

# HIV risk and sexual health among female migrants in China

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## Summary

Sexual behavior is the dominant mode of HIV transmission in China, and young female migrants are among the populations at highest risk. This article examines how HIV-related risk behaviors among female migrants might vary according to workplace settings. Participants were young female migrants recruited from three workplace settings—factories, restaurants and entertainment venues. In a cross-sectional survey, we assessed 457 participants' sociodemographic characteristics, HIV/AIDS-related knowledge, condom use knowledge, sexual behaviors, condom use behavior and reproductive health factors. Participants working in entertainment venues were significantly more likely than those working in factories and restaurants to report sexual behavior, unprotected sex, multiple pregnancy terminations and sexually transmitted infections (STI). However, participants working in factories and restaurants reported significantly lower levels of HIV/AIDS knowledge, condom use knowledge, condom use self-efficacy and history of HIV/AIDS counseling and testing. Independent correlates of unprotected sex included employment in an entertainment venue, abortion history and sexual self-efficacy. Independent correlates of STI or genitourinary tract infection included employment in an entertainment venue, abortion history, recent migration and recent unprotected sex. These findings indicate a need for sexual and reproductive health interventions prioritizing young female migrants, and call for programs that can be incorporated into different workplace settings.

**Key words:** China, women, migrants, sexual risk behaviors

## INTRODUCTION

The HIV/AIDS epidemic in China has shifted from an epidemic characterized by injection drug use and contaminated plasma donation to one associated primarily with sexual transmission (Ministry of Health, 2006; State Council AIDS Working Committee Office, 2007; Ministry

of Health, 2010; Ministry of Health, 2011). By the end of 2011, 46.5% of the estimated 780 000 people living with HIV in China acquired the virus through heterosexual transmission and approximately three-quarters of these cases were not attributable to sex with a married partner (Ministry of Health, 2011). Such trends indicate the role of premarital

or extramarital sexual transmission in China's HIV epidemic and suggest a need to better understand factors associated with heterosexual risk factors for HIV transmission.

In parallel with the evolution of the nation's HIV epidemic, public health interventions to prevent HIV transmission in China have transformed substantially over the past decade. China's official national response to the HIV epidemic began in 2003, commencing with the comprehensive 'Four Free and One Care' HIV prevention strategies which including free access to HIV testing and counseling, free medications to prevent mother-to-child transmission, free access to antiretroviral drugs for people living with AIDS living in rural settings or lacking health insurance, free schooling for AIDS orphans and care and assistance to households affected by HIV (Wu *et al.*, 2007a, 2007b). National policies have also included expansion of HIV testing to reduce secondary transmission, effective treatment to reduce mortality and public campaigns for HIV education and HIV-related stigma reduction (Sun *et al.*, 2010). Notably, intervention strategies have placed greater focus on high-risk and marginalized groups including migrant workers, female sex workers and men who have sex with men (Ministry of Health, 2011).

Migration has been a major factor in advancing the global HIV/AIDS epidemic and is a key contributor to China's growing epidemic (State Council AIDS Working Committee Office, 2007). In the context of China's HIV epidemic, high-risk migrant populations generally include internal migrants who relocate within China, usually from rural to urban settings, in search of economic opportunities. During the past three decades, China has experienced a dramatic increase in internal migration, from 6.75 million migrants in 1982 to an estimated 221 million migrants in 2010, of which 36% were females between 18 and 49 years old (Liu *et al.*, 2011a, 2011b; National Population and Family Planning Commission of P.R. China, 2011). Migrant populations have been identified as one of China's growing HIV risk groups. Of the 5635 HIV/AIDS cases reported in Beijing in 2008, the majority (75%) were internal migrants, compared with city residents (21%) and foreigners (4%) (Kaiser Health News, 2008). Migrants frequently return to their villages seasonally or during the Chinese Spring Festival, and this pattern of migration can facilitate the transmission of infectious diseases such as HIV from urban to rural settings.

