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Full Length Research Paper

Association of human immunodeficiency virus (HIV) preventive information, motivation, self-efficacy and depression with sexual risk behaviors among male freelance laborers

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The waves of rural-urban migration are increasingly growing in many developing countries, including Vietnam. This migratory process, whether voluntary or not, may result in the spread of human immunodeficiency virus (HIV) infection to both those who migrate and those who receive migrants. Coupled with this process, is the experience of depression that may facilitate risk behaviors for HIV. However, there has been little research concerning this dimension. This study examined self-reported risk behaviors and factors associated among 450 male freelance laborers in Hanoi, Vietnam. Risk of acquiring and transmitting HIV was high among these men. One third reported having intercourse with commercial sex workers and one quarter had casual sex partners. One in every 12 men reported homosexual or bisexual behavior. These men on average had 3 partners within the preceding year, and condom use was inconsistent. These men have limited HIV knowledge and only moderate motivation and perceived behavioral skills for protective behavior. Although mobility was not associated with sexual risk behavior, three elements of IMB (information-motivation-behavioral skills) model and depression associated with this process were a robust predictor of sexual behavior. Men who are better informed, motivated, display higher self-efficacy and less depressed are more likely to alter their risk behavior. The study highlights an important need for HIV-related information, motivation, self-efficacy, depression and risk behavior change.

Key words: Vietnam, freelance laborer, human immunodeficiency virus /acquired immune deficiency syndrome (HIV/AIDS), information-motivation-behavioral skills (IMB) model, depression, sexual behavior, sexual risk behavior.

INTRODUCTION

Most previous studies of human immunodeficiency virus (HIV) risk behavior in Vietnam have focused on traditional "core transmitter" groups (Agence , 2001; Hien, 2002; Hien et al., 2004; Tuan et al., 2007; Vietnam Commission for Population, Family and Children, 2003). However, this concentration on high risk groups may leave others under-protected or unprepared for prevention. For male freelance workers, most of whom are migrants, the separation from family, breakdown of social networks, lack of social controls and support and anonymity of living in a city, frustrates them and such stresses, compels

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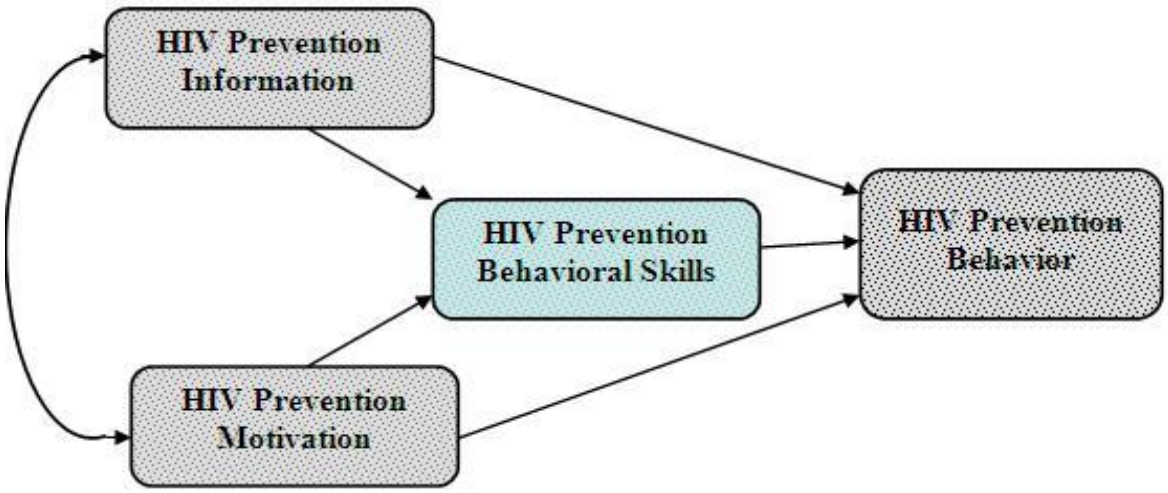

Figure 1. IMB model of HIV prevention behavior.

them to involve in sex to shed away the stress and thus make them especially vulnerable to HIV infection. These men may have multiple sexual encounters with different, changing partners, and usually without condom protection (Jochelson et al., 1991), and consequently have higher rates of HIV as compared with non-migrant men (Lurie et al., 2003a, b).

