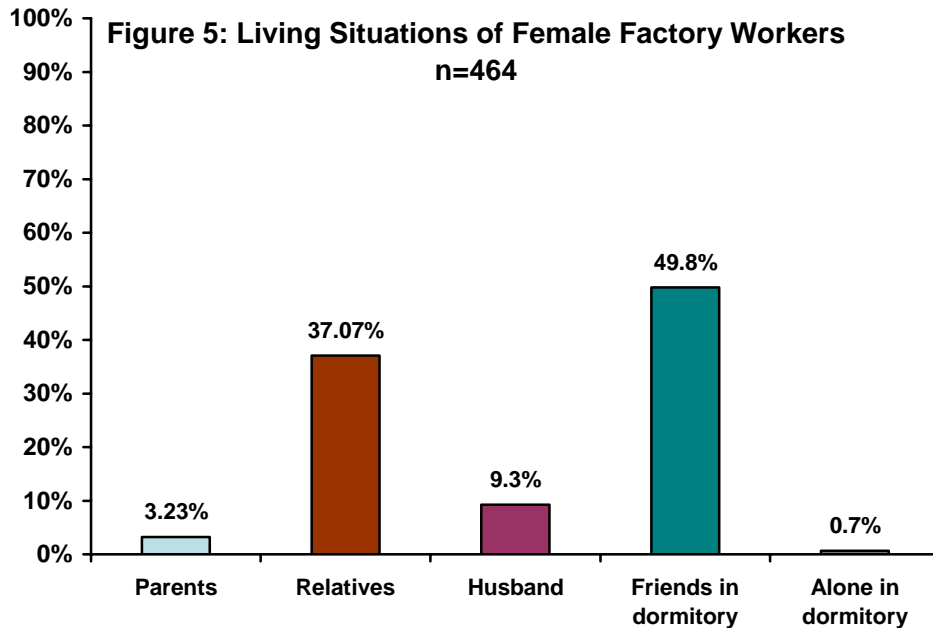
	%/mean	(n/median)
Mean age first intercourse (n=118)	19.8	(19)
Have had sex with in their lifetime (n=116)		
1 person	94.8%	(110)
2 persons	5.2%	(6)
First sexual partner were: (n=118)		
Husband	96.6%	(114)
Sweetheart	2.5%	(1)
Client	0.9%	(3)
Had sex with husband before marriage (n=63)	1.6%	(1)
Having sex with a sweetheart in the past year (n=64)	1.1%	(5)
Mean months since first time sex with current sweetheart (n=7)	11.8	(9)
Received money or gifts from having sex with a man in the past year (n=118)	1.7%	(2)
Have ever had anal sex (n=118)	1.7%	(2)
Have ever used a condom (n=102)	12.8%	(13)
Mean age first condom usage (n=13)	25 yrs	(24)

Only 13 women in this cohort of factory workers reported ever using a condom, about 13% of those sexually active (Table 6). The mean age of first condom use for those thirteen women was 25 years. One woman reported always using a condom with her husband; most women reported never using a condom with their husband (81%). Amongst the three women who had never been married but who had sweethearts whom they had sex with, one said she always used a condom, another reported never using a condom and the third was an occasional user. Because of the very few women in this study who were sexually active outside of marriage, it is not possible to generalize about condoms use of young unmarried women in Cambodia from this study.

#### 4. Living Situation and Migration History

Approximately half of the factory workers reported living with their family and the others in dormitories. Amongst those living in the dormitories, very few (n=3) lived alone. Amongst those living with family, the majority of women live with relatives other than their parents or immediate family. This suggests some factory workers live with extended families in Phnom Penh.





Amongst factory workers who live in dormitories, the average number of time they reported living in them was just over 2 years (Table 7). Within the dorm rooms, the women report are an average of 6.1 persons sharing the same room. On average, the factory workers reported last year traveling 6.8 times to visit their families and that their families came to visit them 3.1 times. Therefore, this group of young women does see their families fairly often even if they live far from them.