Previous literature has suggested that young female migrants face high risk for HIV due to a lack of knowledge related to sexual health, limited skills for practicing safer sex and low awareness and use of reproductive health services in their native rural settings (Tu *et al.*, 2004; Liu *et al.*, 2011a, 2011b; Mantell *et al.*, 2011; He *et al.*, 2012; Lu *et al.*, 2012). Furthermore, compared with their male

counterparts and urban citizens, female rural-to-urban migrants face greater social and cultural vulnerability and gender-related inequalities, such as unequal work opportunities, low socioeconomic status and lack of social support (Mou *et al.*, 2013). Due to the conservative sexual culture in China, young females face social taboos related to openly talking about sex and HIV. Thus, sexual- and HIV-related education is particularly limited among rural females. Consequently, female migrants in China are frequently undereducated and underprepared for the increased opportunities to engage in sexual behavior that are available to them in urban settings (Huang *et al.*, 2014). In the absence of skills, knowledge and services to promote sexual health, female migrants who relocate to large urban centers may experience risk for a range of health consequences, including unwanted pregnancy, unsafe termination of pregnancy and sexually transmitted infections (STIs) (Zhang *et al.*, 2007; Yi *et al.*, 2010; He *et al.*, 2012). Some research has contrasted the more permissive norms related to premarital sex in large urban contexts versus norms in rural settings, which might also contribute to health risk behaviors among rural-to-urban migrants (Yang *et al.*, 2007).

Previous studies have shown that the majority of rural-to-urban female migrants find employment in factories, service industries (e.g. restaurants) and 'entertainment establishments' (Ge, 2007; Lin *et al.*, 2007; Chen *et al.*, 2011). In factory and restaurant venues, female migrants typically work as manual laborers or servers. Both venues tend to have rigid work schedules and management regulations which greatly restrict their contact with locals. For example, factory workers frequently are required to live in a dormitory located close to work and socialize exclusively with other factory workers. In contrast, entertainment establishments include commercial venues where patrons, mostly male, pay female employees for accompaniment in social activities including karaoke, dancing, gambling and massage (Yang *et al.*, 2005). Employment in an entertainment venue might be considered desirable due to the relatively higher wages including tips, as well as due to the opportunities to socialize with local men. However, entertainment venues might confer behavioral risks for female employees due to the more intimate nature of services provided, including a likelihood for employees to use alcohol at the work setting and to be propositioned by patrons for sex. Owing to the different type of work in these various employment settings, risk for HIV and other STIs among female migrants might vary according to their workplace (Yang *et al.*, 2005; Chen *et al.*, 2011). Previous studies of female migrants have focused on young women identified as sex workers (Hesketh *et al.*, 2005; Chen *et al.*, 2010; Huang *et al.*, 2011), but fewer studies have paid attention to young female migrants who work in other settings that

might confer different levels of risk for behaviors and reproductive health.

This article examines HIV/STI-related sexual risk and reproductive behaviors among young female migrants recruited from three different work settings—factories, restaurants and entertainment venues. The study was conducted in Hefei, the capital city of Anhui Province. This city provides a compelling context for studying migrants due to its rapid development in a relatively less-developed provincial setting. As the city has developed during the past decade, there have been increasing numbers of new restaurants, factories and entertainment venues which provide a large job market for young female migrants. The aims of this article are to (i) describe demographic characteristics and sexual health risk according to workplace and (ii) examine independent correlates of HIV/STI-related risk among young female migrants. The findings of this article could help in developing workplace-sensitive HIV prevention strategies for young female migrants in China.