Although, there is growing interest of research in migrant laborers (Duong et al., 2005), little is known about patterns and determinants of risky or safer sexual behaviors for HIV, especially among freelance laborers. The only two most recent qualitative studies on this population have revealed some interesting results (Huy et al., 2010a, b). In their studies, Huy et al. (2010a, b) explored living experiences of freelance laborers who were involved in unskilled, unregistered, and low-income labors from an urban perspective of Vietnam and found that these men are at risk of HIV transmission. Decisions to engage in HIV risk behavior were influenced by a complex network of factors, especially misperceptions, emotions and psychological problems that placed these mostly poor and minimally educated men highly vulnerable for HIV infection. Men who lacked HIV-related knowledge and experienced with psychological issues such as curiosity, tiresomeness, distress, fatalism, revenge, and family pressure, and others are more likely to be involved in risk behaviors for acquiring HIV, including unsafe sex and sharing needles. However, what literature is lacking is quantitative research to be statistically tested in order to validate findings of the previous studies and to analyze the extent and impact of various factors believed to influence sexual risk behaviors among this population.

Behavioral science theory has not been used to examine factors that determine risky health behaviors for HIV among this segment of the urban populations in Vietnam. The information-motivation-behavioral skills (IMB) model (Fisher and Fisher, 2002) has been used as the basis for studies in a wide range of areas – breast self-examination, motorcycle safety gear use and medical treatment adherence (Fisher and Fisher, 2002) in a diversity of populations (Fisher and Fisher, 1999; 2003a). It has also been applied to research regarding risk of HIV infection among heterosexual and homosexual people, in rural and urban groups, working people or students in both developed and developing countries (Fisher and Fisher, 2003b).

The IMB model (Figure 1) proposes that a HIV preventive behavior, such as condom use during sexual intercourse, is a function of AIDS prevention information, AIDS prevention motivation, and AIDS prevention behavioral skills (Fisher and Fisher, 1992; Fisher et al., 1994). Bryan et al. (2000) and Odutolu (2005) highlighted, however, that as the model has been by and large individual-level based, there is a need to adapt the model in order to assess how other social and individual factors would be associated with HIV-related preventive behaviors.

The main goal of this study was to examine prevalence of HIV risk behavior and factors associated with risky - or safer - sexual behavior among male freelance laborers in urban Vietnam. In particular, we adopted the IMB model as a tool to examine how each construct of the model would contribute to sexual risk behavior change. Concurrently, we also assessed the role of some additional components such as migration index and depression in relation to such a behavior. Our study hypothesized that mobility index, depression, information and motivation would be associated with protected sex self-efficacy as well as with the level of safer sexual behavior change among male freelance laborers.

The current study has been informed by depression and strategies to cope with them among male freelance laborers (Huy et al., 2010a, b). In the prevailing

depression contexts, for example, dissatisfaction with family life and overwhelming pressure as financial bread pillar of the family, one of the coping strategies among this population was in the form of sex (Huy et al., 2010b). The current quantitative survey study was carried out as part of a larger, multi-disciplinary project attempting to understand determinants of HIV risks among male freelance laborers in Vietnam.

METHOD

Research site

The site for this study is in urban and suburban Hanoi in northern Vietnam. Hanoi is one of the two large cities in Vietnam and one of the most frequent choices for rural-urban migrants, including those who become unregistered laborers.