**Table 7: Characteristics of Dormitory Living and Visiting Family**

	% / mean (n / median)	
Dormitory living:		
Mean months living in current dormitory (n=233)	24.4	(18)
Mean number persons living in same room (n=234)	6.1	(5)

#### 5. Reproductive Health (discharge, douching, lubrication, pregnancies, live births)

Within the past year, 21.0% of the factory women reported having abnormal discharge (Table 8). Amongst those women, most of them reported receiving treatment for their symptoms but one third (29%) reported not receiving any treatment. About one quarter of the women with symptoms went to the pharmacy (24.7%) for treatment and about one third to a traditional healer. Few sought care at a private clinic or hospital. Almost half of the cohort of women reported not douching. Among the women who indicated douching, the majority used soap, lemon, saltwater, and antiseptic were also reported as used for douching but by few women. In addition, virtually all the sexually active women reported not using any product for lubrication. Mean number of pregnancies among those reporting having ever been pregnant was 2.4, and the mean number of children among those who reported having one or more children was 1.8.

**Table 8: Reproductive Health: Reported Symptoms and Practices**

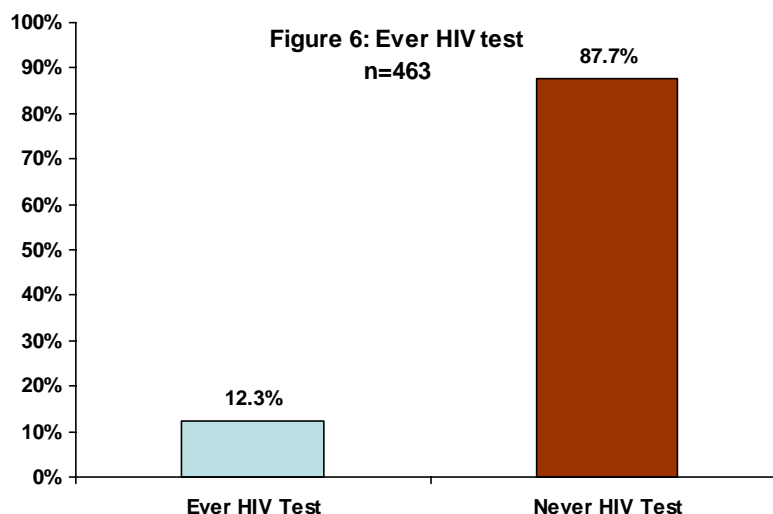
	%/mean	(n/median)
Have had abnormal discharge in past year – n=463	21.0%	(97)
Got treated for abnormal discharge at: (n=97)		
Pharmacy	24.7%	(24)
Private clinic	12.4%	(12)
Public hospital	5.2%	(5)
Traditional healer	28.9%	(28)
Never get care	28.9%	(28)
Douching with: (n=462)		
Douche	54.1%	(250)
Don't Douche	45.9%	(212)
Use of lubrication during sex (n=110)		
Use lubrication	<1%	(1)
Do not use lubrication	99.1%	(109)
Reporting having ever been pregnant - n=463	18.6%	(86)
Mean number of pregnancies (median) - n=86	2.4	(1)
Reporting having one or more child – n=463	13%	(60)
Mean number of children among women reporting one or more child (median) – n=60	1.8	(1)

## 6. Past Employment History

No factory women who participated in this cohort reported previously work as a dancing girl, masseuse, beer girl, or karaoke girl.

## 7. HIV and Drug use

Only 12.3% of the factory workers in this cohort reported ever having an HIV test prior to study enrollment. Most of the women who reported a previous HIV test were tested in a public hospital (62.1%). 22.6% were tested in a private lab or clinic, 8.1% in a voluntary testing center, and 6.5% elsewhere. Amongst the women tested, 60.4% reported being counseled. Finally, about one third of the women in this cohort reported they knew someone who was sick or who had died of AIDS.



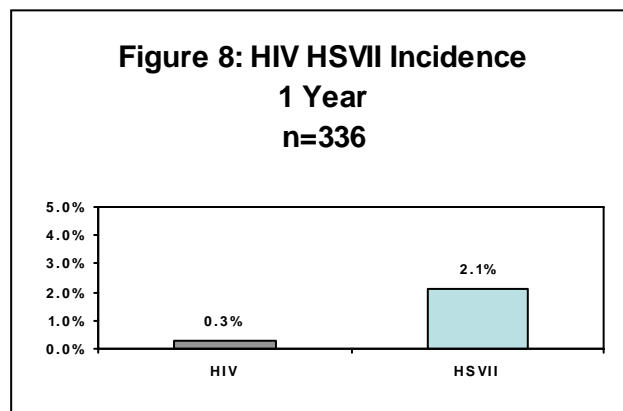
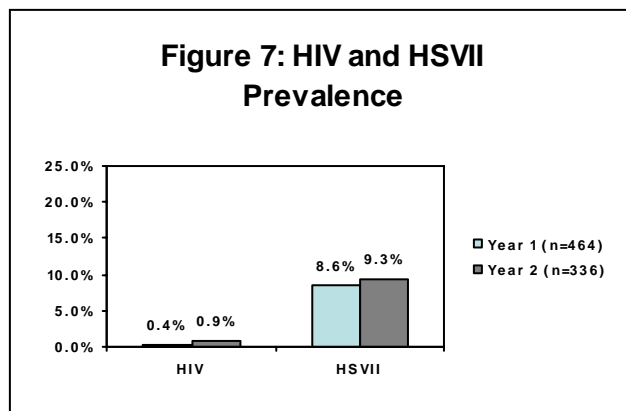
**Table 9: Facility Where HIV Tested Among Women reporting Ever HIV Testing (n=57)**