## METHODS

### Study sites and participants

From 2007 to 2008, we conducted a cross-sectional survey of young rural-to-urban migrant women recruited from factory, restaurant and entertainment venues in Hefei, Anhui Province, China. For the purposes of this study, rural-to-urban migrants were defined as individuals who moved from rural settings in order to life and work in Hefei, and who lacked an official household registration in Hefei. To facilitate recruitment activities in the targeted settings, which required the permission of owners/managers of targeted venues, we partnered with the local Centers for Disease Control and Prevention (CDC). In China, the CDC is responsible for all HIV/AIDS-related activities, including prevention, treatment and surveillance. Collaborating officials from the CDC helped to explain the purpose of the research to venue owners/managers and assisted in obtaining permission to recruit from within their venue. In total, one large factory, six restaurants and six entertainment venues located in Hefei agreed to serve as recruitment sites.

Eligibility criteria included being female, 16–24 years old, unmarried, rural migrants to Hefei and employed in one of the targeted settings. Prior to recruitment, informational leaflets about our survey were distributed in each recruitment site. Of 502 individuals who were expressed initial interest in the study and were screened for eligibility, 483 participants were deemed eligible and provided informed consent to participate in the study. Before interviewing, we also inquired whether participants experienced any coercion by their managers or coworkers to participate

in the study; no participants reported coercion. Twenty-six participants elected to terminate the study early, yielding 457 valid surveys for analysis (175 factory workers, 138 restaurant workers and 144 entertainment workers). The confidential face-to-face survey interviews were conducted by trained female research assistants of similar age to the participants; we elected to not ask participants to self-administer the survey due to possible limitations in literacy. All interviewers were trained to avoid asking leading questions or give any hints or guidance as to how participants should answer any of the survey questions. Interviews took place in a private room in the workplace setting during employees' breaks or before or after work shifts. Interviews lasted 30–40 min. Participants were compensated with a small gift worth 40 Chinese Yuan (~6 U.S. dollars) after they completed the questionnaires. The study was approved by the Institutional Review Board of the investigators' institutions.

### Measures

Sociodemographic characteristics were assessed including age, education, monthly income, family status (e.g. having an intact two-parent family, single-parent family or step-parent family), type of work setting and time since migration to Hefei. Behavioral health variables measured included sexual behaviors with men (number of lifetime male sexual partners, age of sexual debut and whether first sex was voluntary) and condom use (including condom use during initial sex and at last sex episode, and frequency of condom use during the past 2 months).

Four social-cognitive HIV/AIDS variables were measured, using instruments previously validated in China by Chen *et al.* (Chen *et al.*, 2010). *HIV/AIDS-related knowledge* was measured using an 18-item measure (sample item, 'Do you think you can be infected with HIV by hugging or shaking hands with HIV-positive people?'). *Condom use knowledge* was measured using a 10-item measure (sample item, 'It is OK to put on a condom just right before the ejaculation'). *Self-efficacy to use condoms* was assessed using a 5-item measure (sample item, 'Are you confident you can use condoms each time you have sexual intercourse?'). *Self-efficacy to control one's sexual behavior choices* was assessed using a 5-item measure (sample item, 'Are you confident you can refuse to have sex?').

Reproductive health items included whether participants ever terminated a pregnancy, total number of pregnancy terminations and whether they had any STI or genital tract infection in their lifetime and in the past year. Participants were also asked whether they ever received any HIV risk reduction counseling and whether they had ever undergone HIV testing.

## Data analysis

EpiData 3.0 software was used to input the original data and SPSS 10.01 was used to analyze the data. Descriptive analyses,  $\chi^2$ , Fisher's exact tests and analysis of variance were used to compare descriptive characteristics according to work settings (factory, restaurant, entertainment venue). Univariate and multivariable regressions were conducted to examine the correlates of two dependent variables: (i) unprotected sexual behavior in the last 2 months and (ii) any STI or genital tract infection in the last year. Following Hosmer and Lemeshow (Hosmer and Lemeshow, 2000), independent variables were included in multiple logistic regression models if they were associated with the dependent variable in univariate logistic regression or based on a priori interest (such as sociodemographic variables). Multivariable regressions used the stepwise backwards method to identify the most parsimonious model. Due to low cell counts, we combined factory and restaurants members into one group in the univariate and multivariable logistic regressions.