Sample size and participants

Based on a definition of freelance laborers by Duong et al. (2005) and Simpson and Weiner (1989) participants were males aged 18 to 59 who work for private owners or self-earn without a labor contract. A sample of 450 was identified given the following formula of Lwanga and Lemeshow (1998) for sample surveys of simple random sampling:

$$N = \{ [(Z^2_{1-\alpha/2})P(1-P)N] / [D^2 (N-1) + (Z^2_{1-\alpha/2})P(1-P)] \}$$

Where α refers to a statistically significant level at 0.05; (1-α) is a confidence level (95%); Z yields 1.96, a value derived from the Z-table corresponding to α of 0.05; P is defined as an estimated population proportion with protected sex (36.2% based on our pilot survey); d is an absolute precision at 0.04; N is the population size with 5000 as estimated for male freelance workers in Hanoi based on the data of Australian National University (ANU) (2003) and Duong et al. (2005); n, a minimum sample size according to the formula, is 450.

A sampling frame was made by social mapping venues of freelance laborers in districts of Hanoi. We aimed to identify as many venues of male freelance laborers within the city as possible. A group of researchers were formed and trained on mapping. Each member was assigned a number of districts to visit. Afterwards these members identified venues at which freelance laborers congregated. In each district field workers searched for men in casual employments. Typically, this is in streets, markets, construction sites, bus stations, small business shops, or by such other social services as schools, hospitals, and factories.

In each venue key informants such as freelance laborers themselves, local people living close to the venue, local leaders, experienced researchers (from prior studies on mobile populations), peer educators and outreach officers were consulted for mapping the next venues. At the same time, field workers were asked to estimate the number of male freelance laborers as a basis for approaching respondents in the main survey. Finally, a list of all the venues and the estimated number of respondents was created.

Survey procedures

This study began with 16 explorative qualitative interviews to identify key variables to be included in the modified IMB model. The draft research instrument was evaluated with a sample of 55 participants. The pilot showed that the instrument was technically feasible for the main survey (Cronbach's α > 0.70 for most subscales) and an average number of 770 participants were estimated from 13 potential districts within the city. Experience from prior research indicated that 10% of the sample would refuse interviews and about 30 to 35% changed locations; therefore in this study we approached the entire population to conduct structured interviews.

Participants were verbally informed about the study purpose, that participation was voluntary, that they had the right to withdraw at any point, and, that data would be handled confidentially. After obtaining informed consent, a structured questionnaire was administered to participants by face-to-face interview. The interviews were conducted in participants' homes, at their worksites, in the home of researchers or a nearby place convenient to participants. The survey was conducted by trained interviewers, and no personal identifiable information was noted on the questionnaire. The questionnaire took between 30 to 45 min to complete. Each participant was given AU$10 to compensate for his time. The study protocol was approved by the Institutional Review Boards at both Queensland University of Technology in Australia and Hanoi Medical University in Vietnam.

Measures

Social contexts

Access to AIDS information was formed from 12 items (α = 0.55). The ratio of the number of migratory cities to years of total migration was employed as an index of mobility (Li et al., 2004). Migration was classified if mobility index was more than zero. Alcohol use was a composite of the number of standard drinks and frequency of use over the past 4 weeks (α = 0.60). To measure depression, a short version "Boston form" of the center for epidemiological studies depression scales (CEDS) was used as it is made up of concrete experiences that participants with less formal education could interpret in the context of their daily lives. The scale has been proven reliable and valid though with less items in prior research, as well as validated in the labor migrants, most of whom are males with life experiences (Joseph et al., 2006). With ten 4-point items the scale of depression experience has an α of 0.88 (Andresen et al., 1994; Cole et al., 2004; Kohout et al., 1993; Santor and Coyne, 1997) and of 0.86 in the present study.

Information

AIDS preventive information was assessed with ten true/false/do not know items (Bryan et al., 2001; Misovich et al., 1997). Scoring the information scale was accomplished by dichotomizing each item into a value of 1 (correct) and 0 (incorrect or do not know) and then summing the item values to form a composite score with higher scores on this scale reflecting increased knowledge about AIDS prevention (α = 0.60). The scale is split into two subscales. One subscale includes 5 items (α = 0.57) measuring theoretical knowledge or relevant to the sexual transmission of HIV (e.g., "Using condoms when you have sex can reduce the chance of getting HIV"); the sum of correct responses is the sexual transmission information score. The other subscale comprises 5 items (α = 0.62) that address HIV prevention heuristics (e.g., "Once you trust your partner you do not need to use condoms with them"). The sum of correct responses is the heuristic information score. These two scores serve as indicators of the latent construct of AIDS prevention information.