	%/mean	(n/median)
Had HIV test at: (n=62)		
Private lab or clinic	22.6%	(14)
Public hospital	62.9%	(39)
Voluntary testing center	8.1%	(5)
Government test (HIV sentinel surveillance)	0.0%	(0)
Other	6.5%	(4)
Received counseling with last HIV test (n=53)	60.4%	(32)

In terms of using drugs, none of the women reported ever having tried amphetamines.

#### 8. HIV HSVII Prevalence and HIV HSVII Incidence 1 year

The prevalence of HIV was extremely low both, year 1 (0.4%, n=2) and year 2 (0.9%, n=3). Only 2 women tested positive for HIV at baseline and only one woman acquired HIV during the year. Thus, incidence of HIV was very low (0.3%). The HSV prevalence was higher, with 8.6% (n=40) at year 1 and 9.3% (n=31) at year 2. The HSV incidence was also higher 2.1% because 7 women became positive between year 1 and year 2. There were 13 (3.8%) factory workers who said they never had sex but were HSV positive.



## 9. HSV-2 Risk Factors

Because the prevalence of HIV was low in this cohort of women, the numbers were too small to identify factors associated with in factory women. The higher prevalence of HSV, however, made it possible to identify factors statistically associated with HSV using t-tests and chi square (or fisher's exact) tests. Table 9 shows all risk factors that were statistically significant (ie. produced a p-value less than or equal to 0.05).

Women who were HSV positive were more likely to be older (on average 3 years older than those who were HSV negative). Women with HSV were more likely to be married than never married (65% of the HSV positive women had reported being ever married compared to only 21% of the HSV negative women). In this cohort of women, women who were married were older than non-married women and indicated having had sex. Therefore, it follows that age and marital status would be associated with HSV as these women have had more opportunity to be exposed to HSV. Moreover, the relationship between the married factory worker and her husband prior to marriage may be a risk factor for HSV. Amongst the married women, 61.5% of the HSV positive women stated they knew their husband very little or not at all before marriage compared to 28.6% of HSV negative. In addition to relationship before marriage, the communication between spouses after marriage was also associated with HSV status. 75% of the married HSV positive women reported not talking to their husband about their personal worries, while only 40.5% of the HSV negative married women expressed the same sentiment.

Another factor associated was vaginal discharge. When asked whether they had abnormal discharge in the past year, 37.5% of the positive women indicated yes compared to 19.2% of the HSV negative women. Past history of HIV testing was also associated with HSV status. 25% of the HSV positive women had ever had an HIV test prior to the study compared to only 12.11% of HSV negative women. In terms of migration, the women who were positive had been living in the city on average 2.1 years longer than those that were HSV negative. Therefore, it would logically follow that the women who were positive would have also been working at their current jobs on average more months (24.7) than the HSV negative women.

No other behavioral or demographic characteristics of the women were associated with testing positive for HSV. For example, both women with and without HSV got married

around the same age, and an equivalent proportion of both groups of married women had their husbands chosen by their parents. Years of education, mean monthly income, mean months living in dormitory, and mean number of persons living in the same room were not associated with HSV. Nor were having had a sweetheart in the past year or reporting having a current sweetheart associated with HSV. All other questions related to relationship with current or past sweethearts produced the same results. For example, having had sex with a sweetheart or whether the sweetheart has had sex with other women were not associated with HSV. But, the amount of women in this study who indicated having a sweetheart in the past year and were HSV positive was very small (n=4). Therefore, it is difficult to evaluate whether these factors are indicators of risk or not amongst these women. While whether knowing the husband before marriage appeared to be a risk factor for HSV, other behaviors with husband before marriage were not such as holding hands or meeting within the context of relatives. There was even no association with HSV for having the husband as a sweetheart before marriage. Finally, women's reported condom use was not associated with HSV, a similar proportion of women who were having sex had used them.