## RESULTS

### Participant characteristics

Sociodemographic characteristics are presented in Table 1. The average age was 20 years ( $SD = 2.0$ ), with an age range of 16–24. Nearly three-quarters (73%) had a junior high school education or less, and 62% had earned less than 1000 Yuan (roughly 150 USD) monthly. Over half (54%) had been working in Hefei for more than 2 years. Most participants (84%) had intact families at home with both parents married and living together.

Significant workplace differences were observed for sociodemographic characteristics (see Table 1). Participants working in entertainment venues were more likely than those working in factories and restaurants to be between 20 and 24 years old (76%), from a single-parent or step-parent family (35%), have a monthly income greater than 1500 Yuan (56%) and have worked in Hefei for <2 years (59%). Participants working in factories were more likely than those working in restaurants or entertainment venues to be between 16 and 19 years old (65%) and to have completed junior high school or less (94%). Participants working in restaurants were more likely than those working factories or entertainment venues to have a monthly income of <1000 Yuan (91%).

### Sexual behaviors and condom use

Prevalence of HIV-related risk behaviors and comparisons by workplace are presented in Table 2. Approximately

one-third (35%) of the sample had ever had sex with a man. History of sex with a man was significantly higher among participants working in entertainment venues (87%) compared with factory workers (5%) and restaurant workers (20%). Among participants who ever had sex, most (83%) were 18 years or older at their first sexual experience and 79% experienced sexual debut voluntarily; no group differences were observed for these two variables. Among all sexually active participants, 32% used a condom during their first sex episode, 57% reported always using condoms during the past 2 months and 72% used a condom during their most recent sex episode. Participants working in entertainment venues were more likely than factory workers and restaurants workers to have used a condom during their first sex episode (38 vs. 11% and 11%, respectively), used condoms consistently during the past 2 months (64 vs. 22% and 33%, respectively) and used a condom during their most recent sex episode (80 vs. 33% and 48%, respectively). Participants working in entertainment venues reported more lifetime sex partners ( $M = 11.71$ ) compared with factory workers and restaurant workers ( $M = 1.67$  and  $1.44$ , respectively).

### Reproductive health, HIV counseling and testing and HIV/AIDS-related cognitive factors

Table 3 presents prevalence and group differences in reproductive health factors, HIV counseling and testing and measures of HIV/AIDS-related knowledge and self-efficacy. Overall, 16% of participants ever had a termination of pregnancy, 5% had more than one termination, 19% ever had an STI or genital tract infection and 11% had an STI or genital tract infection during the past year. Only 6% had ever received HIV/AIDS risk reduction counseling, and 6% had received an HIV test. Participants working in entertainment venues were more likely than factory and restaurant workers to have ever experienced termination of a pregnancy (43 vs. 2% and 5%, respectively), two or more terminations (15 vs. 0% and 1%, respectively), an STI or genital tract infection during the past year (32 vs. 1% and 4%, respectively), HIV/AIDS risk reduction counseling (17 vs. 1% and 1%, respectively) and an HIV test (16 vs. 2% and 1%, respectively).

Participants working in entertainment venues reported significantly higher HIV/STI knowledge compared with factory workers and restaurant workers ( $M = 13.7$  vs.  $M = 7.5$  and  $10.5$ , respectively), higher knowledge about condom use ( $M = 6.9$  vs.  $0.6$  and  $2.0$ , respectively) and higher condom self-efficacy ( $M = 13.8$  vs.  $11.4$  and  $11.3$ , respectively), but reported lower sexual behavior self-efficacy ( $M = 13.2$  vs.  $15.3$  and  $13.9$ ).