Motivation

Motivation was measured by twenty one 5-point items assessing respondents' attitudes towards condom use [e.g., "How good or bad would it be if you talked about condom use (to keep from getting HIV/AIDS) with your sex partner(s) before having sex with them during the next month?"]; subjective norms or generalized perceptions of social support for their practice of condom use (e.g., "Most people who are important to you think you should talk about condom use with your partner(s) before having sex with them during the next month?"; and intentions to perform each condom behavior (e.g., "If you have sex during the next month, you intend to talk about condom use with your partner(s) before having sex with them?") (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975; Misovich et al., 1998). Respondents rate their performance of twenty-one condom use statements on a 5-point semantic scale (bad-good) from 1 (negative evaluation) to 5 (positive evaluation). A composite score was obtained by summing responses to items with higher composite scores indicating higher levels of motivation toward condom use ($\alpha = 0.90$).

Behavioral skills

Behavioral skills toward safer sex were assessed with seven items dealing with perceived self-efficacy to perform behaviors related to condom use. The answers are on a 5-point semantic scale ranging from very hard (1) to very easy (5) (e.g., "How hard would it be for you to consistently use condoms with a partner every time you have sex with?") (Bryan et al., 2000; Misovich et al., 1998). A composite score was obtained by summing responses to items with higher scores reflecting higher levels of behavioral skills for condom use ($\alpha = 0.86$).

Protected sex behavior

Protected sex behavior was assessed with three subscales measuring discussion of safer sex, condom accessibility, and condom use (Misovich et al., 1998), employed in a variety of safer versus riskier sexual practices. Safer sex discussion was measured with two items that if the respondent has discussed safer sex (condom use) with sexual partner(s) and if he has tried to persuade a sexual partner to practice safer sex using a condom ($\alpha = 0.73$), which were summed to create an indicator of safer sex discussion. Condom accessibility was assessed with two items asking respondents how often they have purchased condoms and the extent to which they have kept easily available ($\alpha = 0.86$), which were summed to create an indicator of condom accessibility. Condom use during sexual intercourse was assessed with four items asking respondents about their frequency of condom use during intercourse ($\alpha = 0.83$), which were summed to produce an indicator of condom use. The above three subscales were summed to form a composite score of safer sex behavior ($\alpha = 0.90$).

Analytic strategy

The Pearson's product moment correlation coefficient was used to determine whether pairs of factors are significantly associated with each other. In order to examine predictors of sexual behavior change, we adopted a set of nested linear regression models for the two primary outcomes of interest – reporting a change in self-efficacy and in sexual behavior in response to AIDS prevention. We used a conventional *p* value of 0.05 for these analyses. Descriptive statistics (frequency, percentage, mean, SD, and range) were also used to identify prevalence and levels of risky sexual behavior.

FINDINGS

Sample characteristics

Table 1 displays socio-demographic data for the sample. Nearly all men (98.7%) in the sample were ethnic Kinh, 84% were married, 73.8% followed one type of religion (Buddhism, catholic, and ancestor worship). Mobility was fairly high as most (63%) were born in rural areas. Almost 70% resided in urban centres before traveling to Hanoi. In the whole sample, 87% were migrants; the average number of cities for paid work was 2.4; and the average number of years in cities for paid works was 16.4. The mean age was 39 years and most had low levels of education (mean years completed = 8.19). The majority (almost 60%) were farmers when in their hometowns and the most common occupation in urban areas were motorbike driver (~65%), followed by manual laborer and construction worker, each contributing more than 10% of the total. The average monthly income was 2.6 million VND (equivalent to U.S. $140). Despite a fairly low level of alcohol consumption per drinking occasion, nearly all men consumed alcohol sometimes (over 90%). Level of access to HIV information was limited (M = 3; range = 0-9). Although level of depression was not high, its percentage was fairly prevalent (over 25%).