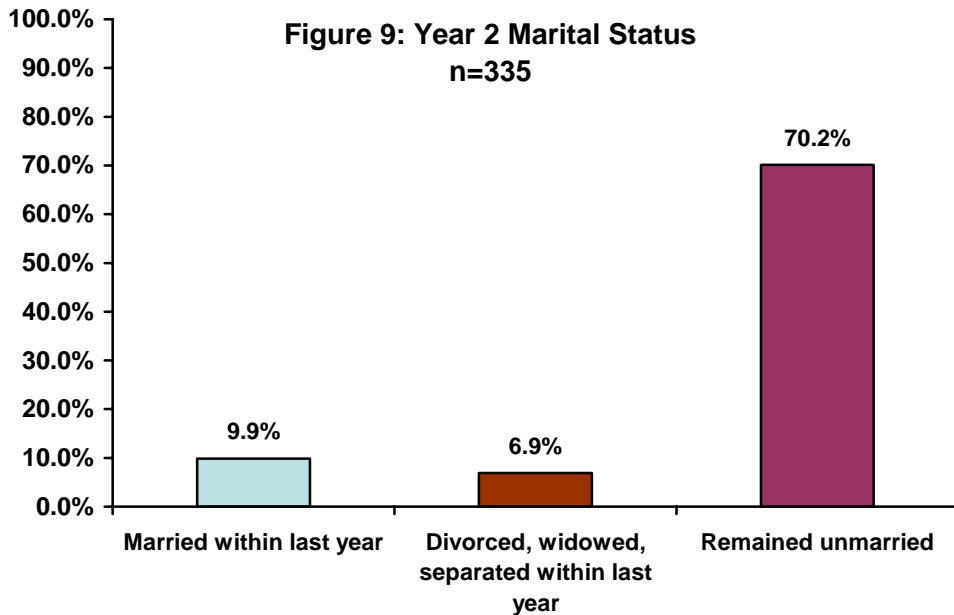
**Table 10: Risk Factor's for HSV**

Risk Factors	HSV Positive		HSV negative		P-value
	n	Mean/ Median	n	Mean/ Median	
Mean age- year	40	26.2 (24)	422	23.1 (22)	.002
Ever Married	40	65%	422	21%	<.001
Knew husband very little or not at all before marriage	13	61.5%	49	28.6%	.027
Never talks about personal worries with husband	16	75%	74	40.5%	.012
Had abnormal discharge in past year	40	37.5%	421	19.2%	.013
Ever had HIV test	40	25%	421	12.11%	.022
Mean years living in city	40	5.5 (3)	422	3.4 (2)	.004
Mean months working at current job	40	54.3 (36)	422	29.6 (24)	.004

## 10. Changes in Year 2

By the end of one year, 333 women (72%) were re-interviewed. Among these women, 3 only consented to the interview, 9 refused, 74 women had stopped working, and 28 were lost to follow up.

At the one year follow up interview, the majority of women were still unmarried (70.2%). During the year of study, 9.9% of the women got married and 6.9% of the women were divorced, widowed or separated. Most women still had no sweethearts, but 2.7% of women had the same sweetheart, 1.2% acquired a new sweetheart, 1.8% no longer had a sweetheart, and zero women had a different sweetheart.



The average months since divorced, widowed, or separated for the factory workers at follow up was 4.6 months. Out of the 33 women who were recently married, 27.3% chose their own husband. Amongst the 8 women who responded as to why their previous sweetheart relationships ended, the main reason given was due to partners being “tired of each other”. Two women said it was because he had another girlfriend. While the remaining 2 women stated the relationship terminated because she had no money.

The percentage of women who moved at least one time in the last year was 16.4% (n=55). In addition, 73.1% had the same job as last year. Additional questions were asked at year 2 in regards to previous migration to the city. The percentage of women who had made arrangements prior to moving was 57.0%, and 23.0% of the women did not know anyone before moving. On average, the women arrived with \$30.8 and began working after 1.8 months. 61.8% of the women do not plan on returning to their hometown. From year 1 to year 2 of the study, 11.04% of the women became pregnant.