**Table 1:** Sociodemographic characteristics—overall sample and workplace differences

Variables	N (%)	Working in factory (N=175), n (%)	Working in restaurant (N=138), n (%)	Working in entertainment venue (N=144), n (%)	$\chi^2$	p-value, Fisher's exact
Age group (years)					55.29	<0.001
16–19	207 (45.3)	114 (65.1)	58 (42.0)	35 (24.3)		
20–24	250 (54.7)	61 (34.9)	80 (58.0)	109 (75.7)		
Education level					71.91	<0.001
Junior high school or less	333 (72.9)	164 (93.7)	85 (61.6)	84 (58.3)		
High school or higher	124 (27.1)	11 (6.3)	53 (38.4)	60 (41.7)		
Single-parent or step-parent family					52.41	<0.001
Yes	72 (15.8)	11 (6.3)	11 (8.0)	50 (34.7)		
No	385 (84.2)	164 (93.7)	127 (92.0)	94 (65.3)		
Monthly income (RMB)					274.14	<0.001
≤1000	284 (62.1)	139 (79.4)	125 (90.6)	20 (13.9)		
1001–1500	86 (18.8)	35 (20.0)	8 (5.8)	43 (29.9)		
>1500	87 (19.1)	1 (0.6)	5 (3.6)	81 (56.2)		
Migrant work time (year)					23.09	<0.001
<2	209 (45.7)	57 (32.6)	67 (48.6)	85 (59.0)		
≥2	248 (54.3)	118 (67.4)	71 (51.4)	59 (41.0)		

**Table 2:** Sexual behaviors—overall sample and workplace differences

Variables	N (%)	Working in factory (N = 175), n (%)	Working in restaurant (N = 138), n (%)	Working in entertainment venue (N = 144), n (%)	$\chi^2/F$	p-value Fisher's exact
Ever have sex with male					270.77	<0.001
Yes	161 (35.2)	9 (5.1)	27 (19.6)	125 (86.8)		
No	296 (64.8)	166 (94.9)	111 (80.4)	19 (13.2)		
Age of sexual debut <sup>a</sup>					0.75	0.725
<18	27 (16.8)	1 (11.1)	3 (11.1)	23 (18.4)		
≥18	134 (83.2)	8 (88.9)	24 (88.9)	102 (81.6)		
Voluntary first sex <sup>a</sup>					4.34	0.117
Yes	127 (78.9)	5 (55.6)	24 (88.9)	98 (78.4)		
No	34 (21.1)	4 (44.4)	3 (11.1)	27 (21.6)		
Condom use during the first sex <sup>a</sup>					9.67	0.006
Yes	52 (32.3)	1 (11.1)	3 (11.1)	48 (38.4)		
No	109 (67.7)	8 (88.9)	24 (88.9)	77 (61.6)		
Condom use with male partners in the past 2 months <sup>a</sup>					36.52	<0.01
Always	91 (56.5)	2 (22.2)	9 (33.3)	80 (64.0)		
Sometimes	52 (32.3)	0 (0.00)	12 (44.4)	40 (32.0)		
Never	18 (11.2)	7 (77.8)	6 (22.3)	5 (4.0)		
Condom use in the last sex with men <sup>a</sup>					16.99	<0.01
Yes	116 (72.0)	3 (33.3)	13 (48.1)	100 (80.0)		
No	45 (28.0)	6 (66.7)	14 (51.9)	25 (20.0)		
The number of male sexual partners in lifetime (M ± s) <sup>a</sup>		1.67 ± 0.50	1.44 ± 0.80	11.71 ± 2.5.17	2.94	0.057

<sup>a</sup>Includes those who reported ever having sex with male.