As can be seen in Table 2, there were deficits in HIV prevention knowledge. More than 70% incorrectly believed that condoms only need to be used with prostitutes. More than 50% incorrectly believed that once you trust your partner, you no longer need to use condoms with them, and many believed there is a cure for AIDS. Around 60% incorrectly believed that oral sex is just as risky as vaginal intercourse for transmitting the virus, and as many men believed that you can tell by looking at someone if they have HIV, and there is currently a vaccine that prevents AIDS. On a more positive note, over 98% knew that using condoms when you have sex can reduce the chance of getting HIV, and more than 86% did not believe that it is safe to use the same condom more than once.

Table 3 displays general patterns of risk sexual behaviors for HIV. Most participants (92.2%) reported that they were heterosexual, 5.6% were bi-sexual, and 2.2% were homosexual. The number of reported lifetime sexual partners ranged from 0 to 77 with a mean of 10 (SD = 7.5). Number of partners in the past year ranged from 0 to 20 with a mean of 3.2. Around 95% of the participants had sexual encounters with regular partners, one third with sex workers, and almost 25% with casual partners. Safer sex discussion with sex partners before having sex was fairly limited, with just over 50% of the participants saying that they talked about condom use. Access to condoms was also relatively limited – those reporting buying condoms and keeping a condom available were in the minority. Condom use among participants was inconsistent and with the proportions

Table 1. Selected socio-demographic characteristics.

Variable (N = 450)	n (%) Mean ± SD
Age (year, range = 18-59)	39.23 ± 10.29
Marital status	
Unmarried	46(10.2)
Married	378(84.0)
Separation/divorced/widowed/cohabitation	26(5.8)
Race	
Kinh	444(98.7)
Minors	6(1.3)
Religion	
Buddhism	116(25.8)
Catholic/Christian	9(2.0)
Ancestor worship	207(46.0)
None	118(26.2)
Education level (Class completed, range = 0-15)	8.19±2.52
Place of birth	
Urban	167(37)
Rural	283(63)
Place of residence before Hanoi	
Urban	314(69.8)
Rural	136(30.2)
Number of cities traveled for paid works	2.41 ± 2.68
Number of years in cities for paid works	16.36 ± 14.10
Mobility	392(87%)
Living with whom in urban area	
Alone	46(10.2)
Peers and friends	147(32.7)
Sex partners (wife, lovers, casual partners, sex workers and others)	202(44.9)
Family and relatives	55(12.2)
Main occupation during urban stay	
Manual laborer	55(12.2)
Construction worker and subcontractor	49(13.1)
Porter	29(6.4)
Motorbike driver	291(64.7)
Small trader	19(4.2)
Others	7(1.6)
Main occupation during hometown	
Farmer	263(58.5)
Construction worker	36(8.0)
Office staff and factory worker	40(8.9)
Militant	7(1.6)
Motorbike driver	55(12.2)
Student	19(4.2)
Unemployed	30(6.6)

Table 1. Contd.

Office staff and factory worker	40(8.9)
Militant	7(1.6)
Motorbike driver	55(12.2)
Student	19(4.2)
Unemployed	30(6.6)
Average income (million Vietnam dong, $USD1 = VND18,000; range = 0.09-12)	2.60 ± 1.30
Alcohol Use	
Level of consumption (0-28.50)	5.66 ± 4.83
Percentage	416(92.22)
Depression	
Level of depression (0-27)	6.65 ± 5.16
Percentage	113(25.11)
Access to AIDS Information (0-9)	3.01 ± 1.32

Table 2. Percentage and Level of Correct Responses to Knowledge of HIV/AIDS.