**Table 11: One year Follow Up: Changes in living situation, migration, and pregnancy status (n=335)**

	%/mean	(n/median)
% of women who moved at least one time in the last year – n=335	16.4%	(55)
% with same job as last year – n=334	73.1%	(244)
% who had arrangements before they left home town – n=335	57.0%	(191)
% who did not know anyone before moving - n=335	23.0%	(77)
Mean amount money upon arrival to city (median) – n=335	\$30.76	(\$25)
Mean months began working after arrival into city (median) – n=334	1.8	(1)
% that do not plan on returning to their hometown – n=335	61.8%	(207)
% that got pregnant within the last year	11.0%	(37)

During the follow up year, 26 women had an HIV test on their own outside of the study. Most of the women went to a voluntary testing center, public hospital, or private lab/clinic. Of those tested, 19.2% received counseling.

In the year of follow up, 11 women reported being forced to have sex or raped. Only one woman indicated she had had sex with someone other than a husband, sweetheart, or client, a casual or non-regular sex partner.

**Table 12: Year 2 changes in HIV testing**

	%/mean	(n/median)
Have an HIV test, different than the one for the study – n=335	7.8%	(26)
Received counseling with HIV test – n=26	19.2%	(5)

Changes in women's behaviors, experiences, and conditions between the baseline and followup interviews were tested using paired significance test; those with a p-value less than .05, are discussed. Fewer women reported living in dormitories at the follow-up than at the baseline interview (35.4% vs. 50.8% at baseline). Women report fewer roommates; the mean number of persons sharing a room decreased from 6.4 at baseline to 3.1 at follow-up.

In terms of sweethearts, 5.7% (n=19) reported having a sweetheart in year 2. 9 women had the same sweetheart in year 2 that they had in year 1 and 4 women acquired a sweetheart in year 2 and had not had one in year 1. In year 2, 6 of the women said they did have sex with a sweetheart in the past year.

Amongst the married women interviewed at one year follow-up, at the baseline only one woman reported premarital sex but at the one year follow up interview 6 women reported premarital sex. There was a decrease in woman talking about their health problems and worries in regards to their children with non family members. 56 women in year two indicated their husbands liked to spend time with them and in year 1 only 46 of the same women had reported the sentiment. There was a decrease in women

reporting their husbands had a sweetheart before marriage, from 21 in year 1 to 12 in year 2. 33.3% of women in year 1 had known someone who had died from AIDS. This number increased to 47.0% in year 2. There was a decrease in the number of times family visited with the past year from 3.2 to 2.6.

**Table 13: Changes From Baseline to One Year Follow Up Interview**

	n	Baseline	Follow Up	P value
Percent living in dormitory	333	50.7% (169)	35.4% (118)	<.001
Mean number persons living in the same room	163	6.4	3.2	<.001
Reported sweetheart in the past year	334	11.9% (40)	5.7% (19)	<.001
Percent reported sex with sweetheart in the past year	11	0.0% (0)	54.4% (6)	<.014
Percent reported current sweetheart	334	10.2% (34)	3.2% (11)	<.001
Percent reported sex with husband before marriage	38	2.6% (1)	15.8% (6)	.025
Percent discusses health problems with non-family members	307	44.9% (138)	33.9% (104)	<.001
Percent discusses worries about children with non family members	253	46.2% (117)	33.2% (84)	<.001
Percent reported husband/sweetheart likes to spend his free time with her	59	78.0% (46)	94.9% (56)	.004
Percent reported husband has had sweetheart other than her	35	60% (21)	34.4% (12)	.030
Percent know anyone who has died from AIDS	330	33.3% (110)	47.0% (155)	<.001
Mean number times family visited last year	331	3.18	2.56	.026



## VI. Conclusions

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In this cohort of women working in factories in Phnom Penh, there was a low prevalence of HIV and HSV-2 and little risk behavior reported. There was high consistency between the behavioral data and biological data as only 13 (3.8%) factory workers who said they never had sex tested positive HSV that is sexually acquired. This small discrepant number lends confidence that there was limited underreporting of sexual behavior due to perceived social stigma.

The findings from this study illustrate that very few factory women engage in risky sexual behavior. For the most part, they have sex when they are married. The majority of the young women in this cohort of factory women, a representative sample of factory women in Phnom Penh, were unmarried and not sexually active. Few women, who have never been married, reported sweethearts. Those that did have sweethearts reported rarely engaging in sexual intercourse and do intend to marry their sweethearts. In addition, these factory workers were not having sex for money with either clients or sweethearts. Therefore, their reported sexual behaviors and partnership characteristics are reflected in the very low prevalence of these sexually transmitted diseases detected amongst these factory women.