**Table 3: Reproductive health factors and HIV/AIDS-related knowledge—overall sample and workplace differences**

Variables	N (%)	Working in the factories (N = 175), n (%)	Working in the restaurants (N = 138), n (%)	Working in the entertainment venue (N = 144), n (%)	$\chi^2/F$	p-value Fisher's exact
Ever had to terminate pregnancy					108.96	<0.001
Yes	73 (16.0)	4 (2.3)	7 (5.1)	62 (43.1)		
No	384 (84.0)	171 (97.7)	131 (94.9)	82 (56.9)		
The total of pregnancy terminations					109.41	<0.001
0	384 (84.0)	171 (97.7)	131 (95.0)	82 (56.9)		
1	50 (10.9)	4 (2.3)	6 (4.3)	40 (27.8)		
≥2	23 (5.1)	0 (0.0)	1 (0.7)	22 (15.3)		
Got STD or genital tract infection in lifetime					138.75	<0.001
Yes	88 (19.3)	3 (1.7)	11 (8.0)	74 (51.4)		
No	369 (80.7)	172 (98.3)	127 (92.0)	70 (48.6)		
Got STD or genital tract infection in the last year					85.17	<0.001
Yes	52 (11.4)	1 (0.6)	5 (3.6)	46 (31.9)		
No	405 (88.6)	174 (99.4)	133 (96.4)	98 (68.1)		
Ever had HIV/AIDS counseling					41.92	<0.001
Yes	28 (6.1)	1 (0.6)	2 (1.4)	25 (17.4)		
No	429 (93.9)	174 (99.4)	136 (98.6)	119 (82.6)		
Ever had HIV testing					34.31	<0.001
Yes	27 (5.9)	3 (1.7)	1 (0.7)	23 (16.0)		
No	430 (94.1)	172 (98.3)	137 (99.3)	121 (84.0)		
STD and HIV/AIDS knowledge (M ± s) <sup>a</sup>					105.32	<0.001
Condom use knowledge (M ± s) <sup>b</sup>		7.47 ± 4.17	10.52 ± 3.98	13.66 ± 3.07		
Condom self-efficacy (M ± s) <sup>c</sup>		0.56 ± 1.24	2.04 ± 2.75	6.94 ± 2.07	403.46	<0.001
Sexual behavior self-efficacy (M ± s) <sup>d</sup>		11.43 ± 4.78	11.30 ± 4.01	13.78 ± 4.60	14.184	<0.001
		15.33 ± 4.52	13.93 ± 3.92	13.15 ± 4.64	10.22	<0.001

<sup>a</sup>Higher scores reflect greater levels of STD and HIV/AIDS-related knowledge; range 0–18.

<sup>b</sup>Higher scores reflect greater levels of condom use knowledge; range 0–10.

<sup>c</sup>Higher scores reflect greater levels of condom self-efficacy; range 0–20.

<sup>d</sup>Higher scores reflect greater levels of sexual behavior self-efficacy; range 0–20.

### Independent correlates of unprotected sexual behavior

Univariate and multivariable logistic regression models examining correlates of unprotected sexual behavior during the past 2 months are summarized in Table 4. In univariate logistic regressions, unprotected sexual behavior during the past 2 months was associated with workplace, education level, pregnancy termination history, STI or genital tract infection in the last year, condom use-related knowledge and sexual behavior self-efficacy. In the multivariable logistic regression model controlling for age, education level and family type, unprotected sexual behavior during the past 2 months was associated with working in an entertainment venue [adjusted odds ratio (AOR) = 2.69, confidence interval (CI) = 1.33, 5.43], abortion history (AOR = 3.23, CI = 1.56, 6.71) and sexual behavior self-efficacy (AOR = 0.85, CI = 0.79, 0.91).

### Independent correlates of STI or genital tract infection

Univariate and multivariable logistic regression models examining correlates of STI or genital tract infection in the last year are summarized in Table 4. The univariate logistic regressions showed that STI or genital tract infection in the last year was associated with workplace, education level, length of work as a migrant, HIV testing history, pregnancy termination history and unprotected sexual behavior during past 2 months. In the multivariable logistic regression model controlling for age, education level and family type, STI or genital tract infection in the last year was associated with working in an entertainment venue (AOR = 3.97, CI = 1.76, 8.96), recent migration (AOR = 1.98, CI = 0.88, 4.48), pregnancy termination history (AOR = 6.78, CI = 3.07, 14.98) and unprotected sexual behavior in past 2 months (AOR = 2.85, CI = 1.28, 6.31).