Variable (N = 450)	n (%) (correct response)	# of Correct responses	
		# of items	n (%)
Using condoms when you have sex can reduce the chance of getting HIV (true)	443(98.4)	1	4(0.9)
It is safe to use the same condom more than once (false)	389(86.4)	2	23(5.1)
Oral sex is just as risky as vaginal intercourse for transmitting HIV (false)	190(42.2)	3	44(9.8)
Condoms only need to be used with prostitutes (false)	127(28.2)	4	62(13.8)
Once you trust your partner, you don't need to use condoms with them (false)	129(48.6)	5	101(22.4)
It is safe to have sex without a condom if it's with your wife (false)	50(11.1)	6	85(18.9)
As long as both partners wash themselves after sex, it is not necessary to use condoms (false)	270(60.1)	7	79(17.5)
You can tell by looking at someone if they have HIV (false)	191(42.4)	8	30(6.7)
There is a vaccine that prevents AIDS (false)	171(38.0)	9	15(3.3)
There is a cure for AIDS (false)	207(46.0)	10	7(1.6)

being just under one third with regular partners and commercial sex workers and very low (17.6%) with casual partners.

The means, standard deviations and intercorrelations between key factors in the IMB model and depression are shown in Table 4. HIV knowledge was limited (M = 4.40; range = 1-10), whilst motivation, perceived behavioral skills, and preventive behavior were moderate. Mobility index had a minimal relationship with all other constructs. Depression was significantly negatively correlated with all constructs of the IMB model, while correlations among the IMB model constructs were significantly positive with one another.

Table 3. Prevalence and levels of sexual risk behaviors for HIV.

Variable	n (%) Mean ± SD
Sexual orientation (N=450)	
Sex only with men	10(2.2)
Sex only with women	415(92.2)
Sex with both men and women	25(5.6)
Age at first sex (N = 435) (range = 15-52)	22.46 ± 3.69
Types of sexual partners (N = 450)	
Regular partners (participants do not pay for sex)	427(94.9)
Commercial sex workers (participants pay for sex)	147(32.7)
Casual sex partners (participants do not pay for sex)	109(24.2)
Multiple sex relations (N=450)	
# of different partners (lifetime) (range = 0-77)	10.1 ± 7.54
# of different partners (past year) (range = 0-20)	3.17 ± 2.10
Safer sex discussion with sex partners before having sex (past year) (N = 435)	
Talking about condom use with sex partners before having sex	255(58.6)
Level of persuading condom use with sex partners before having sex (range=0-2)§	0.78 ± 0.70
Condom accessibility (past year) (N = 450)	
Level of buying a condom (range = 0-4)§	1.55 ± 1.10
Level of keeping a condom available (range = 0-4)§	1.81 ± 1.29
Condom use	
Last sex with regular partners (N = 426)	132(29.3)
Last sex with commercial workers (N = 149)	137(30.4)
Last sex with casual partners (N = 110)	79(17.6)
Level of past year condom use with regular partners (N = 427) (range = 0-4)§	1.26 ± 1.17
Level of past year condom use with commercial workers (N = 152) (range = 0-4)§	3.32 ± 1.10
Level of past year condom use with casual partners (N = 112) (range = 0-4)§	2.47 ± 1.42
Level of past year condom use with all sex partners (N =435) (range = 0-4)§	1.83 ± 1.04
Protected sex behavior (range = 0-26) (n = 450)	14.70 ± 6.24

§Range from 0 to 4 with higher scores indicating higher levels of the practice.

Table 5 presents the results of linear regression for predictors of the two primary outcomes - self-efficacy and sexual behavior. For both outcomes, the model accounted for the most percentage variance when a full set of variables were entered into the multiple linear regression. All the adjusted R^2's and models, except for models with mobility index added (data were not shown in the interest of space), were significant. Taken together, the three variables in the model of self-efficacy and four in the model of safer sexual behavior significantly best explained change in each of these behaviors.