Sexual “risk” behaviors that traditionally have been risk factors for STDs were not found to be associated with HSV in this cohort. Marital status and older age were associated with higher risk of HSV. This is attributed to the partnership and sexual characteristics of factory women described earlier. Those who are having unprotected sexual intercourse are married, and therefore, it is their husbands who are putting them at risk. The type of marriage, and subsequent husband wife interaction, were also associated with HSV. Women who reported not knowing the husband well or at all before marriage and whose husbands did not talk to them about their personal worries were more likely to have HSV.

Women’s migration patterns were also associated with likelihood to have HSV-2. The more years since migration to the city and the more months working at current job, the more likely they are to be HSV-2 positive. This suggests the longer women stay in the city, the more they are at risk for acquiring this STD. Since, we did not find that the women reported increasing their number of partners, or having extramarital sex, a possible explanation is the more time women have had in the city means less time around their husbands. During periods of absence, husbands may engage in extramarital sex which carries a risk of acquiring a STD, especially if the extramarital sex is with a sex worker. The husbands may subsequently be more likely to transmit STDs to their wives.

Factory women’s behaviors changed over the one year of observation. More women reported having sweethearts, having sex with sweethearts, and having pre-marital sex after the first year. This could be due to a number of factors. The social climate in Cambodia may be changing and attitudes towards sex evolving, suggesting that each

year young women are more likely to have pre-marital sex. Another possibility is the effect of migration on young women over time. With more time spent outside the family in the city, personal beliefs regarding sex and partnership could change. Regardless, the factory women are being exposed to different things the longer they spend in Phnom Penh. For example, after year 1, there was a substantial increase in the number of women who had known someone who died from AIDS. This reflects a change in environment. This difference in environment could be influential. But, this difference in environment while influential could also be a natural progression that all young women go through. When young women enter the work force in a big city they will gain experience and decide to branch out into areas previously not experience. This does not indicate young factory women will engage in risky behavior or become vulnerable to acquire sexually transmitted diseases. The results from the follow-up, while showing that the women's behavior changed, did not necessarily change in a risky or negative direction. It may merely demonstrate maturing of young women who move from the countryside to a big city.

Yet, another possible explanation for the changes observed after year 1 is that factory women may have felt more comfortable disclosing aspects of their partnerships or sexual behaviors to the interviewers at the follow-up. Yet if women had been underreporting risk to interviewers at the baseline, there should have been more women testing positive for HSV-2 who reported never having sex, and as mentioned above, this was true for less than 5% of women studied.

In summary, while previous studies in Cambodia conducted using different research methodologies have reported riskier behavior amongst young factory workers, the low risk behaviors reported in this study are validated by low prevalence of HIV and HSV found. Moreover, this study was a large and representative sample of factory workers in Phnom Penh, suggesting the behaviors and risk of factory workers reported may be generalized to other factory workers in the city.

## VII. Recommendations and Implications

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Female factory workers should not be considered a high risk group. The findings from this study indicate that few factory women have sex outside of marriage, and as most are unmarried, most are not sexually active. Therefore, even though these young women come from rural areas and are new to the city, they do not appear to be at high risk of HIV infection. They continue to wait until marriage before initiation of sexual intercourse. There are young women working in other professions in urban Cambodia that may be at higher risk and should be prioritized for HIV prevention before factory women.

Female factory workers are somewhat stable, but nevertheless hard to maintain as a cohort. This is evident through the low retention rate in the cohort over one year (30% were lost to follow-up). Future cohort studies in Cambodia need to be aware of the high mobility of young women and plan for this possibility in design and analysis.

Factory workers reported low condom use with sweethearts and husbands, although few factory workers have sex with sweethearts. Condom use within married couples who may be interested in childbearing is a particular challenge. Unfortunately, even though a married factory woman is not engaging in extramarital sex, her husband might be. Therefore, HIV prevention methods such as microbicides should be investigated to protect married Cambodian women.

Finally, although factory women may not be at high risk for HIV, these young women are getting married, pregnant, and initiating sex and therefore are in need reproductive health services that should include HIV testing and counseling and condom promotion.

## VIII. Acknowledgments

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