## DISCUSSION

The current study brings attention to young female migrants in China as a vulnerable subpopulation with potentially high risk for HIV/AIDS and poor reproductive health. Due to the size and movement in China's migrant population, and in light of the critical sexual and reproductive health needs of this population, increasing access to appropriate health services to reduce behavioral risk for HIV and other STIs among female migrants is a priority (Anderson *et al.*, 2003).

This study found important subpopulation differences within young female migrants. Overall, migrants working in entertainment venues showed elevated risk for sexual and reproductive health problems, including greater

sexual risk behavior, history of pregnancy termination, any STI and genital tract infection. History of HIV counseling and HIV testing in the sample was low overall, although slightly higher (but still inadequate) among workers in entertainment venues. Female migrants who worked in entertainment venues had spent less time working in the urban setting, were less likely to have intact families and were significantly older than female migrants who worked in factories and restaurants. In contrast, migrants working in factories were the least educated, and migrants working in restaurants reported the lowest monthly incomes. Factory and restaurant workers also reported lower levels of HIV/AIDS-related knowledge and self-efficacy compared with migrants working in entertainment venues.

Group differences observed in this study are consistent with previous research from China revealing family structures and socioeconomic backgrounds of female adolescents influence their employment opportunities and tendencies to engage in sexual risk behaviors (Li *et al.*, 2009; Yan *et al.*, 2009). Specifically, those who come from single-parent or step-parent families experience greater financial pressure to work in entertainment venues. Indeed, the majority of females who worked in entertainment venues were more likely to earn more than 1500 Yuan monthly than females worked in factory and restaurants, indicating the possible influence of financial motivations in migrants' decisions to work in entertainment venues (Fang *et al.*, 2007). Findings reported here are also consistent with other studies indicating that females working in entertainment venues are likely to have multiple sexual partners (Fang *et al.*, 2007; Chen *et al.*, 2011; Hong *et al.*, 2011). Findings are consistent with results reported by Yang *et al.* (Yang *et al.*, 2005), who found that females working in entertainment establishments in China engaged in risky sexual practices twice as frequently as females working in non-entertainment establishments.

There are several limitations in the current study. First, we used convenient sampling rather than random sampling of employees, which limits generalizability due to a potential for volunteer bias. Generalizability might be particularly limited because we required the permission of owners/managers to recruit and implement the study in their venues. Second, due to the sensitive nature of the study topic, participants might have underreported risk factors as a result of a social desirability bias; biological confirmation of STI status would be useful to verify self-reported sexual health data. Third, we did not collect information on other behavioral risk factors such as alcohol use and drug abuse. Previous studies revealed that the overlap between substance use as co-occurring risk factors in most-at-risk populations for HIV (Kalichman *et al.*, 2007; Li *et al.*, 2010). Fourth, this cross-sectional study