DISCUSSION

The findings of this study revealed that Vietnamese men who are low-skilled, unregistered laborers are at risk of acquiring HIV given the prevalent patterns of sexual risk behaviors. The percentage of men who reported having intercourse with commercial sex workers (32.7%) is much higher than that among husbands of HIV-positive women (18.8%) (Mai et al., 2010), fishermen (18.9%) (Truyen, 2010), and prisoners (24.2%) (Chien, 2010), but lower than that among IDUs (68%) (Chieu and Tam, 2010), and male clients of FSW (39%) (Quyen et al., 2010). This proportion is also similar to reports among the Chinese migrants (31%) (Li et al., 2004), but is substantially higher than commercial sexual activity among indigenous rural Chinese (7.8%) in other studies (Liu et al., 1998).

In the present study, the number of lifetime and past year sexual partners, the percentage and level of condom use discussion and persuasion to take precautions with sexual partners also indicated higher levels of risk sexual behavior among freelance laborers. These results are consistent with data from other countries in both Asia and Africa (Lurie et al., 1997; Lurie et al., 2003a, b). The data showing inconsistent use of

condom with various kinds of sex partners among our sample is also in consort with that among other groups in Vietnam such as FSW (Nemoto et al., 2008; Tam et al., 2010), male sex workers (Lan et al., 2010), men who have sex with men (MSM) (Tuan et al., 2010a), male clients of FSW (Nguyen et al., 2010; Quyen et al., 2010), drug users (Chieu and Tam, 2010), prisoners (Chien, 2010), HIV-positive dyads (Mai et al., 2010), fishermen (Truyen, 2010), ethnic minorities (Tuan et al., 2010b), and youth (Thien and Ngoc, 2010).

With respect to migratory issues, Vietnam, like many other developing countries, is hosting an increasing number of migrants from rural to urban areas. Other research in Asia and Africa has shown that people who migrate for work are at increased risk for HIV (Coffee et al., 2007; Decosas and Adrien, 1997; Li et al., 2004). They often have higher infection rates than those who do not move. In this study, as most respondents (87%) were migrants, the effect was expected to be much higher. However, although bivariate correlation coefficients (Table 4) showed that mobility was negatively associated with some of the IMB model constructs, linear multivariate regression analysis revealed that the contribution of mobility index was not significant. This data appears in contrast with studies in China (Hu et al., 2006; Li et al., 2004), in India (Gupta et al., 2010), in South East Asia (Skeldon, 2008), and in Greece (Nikolopoulos et al., 2005), but in concert with studies in Africa (Lurie et al., 2003a, b).

An assessment of the elements included in the IMB model found that all of these constructs are associated with both primary outcomes of interest – self-efficacy and protected sexual behavior in this population. In particular, perceived low behavioral skills toward safer sexual behavior was associated with limited knowledge of HIV and low motivation. Sexual risk behavior was associated with low levels of HIV-related knowledge, of motivation and of self-reported low behavioral skills. This finding corresponds with data on other populations in developed and developing countries (Bryan et al., 2001; Cornman et al., 2007; Fisher and Fisher, 1998). An interesting note from this model is the minor contribution of HIV prevention information and perceived self-efficacy to sexual behavior. For instance, information explained just 2% (model 1a) and 6% (model 2a) in self-efficacy and sexual behavior, respectively, and self-efficacy explained just 3% (difference between model 2c and b) in sexual behavior (Table 5). This data appears to contradict with the original IMB model showing the moderate-to-close associations among all the constructs (Fisher and Fisher, 1998).

However, our data is congruent with the results revealed by Bryan et al. (2000). Responding to this data, we argue that there are two possible explanations for this slight relationship of information with self-efficacy and with sexual behavior. First is a lower level of HIV-related knowledge among the respondents, while the levels of motivation, self-efficacy, and safe sexual behavior are moderate or just over moderate (mean values in Table 4). Second would be actually the modest contribution of information to behavior change, whereas the contribution of motivation was the most substantial - 34% (difference between model 1b and a) and 21% (difference between model 2a and b) of the variance in self-efficacy and sexual behavior, respectively, explained by motivation (Table 5). This interpretation suggests that motivation be a robust predictor of behavior change; that is, respondents who are motivated for safer sex are more likely to alter sexual risk behavior, while information and self-efficacy are the weak predictors of behavioral change.

Another important data which deserves our special attention is a significant contribution of depression to behavior change. Our findings demonstrate that depression, as measured with the short form (ten key items) of CESDS, significantly contributed to explaining great variation in behaviors (self-efficacy and protected sexual behavior). Increased distress or depression is a good predictor of increased risk behaviors among male freelance laborers. Seven percent (difference between model 1c and b) and 20% (difference between model 2d and c) of the variance in self-efficacy and behavior toward safe sex, respectively, were explained by depression. Compared among all factors, depression had almost the same to motivation; such a factor had much greater effect size than information and self-efficacy. The multivariate analysis revealed that among the models the best prediction of sexual behavior change was the model that combines four factors - information, motivation, self-efficacy and depression. The model of three factors – information, motivation and depression (model 1c) accounted for 43% of the variance in self-efficacy; the model of four elements – information, motivation, self-efficacy and depression – explained 50% of the variance in sexual behavior.

These findings postulate that participants who are better informed, motivated, displayhigher behavioral skills, and less distressed are more likely to change sexual risk behavior.

This study is not without limitations. The cross-sectional nature of the design may preclude causality assessments. We are also subject to the usual limitations of self-report bias in measures of sexual behavior. Further research, ideally with an intervention or a longitudinal design is therefore needed to determine causal relationship among model elements as well as the effect of interventions on male freelance laborers' sexual behavior. To be effective, more prevention programs to the specific needs and vulnerabilities of these men should be applied. Besides improving HIV-related knowledge, there is a great need to enhance and foster motivation towards safer sexual behaviors. It is also important to find strategies that could reduce depression in order to allow for sexual risk behavior change.

Table 4. Bivariate correlates of key factors with protected sex behavior.

Variable (N=450)	Mean ± SD	1	2	3	4	5	6
1. Mobility index (range = 0-10)¥	0.36± 0.77	_					
2. Depression (range = 0-27)¥	6.65± 5.16	0.07	_				
3. HIV knowledge (range = 1-10)¥	4.40± 1.83	-0.02	-0.16**	_			
4. HIV motivation (range = 28-105)¥	82.16± 13.31	-0.17**	-0.33**	0.11*	_		
5. Behavioral skills (range = 7-35)¥	25.79 ± 5.20	-0.16**	-0.44**	0.15**	0.60***	_	
6. Safer sex behavior (range = 0-26)¥	14.70 ± 6.24	-0.03	-0.10*	0.12*	0.24***	0.16**	_

¥Ranges with higher scores indicate higher levels of the scale.

Table 5. Nested linear regression for predictors of self-efficacy and sexual behavior change.

	Information	Information motivation	Information motivation self-efficacy	Information motivation depression	Information motivation self-efficacy depression
Self-efficacy¶	Model 1a	Model 1b		Model 1c	
Adj. R^2	0.02***	0.36***	_	0.43***	_
Model fit	F**	F***		F***	
Safe Sexual Behavior¶	Model 2a	Model 2b	Model 2c		Model 2d
Adj. R^2	0.06*	0.27***	0.30***	_	0.50***
Model fit	F*	F***	F***		F***

¶dependent variables: self-efficacy for model 1 and protected sex for model 2; F means F-test for model fit. *p < 0.05; **p < 0.01; ***p < 0.001.

There is still an important step to be taken further once this study has accomplished. Qualitative interviews with male freelance workers, especially who have engaged in any of sexual risk behaviors, will help identify barriers to information, motivation, and self-efficacy change. Qualitative approaches also seek to explore how to reduce stressors and depressions, so behavior change would take place at ease. Understanding and utilization of the findings of this study should be the best practices that facilitate more effective HIV/AIDS prevention intervention programs among this population in Vietnam as well as in countries that have similar contexts.

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