**Table 4:** Correlates of unprotected sexual behavior (past 2 months) and STI or genital tract infection (past year)

Variables	Unprotected sexual behavior, past 2 months		STI or genital tract infection, past year	
	Univariate regression OR (95% CI)	Multivariable regression AOR <sup>a</sup> (95% CI)	Univariate regression OR (95% CI)	Multivariable regression AOR <sup>a</sup> (95% CI)
Workplace				
Restaurant or factory	Ref	Ref	Ref	Ref
Entertainment venue	5.24 (3.05–8.98)	2.69 (1.33–5.43)	24.02 (9.96–57.94)	3.97 (1.76–8.96)
Education level				
Junior high school or less	Ref		Ref	
High school or higher	2.51 (1.49–4.25)		2.86 (1.59–5.16)	
Migrant work time (year)				
≥2	–		Ref	Ref
<2			1.88 (1.05–3.39)	1.98 (0.88–4.48)
Ever had HIV test				
No	–		Ref	
Yes			4.50 (1.90–10.63)	
Ever had an abortion				
No	Ref	Ref	Ref	Ref
Yes	8.43 (4.75–14.96)	3.23 (1.56–6.71)	22.38 (11.35–44.13)	6.78 (3.07–14.98)
STI or genital tract infection, past year				
No	Ref		–	
Yes	6.69 (3.58–12.51)			
Unprotected sexual behavior, past 2 months				
No	–		Ref	Ref
Yes			6.69 (3.58–12.51)	2.85 (1.28–6.31)
Condom use self-efficacy ( $M \pm s$ ) <sup>b</sup>				
	0.94 (0.89–0.99)		–	
Sexual behavior self-efficacy ( $M \pm s$ ) <sup>b</sup>				
	0.83 (0.78–0.88)	0.85 (0.79–0.91)	0.87 (0.82–0.93)	

<sup>a</sup>Model adjusted for age, education level and family type.

<sup>b</sup>Continuous variables (greater value in scores for condom use self-efficacy and sexual behavior self-efficacy reflect higher overall levels).

was conducted between 2007 and 2008 in a single, moderately developed city in eastern China, which may not be comparable with other mega-metropolitan coastal cities (e.g. Beijing, Shanghai or Guangdong). Results do not permit causal inference and may not be generalized to other populations currently in China. Finally, measures included in the survey focused on individual-level factors and, thus, analyses do not permit conclusions related to specific social or structural–environmental factors related to risk outcomes.

#### Implications for health promotion and practitioners

The current study has implications for future HIV prevention programs addressing the needs of young female migrants in China. A systematic review of HIV prevention programs in China identified a growing body of individual-level

behavioral interventions delivered in clinical settings and high-risk venues, and noted an emerging interest in workplace interventions (Hong and Li, 2009). Differences in HIV risk according to workplace settings call for the development of tailored workplace interventions. Young migrant women working in entertainment venues evinced high behavioral risk for HIV, sexual and reproductive health problems, whereas young women working in factories and restaurants had low access to HIV counseling and testing and low levels of HIV-related knowledge and self-efficacy. Thus, HIV prevention strategies for young female migrants working in entertainment venues should focus on reducing unprotected sex, increasing HIV/STI testing and reducing unintended pregnancy; prevention strategies for females working in factory and restaurant establishments should focus on enhancing HIV/AIDS-related knowledge, condom use knowledge and condom use self-efficacy.

Workplace health promotion interventions in China offer opportunities for providing health education to large numbers of employees and might be especially useful for reaching migrant populations (Hong and Li, 2009). A nascent body of research conducted in China has shown promising effects of workplace interventions on improved HIV knowledge (Li *et al.*, 2006; Wu *et al.*, 2007a, 2007b) and contraception education (Qian *et al.*, 2007). Health promotion interventions delivered at venues where young female migrants work may be useful in enhancing knowledge and skills to engage in condom use, increase HIV and STI testing and practice birth control. Activities should particularly focus on increasing young female migrants' self-efficacy and strategies for avoiding risky sexual situations.

However, in order to conduct such interventions, it will be necessary to engage the trust and collaborations of managers/owners of workplace settings to obtain access and implement change in the workplace environment (Qian *et al.*, 2007). Due to the structural–environmental processes that may contribute to sexual and reproductive risks among young female migrants in China, research is needed to understand and address factors beyond the individual level that determine HIV risk (Hong and Li, 2009). Research is particularly needed on social policies, laws and regulations for creating healthier environments to promote the sexual and reproductive health of young migrant women.

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## CONFLICT OF INTEREST

The content is solely the responsibility of the authors and does not necessarily represent the official views of any study sponsors.

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